People’s Republic of China: Provincial Development Strategies for Chongqing Municipality and Guizhou Province
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Prepared by Beijing SINOC Investment Consulting Co., Ltd.
For Guizhou Provincial Finance Bureau

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Executive Summary of the Final Report on Provincial Development Strategies for Chongqing Municipality and Guizhou Province
(Package T2, Guizhou Province)

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General Report:

Study on Development Strategies of Guizhou Province

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Executive Summary

1. Development status and problems

In terms of the level of socio-economic development, Guizhou is the least-developed province in China. In 2009, its GDP per capita, rural net income per capita and urbanization rate (i.e., 29.8%) is only 37%, 58% and 64% of the national average, respectively. Its public service (e.g., education and medical care) lags far behind in China (only 75% of the national average). The improvement of population quality has been slow because of the backward educational conditions in Guizhou. In 2009, the number of junior college diploma holders per 10,000 people in Guizhou is only half of the national average. Despite the rapid development of transport infrastructure since 2000, the overall conditions of roads in Guizhou, particularly at the county and township-level, still lag far behind the national average. In addition, Guizhou’s economic growth heavily relies on agriculture and traditional service sector, with a low degree of industrialization. The contribution rate of manufacturing industry to the GDP growth in Guizhou is low.

A series of reasons and difficulties have caused the slow development in Guizhou. First, the fragile natural resource basis has been overloaded by dense population. Guizhou features the most developed karst topography in the world, its mountains and hills account for 92.5% of the total land area. As a result, there are only 47 farmlands that individually larger than 10,000 mu (670 hectare) in the province. In addition, the problems of stony desertification are serious in the province (21% of the total area is stony desert). Second, the low quality of population in Guizhou was largely derived from its weak human resources basis. Constrained by the complex landscape, the scattered distribution of population has increased the cost of education. Inadequate investment in education has led to high percentage of illiterate and semiliterate among rural population. Third,
Guizhou has been ignored for a long time in China’s regional policies and macro-strategic development. Guizhou is located in a remote corner of the country, isolating from coastal lines, big rivers and international boundaries. As a result, it lacks national macro-strategic support (except for the poverty-relief programs) and has not benefited from the country’s reform and open-door policy.

Guizhou did not have a formal strategy for its industry development in the past ten years. To some extent, this has affected the speed of its industrialization and the contribution to Guizhou's overall economic growth. Natural resource endowment and path dependency have constrained the industry choice in Guizhou. The rapid development of energy and raw material industries (particularly coal, power, metallurgy, and chemical) in Guizhou has further intensified the structural conflicts in industry development. On the one hand, the weak development basis and insufficient job-creating capacity of modern manufacturing and small companies has affected the growth of people’s wealth and economic development. On the other hand, the increasing pressure from saving energy and reducing emissions has made it an urgent and arduous task to change the pattern of industry development.

2. Development environment and opportunity

When choosing development strategies for Guizhou, it needs to consider both the demands for and conditions of accelerating development in the province, as well as the evolving overall development phase and environment in the country. Only when these two considerations are organically integrated can a road towards scientific development be established. China now has entered new phases of development (i.e., middle and late phases of industrialization) after three decades of fast economic growth. Fast growth will gradually be replaced by steady growth and the change of development pattern will be a main theme for a long period. Pursuing “green” growth and “inclusive” growth are two important directions in the future.

Meanwhile, development opportunities are emerging in Guizhou. First, improving transport conditions will shorten the time and distance between Guizhou and major developed coastal regions. Five passenger railways (to connect Guangzhou, Changsha, Kunming, Chongqing and Chengdu) and many express ways are being built, or will be built, to access all counties in the province during the “Thirteenth Five-Year” period (2016-2020). This will change the province’s dilemma of remoteness and provide favorable conditions for receiving industrial immigration from coastal regions, and developing tourism, trade and other modern service industries. Second, with the change of national development phase and the increase of people’s income, high quality ecological environment will become a precious resource and product. This change will provide the “late-development advantage” for less-developed areas like Guizhou. Third, as China’s “demographic bonus” gradually runs out, Guizhou’s rich labor resources that characterized with various minorities will provide an important foundation to diversify economic developments in the province. In addition, Guizhou can take advantage of military industry, energy and mineral resources to accelerate its industrialization.
3. Strategic objectives

Guizhou needs to improve its development conditions and accelerate its economic development in the next ten years. According to optimistic estimate, the development gap between Guizhou and the national average would be remarkably narrowed in the “Twelfth Five-Year” period (2011-2015).

After a decade of hard work, Guizhou’s economic capacity would be greatly enhanced, people live a rich life, urban-rural relationships are basically balanced, and well-protected ecological environment becomes ideal place for life and work. By 2020, the socio-economic gap between Guizhou and the national average would be remarkably narrowed, basic public service reaches national average level, absolute poverty is eliminated, modern main road network and urban-rural transport system are developed, and the “green” economic system with distinctive characteristics is established. By 2020, the objective of building a moderately prosperous society would be basically achieved in the central Guizhou economic zone, surrounding around the capital city Guiyang. By 2025, the whole province would achieve the objective of building a moderately prosperous society. Major economic objectives that need to be achieved by 2020 include:

- GDP per capita: achieving 70% of the national average, 87% of the western region’s average;
- Average per capita disposable income for urban residents: achieving 85% of the national average, 95% of the western region’s average;
- Rural net income per capita: achieving 75% of the national average, 88% of the western region’s average; and
- Public expenditure per capita: achieving the national average.

Assume China’s annual GDP growth rate is 8% during the “Twelfth Five-Year” period (2011-2015) and 7% during the “Thirteenth Five-Year” period (2016-2020), to achieve the above-mentioned objectives Guizhou’s annual GDP growth rate needs to be 13% during the “Twelfth Five-Year” period and 12% during the “Thirteenth Five-Year” period. Namely, the total GDP should achieve 780 billion yuan (price at 2008 level, same below) in 2015 and 1375 billion yuan in 2020. To achieve such high GDP growth rate, the nominal annual growth rate of fixed asset investments in Guizhou should be around 23-25% during both the twelfth and the thirteenth “Five-Year” periods.

4. Strategy selection

The strategic ideas of promoting vigorously the industrialization and urbanization conform to not only the development stage of Guizhou, but also to the building a moderately prosperous society. However, currently Guizhou has concerned with the major projects and capital-intensive industries excessively, has not paid much attention to small enterprises that can provide more employment opportunities. Therefore, we believe, based on the existing strategy, Guozhou should choose the strategy of “rich people and strong province” for the future. That is, integrating internal and external resources of the province, putting people’s livelihood as the core, and focusing on green industrialization. This strategy should highlight the important roles of small companies (including micro companies) in the process of industrialization. It will take a decade to “reserving water to
breed fish,” setting up a large number of small and micro companies, and making breakthroughs in non-agricultural employment. Only through these activities can the driving force be created to sustain the industrialization and urbanization in Guizhou. On the other hand, Guizhou should also increase anti-poverty efforts, through increased investment, economic activities with local characteristics and private economy, enhancement of infrastructure, improvement of public services, and other measures, striving to eliminate absolute poverty basically in ten years.

4.1 The key of accelerating development in Guizhou is to promoting Newly-Industrializing progress vigorously, with guide to "green" concept

“Strengthening province through industrialization” will be the first choice for Guizhou in the immediate future, which means to accelerate socio-economic development through industrialization (i.e., increase non-agricultural employment). Facing the change of China’s development phase and the constraint of the province’s natural conditions, Guizhou must choose a new “green” path for industrialization rather than the existing extensive one. Here the “green” means not only ecological functions, but also a development path that focused on recycling economy, ecological economy, energy saving and emission reduction, and low-carbon industry.

First, energy and mineral resource development relies heavily on scientific and technological innovations. Energy saving, emission reduction and integrated resource utilization should be highlighted in economic development to ensure the ecological environment are well-protected. Second, making great efforts to promote and develop “green” industries. Guizhou should take advantage of the good aspects in climate, environment and culture to increase the proportion of “green industries” (include tourism and recreational industry, efficient ecological agriculture and biological industry) in the overall economic output. Third, building upon the military industry basis to further develop advanced equipment manufacturing sector that features low energy consumption per unit value, and establish a “low-carbon” economic system. Fourth, paying for ecosystem services should be lifted to a strategic height to create opportunities for the development of ecological services.

4.2 The core to accelerate the province’s development is to increasing employment opportunities and “enrich people”

To accelerate development in Guizhou, the province should “walk on both feet,” work with “both big and small companies,” and make full use of the role of “small companies in creating wealth for people”. On the one hand, priority should be given to big companies in energy, raw material and equipment manufacturing industries by launching the big companies fostering program. By supporting these large enterprises, the “ecological” level, integrated utilization of resources, and outputs from these industries will be increased. On the other hand, it needs to actively improve the investment environment, and increase the support for the “reserving water to breed fish” program. To achieve the objective of “creating wealth for people”, small companies and private enterprises (in areas such as: ecological agriculture, agricultural produce processing, tourism and recreation, and biological industry) need to be energetically supported to create job opportunities and increase resident’s income.

To achieve the objective of “creating wealth for people”, the traditional way of thinking –
relying on the government to implement large projects – needs to be changed to make full use of market’s leading role and government’s guiding role. Top priorities include: improving investment environment by “reserving water to breed fish” to attract investment, capital, technology and human resources, and promoting the development of private enterprises and small companies (including micro companies).

One of the purposes in developing small companies is to create large amount of employment opportunities, not just revenue. For less-developed provinces like Guizhou, in a certain period of time it should emphasize the function of small companies in creating jobs and wealth for people rather than their ability to increase revenue. Some policy initiatives such as tax reduction and exemption for small companies need to be adopted in the process of “reserving water to breed fish” to facilitate the rapid development of small companies in Guizhou.

In the traditional thinking of planned economy, developing large projects and big companies are important means in many areas to promote industrialization. However, past experiences indicate that in less-developed regions totally relying on the development of big companies will usually lead to a “dualistic structure.” On the one hand, big companies can quickly increase local GDP and revenue; but on the other hand, these big modern capital-intensive companies are not able to create a lot of jobs for people, hence reducing the opportunity to increase local resident’s income. In addition, those underdeveloped small and medium local companies did not provide supporting services for large enterprises, thus making it difficult to form efficient company groups. It is a dilemma that many western regions are facing. To overcome the dilemma, the development of small companies must go through the early phase of industrialization via a wide range of market means. Only when small companies have grown and thrived for a certain period of time can the local “industrial environment” be created to break down the “dualistic structure”.

4.3 Increasing investment as the basis to accelerate development in Guizhou

As the least-developed province in China, Guizhou deserves more care from the public nationwide, more attention in the national regional development strategy, and more support from the central government and other provinces. For years, the per capita fixed assets investment in Guizhou has been apparently lower than the national average. Since the province is still in the early phase of industrialization, investment has an immediate effect on economic growth. As a result, increasing fixed assets investment will be a major driving force to accelerate economic development in Guizhou.

Only when external support and self-efforts are closely combined can Guizhou accelerate its development. On the one hand, the central government should give the province more state investments and projects and launch all-round province-to-province aiding programs to increase investment in Guizhou, so that the per capita fixed assets investment of the province can reach or exceed the national average. On the other hand, the province should capture the opportunity in the national division of main function zones and the national poverty relief campaign in large stretches of poverty-stricken areas, and use the support from the central government to remarkably improve the development conditions and basic public services in less-developed areas of the province.
4.4 Guizhou needs “centralized” and “decentralized” spatial strategies to accelerate development

Guizhou should promote “green” industrialization to accelerate development. Spatial layout should be well arranged while the relationship between development and environment well handled for scientific development. Firstly, the main part of industrial development in Guizhou (particularly the energy, heavy, chemical and equipment manufacturing industries) should be deployed in the central area of the province as well as Liupanshui-Bijie and Zunyi, where recycling economic parks for heavy and chemical industries should be built so that high-polluting companies are gathered to form industrial chains of recycling economy, share pollution controlling facilities, minimize the impact of resources-intensive industry upon the ecological environment, and realize “greenized” development. Secondly, the large number of small companies, which is needed for the goal of “enriching people” should be deployed according to the “decentralized centralization” principle, meaning every county (and key township) should have industrial parks for small companies. The need of small companies, instead of their scale and level, should be the focus. Of course, economic parks for small companies should be up to the environmental standards, and the government will be responsible for making public facilities environment-friendly.

4.5 Pay more attention to solving the problem of poverty to accelerate development in Guizhou

Guizhou is one of the provinces in China with the largest number, the largest area and the highest level of poverty. Without these 50 state poverty counties getting rid of poverty, there will be no the all-round well-off society of Guizhou. On the one hand, broken landform conditions (karst) led that more farmland is on hill slopes, erosion is serious, natural disasters are frequent, farmland is infertile. And the agricultural basis is vulnerable. On the other hand, the problem of the poor in Guizhou also related to the long-term lack of investment and the historical issue of public services. In poverty counties, there were common problems such as difficult roads, difficulties for the children to go to nurseries, the shortage of drinking water for people, difficulty of getting medical service, bad communications and so on. Hence, the strategy “Antipoverty” in Guizhou should focus on production capacity and characteristic economic development, also on the proportion of supportive funds set by the Central Government and improving the level of public services.

5. Strategic measures

Guizhou is one of the most difficult provinces in China to build a moderately prosperous society in an all-round way. Based on Guizhou’s existing development basis and capacity, it will be very hard to achieve the development objectives that mentioned in this report, namely, by 2020 its GDP per capita achieving 70% of the national average. Therefore, the province needs the support from both the central government and the public to accelerate its development. Only when the internal and external forces are combined can the province catch up with the national pace in building a moderately prosperous society in an all-round way.

5.1 Seeking central government support

Without resolving the problems in Guizhou, it will be difficult for the whole nation to achieve the objective of building a moderately prosperous society. Now it is time for the central government to
pay more attention to the less-development problem in Guizhou. Special support should be given to the province to accelerate its development.

Some concrete measures include: to launch assistance schemes from central enterprises, namely, large central enterprises under the administration of the State-owned Assets Supervision and Administration Commission of the State Council (SASAC) to help developing nationally-poor counties in the province; to set up “growth pole” enterprises in Guizhou, particularly in deploying projects of civil-used small airplane that with less than 30 seats; to launch poverty relief program for large stretches of poverty-stricken areas; and to organize the development planning for “central Guizhou economic zone” to create “growth pole” in the province.

5.2 Implementing important measures in Guizhou

- **“Reserving water to breed fish” program.** In large stretches of poverty-stricken areas in Guizhou, business registration fee, income tax, and value-added tax should be exempted for non-pollution small companies with less than ten employees, so as to remarkably decrease the setup and operation costs of small companies. At the same time, it needs to change the mindset and conception and shift government’s function from administration to service provision; a “high-voltage wire” should be set up to forbid related governmental employees to “eat, take, block, and ask.”

- **Establishing recycling economy and industrial parks.** Province-wide industrial parks and development zones should be established according to recycling economy and ecological design. Recycling industrial demonstration parks or industrial function zones should be built through ecological link of the industrial chain, integrated utilization of resources, intensive utilization of land, recycling of reclaimed water, centralized treatment and recycling of wastes, and energy-sharing mechanism for heating and power facilities.

- **Creating distinctive agricultural product brands.** Policy support will be given to develop famous, high-quality and distinctive agricultural products and create distinctive agricultural product brands. Efforts for quality certification of agricultural products need to be strengthened. Great importance will be given to the certification of pollution-free food, green food, organic food and products marked by geographic characteristics. Trademark registration and brand integration of famous, high-quality and distinctive agricultural products need to be encouraged and supported.

- **Building up small towns with characteristics.** First, it needs to highlight the advantages when creating strong towns that rely on industrial development. Second, it needs to highlight the characteristics when creating culturally strong towns that feature ethnic culture and tradition. Third, it needs to highlight the favorite tourism and climate resources when creating tourist strong towns that rely on the development of recreational and resort industries.

- **Developing rural training programs.** Training programs, focusing on modern citizen awareness and work skills, will be extensively promoted for rural labor forces. Establishing a number of rural labor transfer training bases, and insisting to combine the establishment of farmer training bases with employment service bases. Agricultural science and education will continue to be combined in setting up practical training bases in rural areas (by joint promotion of agricultural science and technology, technological
development, education and training).

- **The planning of ten-year poverty alleviation.** Guizhou provincial government should establish the special transfer payment and policy transfer payment systems. It should innovate in the mechanism of integrating the funds, support at county level to clear, sort and integrate the funds particularly used for agriculture, and use it together without change in the original purposes of funds. It should actively establish rural cooperative banks, village/town (township) banks, micro-finance companies, rural mutual funding cooperatives, and other new financial organizations in the 50 counties. It should encourage and support banks to establish branches at county levels and establish a long-term system to provide loans to small enterprises and micro-loans to rural households.
Sub-report 1:

**Study on Strategies of Promoting Industrialization in Guizhou Province**

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**Executive Summary**

Industrialization is an important phase of development for a country or region. Guizhou must stress the industrialization process in its economic development. This report has mainly analyzed the development phases, threats, challenges, strengths and opportunities of industrialization in Guizhou. Based on this analysis, we have proposed basic ideas and future goals for promoting industrialization, and related industrialization strategies and policy measures for the implementation in Guizhou.

1. Development phases and status analysis

Development economists regard the essence of “industrialization” as a process of constantly improving productivity with four main indicators (i.e., improvement of per capita GDP or labor productivity; increase of the ratio of secondary and tertiary industries in total GDP; transfer of labor forces from agricultural sector to non-agricultural sectors; and decrease of the ratio of primary products). US economist H Chenery studied the industrialization of countries around the world and divided it into three phases (i.e., early, middle and late). This report has analyzed and assessed the phases of industrialization in Guizhou based on the indicative values of different industrialization phases from both international and domestic experiences.

Guizhou’s per capita GDP in 2009 was 10258 RMB (or US$1502 by the exchange rate of the same year), which is lower than the marginal value ($1540) of the starting and early phases of industrialization (i.e., Guizhou is still at the late stage of the starting phase of industrialization). However, if calculated with PPP, Guizhou’s per capita GDP in 2009 was $2565, which is already in the early phase of industrialization. Realizing these two calculation methods are relatively either
high or low in evaluating GDP, we took the average of these two figures and got $2033. This means Guizhou is approaching the middle stage ($2310) of early phase of industrialization.

The output value ratio of three industries in Guizhou is 14.2: 37.9: 47.9. As the percentage of primary industry is lower than 20% but higher than 10%, it means industrialization is at the middle phase. Taking into account the actual situations in China and Guizhou, however, the percentage of secondary and tertiary industries did not accurately reflect the phase of regional industrialization in Guizhou. In 2009, the location quotient of tertiary industry in Guizhou compared with the whole country is 1.17, lower than that of the primary industry (1.46). This means that compared with tertiary industry, primary industry (agriculture) has provided a much stronger support for the province. The output from secondary industry in Guizhou is only 0.8% of the country, and compared with GDP the location quotient is only 0.74%, which indicates that Guizhou’s industry development lags far behind in China. The increase of the tertiary industry ratio in Guizhou doesn’t mean that Guizhou has entered into a higher phase of industrialization; it should be explained by the slow development of the secondary industry in the province.

Primary industry sector employed 16.264 million people, accounting for 70% of Guizhou’s total population. The average productivity and marginal productivity of primary industry in Guizhou are the lowest, only 3406RMB and 52764RMB, accounting for 20.3% and 54.8% of the province’s average and marginal productivity, respectively. Secondary industry has the highest productivity among three industry sectors. Its average labor productivity is 64466RMB, which is 3.8 times of the provincial total, 19 times of the primary industry, and 61.5% higher than the tertiary industry productivity. The marginal productivity of the secondary industry is 241779 RMB, which is 2.5 times of the provincial total, 4.6 times of the primary industry, and 3.7 times of the tertiary industry, respectively. The productivity of Guizhou’s three industry sectors differs tremendously, which indicates the transfer of labor force from primary industry to secondary and tertiary industries (in particular to the secondary industry) shall be the precondition and priority of the productivity improvement in Guizhou. The extremely large agricultural population and the big productivity gap between different industries have demonstrated the characteristics of emerging phase of industrialization in Guizhou.

Mining and energy industries account for 14.60% and 22.10%, respectively, of Guizhou’s total industrial output. These two industries account for 36.70%, while the ratio of these two industries to the whole nation during the same year is only 19.12% (which shows Guizhou’s industries highly depend on raw materials and resources). This is an obvious feature of the early phase of industrialization.

Based on both international and domestic experience and judged by using GDP per capita, output value ratio of three industries, agriculture population ratio and industrial internal structure, it is concluded that Guizhou is at the first half of early phase of industrialization and has a long way to go to realizing industrialization.

The lagging behind of Guizhou’s industrialization has led to its decreasing share in national and western region industry. The ratio of Guizhou’s industry output value to total national output value
decreased from 0.75% in 2000 to 0.65% in 2009, the ratio of Guizhou’s industry output value to total western region output value decreased from 6.44% to 4.90%. The critical issue in Guizhou is lack of industrial input that affects further development. In 2009, Guizhou’s industrial investment only increased 14.9%, while the country increased 25%, and neighboring provinces of Sichuan, Hunan, Chongqing, Guangxi and Yunnan increased 46.4%, 36.8%, 31.7%, 30% and 18.8%, respectively. Should the present situation cannot be reversed, the gap between Guizhou and national industrialization will be further widened, and Guizhou will be further marginalized in regional development.

Guizhou has been slow in the industrialization process for a number of reasons. Apart from objective reasons such as backwardness of agriculture, terrain of mountainous area, stony desertification, low urbanization rate and lack of infrastructure etc., the industry itself also has serious problems. Guizhou relies heavily on resources and lacks capacity for innovation, which are common in less-developed regions. The province also faces some unique problems such as relying heavily on national input and decreasing advantage in labour cost.

In 2009, state-owned industries in Guizhou account for 61.1%, which ranked top five in China. Weak driving force in Guizhou’s industrialization, low capacity of industry support, lack of industrial chain, backwardness of processing industry and low value-adding, etc. are all directly related to lack of private sector business development. Labor cost advantage in Guizhou began to weaken from 2004. Guizhou’s average salary in 2004 was 22.4% lower than national level and 10.7% lower than western regions, respectively. In 2008, it was only 15.8% lower than national level and 3.9% lower than western regions, respectively. As a result, Guizhou’s investment attractiveness has decreased and therefore disadvantaged the labour-intensive industry sectors, making it difficult to transfer from resource and raw material industry to processing and assembly industry. To improve the attractiveness for investment, Guizhou needs to make efforts to improve the soft environment for investment.

However, Guizhou has a lot of advantages and favorable conditions for further industrialization, such as rich resources, solid industrial and technical foundation, strong policy support for “Go West Campaign”, abundant domestic and foreign production factors, and the speeding up of industrial development in western regions.

Guizhou has obvious advantages and profound potentials in resources, minerals and biological resource development in western regions of China. Relevant materials show that Guizhou’s existing coal reserves account for 4.47% of the national total and ranks fifth in China, which are much higher than the total of twelve southern provinces and 75.67% of the reserves have not been used yet. The proven reserves of coal-bed gas is about 200 billion cubic meters (accounting for 22% of national total) and ranks second in China, with almost nothing has been developed. The total developable water hydro-energy resources is 16.83 million KW, ranking sixth in China, of which developable medium and small water hydro-energy resources is 6.74 million KW, ranking fourth in China. The total power installation capacity was 21.35 million KW by the end of 2008. In 2007, total power generation accounts for 3.56% of national total and coal output accounts for 4.3% of national total. This has provided the basic conditions to build Guizhou as an energy base
for southern China and further develop its resource industry.

Energy development with a focus on the “west-to-east electricity transmission project” and raw material development with a focus on coal and coal chemical industry, phosphorus and phosphorus chemical industry, aluminum and aluminum chemical industry, and steel and iron alloy ect., have provided a solid foundation for building Guizhou as an important resources and raw material base in southern China. The construction of industrial belt with a focus on three military industry bases and high-tech industry parks will further promote the development of Guizhou’s equipment manufacturing industry and high-tech industry. The development and expansion of industries like cigarette, wine, tourism, feature foods and local traditional medicine will have positive effects on the formation of unique local economies.

In the next ten years, China will further promote the building of a moderately prosperous society and strengthen the support for western regions, which will definitely provide more opportunities for industry development in Guizhou and create a favorable environment for winning over more national policy support. Guizhou needs to firmly seize this national campaign opportunity to establish “four bases” in western China, select key fields and projects, in particular to extend the industrial chain around the competitive resources and develop new strategic industries that based on the economic and technological basis. By doing so, Guizhou tries to win more national support for the western region construction, making Guizhou the national priority region, key region, or even model region in the construction of “four bases” in western China. At the same time, Guizhou needs to take advantage of the policy on “Go West Campaign” that listing “central Guizhou economic zone” in the new round of key development areas, and making it a core growth pole in driving Guizhou’s industrialization and urbanization.

Global financial crisis has made international markets shrinking. It is now more urgent to speed up economic structure adjustment and upgrading in eastern regions of China, especially the coastal developed regions. At the same time, there will be faster integration of productive factors and optimized allocation of resources at a large scale. Some manufacturing and processing industries need to be relocated to regions with resource advantages. The national strategy of boosting domestic demand will also bring more investment, talent human resources and enterprises to the outback of China. Guizhou’s resource advantages and solid industry basis will make it easier to attract and transfer industries from eastern regions, and fully implement the strategy of building strong industry in Guizhou, which will create opportunities and conditions for upgrading traditional industry, strengthening pillar industry and fostering new industries.

2. Strategic thinking and target setting

Industrialization in Guizhou needs to take the concept of scientific development as the guidance, economic transformation and structure upgrading as the main line, human resources development as the key, and emphasize the increase of industrial scale, efficiency and effectiveness to ensure that its industrialization will enter the middle phase and the development gap between Guizhou and other regions of China will be narrowed by 2020.

The main task of Guizhou’s industrialization is to expand industrial scale (including mainly scales of employment, capital and value) during the process of transforming development pattern. By
expanding industry scale, Guizhou can realize the upgrading of growth pattern from mainly relying on agriculture and traditional service industry to mainly relying on industry and production service industry. Under national background of accelerating development pattern transformation, industrialization in Guizhou can no longer stick to the old extensive development pattern; it must shift to a new development pattern that is resource conservative and environment friendly. At the same time, it must constantly improve industrial quality and benefits by expanding industrial scale to develop a sustainable industrialization pattern that is ecological friendly, low carbon and highly efficient.

According to international experience and the “recipient regions” standard of European Union, concrete targets of “narrowing the per capita GDP gap between Guizhou and other regions of China” include: by 2020 Guizhou’s per capita GDP will achieve 75% of the national average. Based on national projection on per capita GDP growth for the next decade, it was estimated that by 2020 Guizhou’s per capita GDP will achieve 40803RMB (by 2009 constant price, the same hereinafter), and correspondingly Guizhou’s industrialization will enter the middle phase. This target is 260% increase from 2010. Taking into account the acceleration factor in industrialization, the per capita GDP target has been adjusted to 55% of the national average (i.e., 20,963RMB) by 2015. To achieve this target (based on growing rate of per capita GDP), Guizhou needs to keep an average annual growth rate of 13.5%, in the next ten years, and an average annual growth rate of 12.8% during the “Twelfth Five-Year” period (2011-2015).

According to the middle-phase industrialization target, the growth speed of Guizhou’s industry must be faster than that of the tertiary industry. By 2020, added value of secondary industry will account for over 50% of the gross regional products. Accordingly, added value of primary industry will decrease to around 10%. Taking into account the acceleration factor in industrialization, the targeted ratio for secondary industry will increase to around 42.5% by 2015. The ratio of employment in agricultural sector will reduce to 45% by 2020. Agricultural production conditions are poor in Guizhou. In addition to industrialization and urbanization, Guizhou needs to emphasize the important means of emigrating extra labor forces to other provinces to reduce the ratio of agricultural employment in the province.

To achieve the industrialization targets, Guizhou has to take two strategic steps to achieve its internal industrial structure adjustment in the next decade. The first step is to build upon existing resource industry basis, enlarge industrial scale, and develop more resources to increase the proportion of manufacture during the “Twelfth Five-Year” period. The second step is to improve the proportion of processing and assembly industry, especially the proportion of labor-intensive industry during the “Thirteenth Five-Year” period. The target is, by 2020, to achieve a higher proportion of processing and assembly industry than that of raw material industry and become less-dependent on natural resources.

3. Implementation strategies and measures

To achieve the industrialization targets in Guizhou, six strategies and a series of supporting measures and policies are recommended for the next ten years.
Strategy 1 – Developing a green-oriented heavy industry. Guizhou has a solid heavy industry basis (eg, energy and raw material industries like electricity, coal and steel). Improving the competitiveness of these industries and making the heavy chemical industry bigger and stronger are the necessary choice for industrialization in Guizhou. However, large scale resources exploration will further threaten the fragile ecological environment in Guizhou. Therefore, Guizhou must protect the ecological environment by developing a green-oriented heavy industry. First, further improve the exploration of natural resources in heavy industry with less resource wasted. Second, improve and strictly implement the ecological evaluation criteria for heavy industry projects and ban those projects that have major or potential impacts on the ecological environment. Third, centralize the production capacity of heavy chemical industries within industry parks, and reduce waste of land resources to increase benefits from agglomerative economy. Fourth, innovate traditional energy and raw material industries by using modern technologies and improve their capacities in energy saving, emission reduction and eco-environmental protection.

Strategy 2 – Extending dominant industrial chain. Guizhou’s industrial structure has been dominated by resource-intensive industries with small economic and employment scales. Energy, raw material and characteristic agriculture products with low-processing rate are major products that involved in inter-regional and international trade. Guizhou’s dominant industries are mainly at the bottom of the “smiling curve” from the value aspect, which makes it very difficult to improve from present situation. Therefore, it must implement a strategy of extending dominant industrial chain to increase industrial scale and profitability. First, promote the vertical chain extension of raw material industries (eg, electricity and mining) and characteristic agricultural products industry; develop downstream industry chain such as mineral processing, appliance manufacturing and agricultural products deep-processing; improve conversion rate of local resources and realize the transformation from “selling resources” to “selling processed products”. Second, increase the scale and grade of related industry chains (including research and development on advanced technology, products design, wholesale and retail, etc.), so that the main industrial chain would extend along the two ends of the “smiling curve” and form a compete industrial chain. Third, promote the horizontal chain extension of dominant industries and improve the coordination among different industries, especially the finance, insurance, advertisement and logistics that are essential to link production service industries.

Strategy 3 – Facilitating industrial upgrade and transition. Currently, there is a new round of transferring labor-, resource- and capital-intensive industries from eastern coastal regions to middle and western regions in China. To improve its industrial and economic benefits, Guizhou should seize the opportunity of industrial reorganization and take advantage of natural resources, human resources and certain brand resources to attract more enterprises into Guizhou. First, improve soft and hard conditions in industrial parks to create an appropriate environment to accommodate the transferred industries. Second, optimize the investment environment, improve government service efficiency and shorten the period of industry transfer. Third, publicize encouraged or limited transfer industries (with a focus on dominant and potentially competitive industries); encourage the transfer of industries that match regional advantages but lack driving forces; strictly control the transfer of industries that have high pollution, outdated technology and
excessive production capacity. Fourth, improve communication and cooperation with governments and enterprises of eastern regions and establish efficient mechanisms for fair information sharing and beneficial industrial exchange.

Strategy 4 – Developing circulation economy. Circulation economy aims at resolving contradictions between required economic development and limited resource and environmental capacity. With joint efforts of government, enterprise and regional community, the concept of circulation economy can be applied in production, distribution, consumption and recirculation. Circulation economy can be implemented at different levels (enterprises, industrial parks and regional communities) to realize beneficial interactions between economic development and industrialization process. Thus, it will form a circulation economy development model with Guizhou characteristics and transform Guizhou into a resource conservative and environmental friendly province with harmonized development between economy and environment, and human and nature. First, promote circulation industry and clean production. Paper manufacture, printing and dyeing, dye chemical, building materials and thermal-power enterprises will be treated as key facilities for clean production and auditing. All economic development zones and industrial parks will be required for ecological structure transformation to establish waste exchange system and closed-recycling system. Second, accelerate research and development on agricultural pollutant reduction and resource utilization. Third, actively develop circulation service industry. Fourth, based on the geographic features (land resources are mainly mountains and hills with few flatlands), Guizhou should positively revitalize the use of existing land resources to improve its level of intensive use. Fifth, foster waste recirculation use industry. Sixth, develop conservation-minded governments, communities and schools.

Strategy 5 – Developing large enterprises that based on military industrial enterprises and state-owned enterprises. Up to now, state-owned enterprises (SOEs) are still playing a key role in Guizhou’s industrial system, especially some military industrial enterprises with strong scientific and technological innovative capability that have laid a solid foundation for industrialization in Guizhou. The main challenge for Guizhou is how to implement the large enterprise strategy to enhance the coordination and interaction between large SOEs/military industrial enterprises and local medium/small enterprises. For this purpose it needs to carry out following activities. First, continue to provide good regional environment for the development of large SOEs and military industrial enterprises (at least preventing them transfer to other provinces). Second, urge large SOEs and military industrial enterprises to develop and produce new civil products that integrate Guizhou’s comparative advantages and meet local demand, with a view to increasing market exploration capability of Guizhou’s industries. Third, enhance cooperation between large SOEs/military industrial enterprises and local small/medium enterprises and encourage bidirectional flow of elements between them (eg, human resources, capital, technology, etc.) to promote the leading role of large enterprises to small/medium enterprises and extend the cooperation networks among them.

Strategy 6 – Amalgamating small and medium private enterprises. There have great similarities between Guizhou Province and Zhejiang Province (the cradle land of “block economy”): strong motivation of farmers to engage in non-agricultural activities under severe
agricultural production conditions, and limited space to amalgamate small and medium private enterprises in mountain areas with few flatlands. Therefore, it is important for Guizhou to learn from Zhejiang’s experience in the amalgamation of small and medium private enterprises. However, as Guizhou lacks the convenient location to access external markets and the enterprising spirit that Zhejiang Province have enjoyed, it means Guizhou’s government has to play an important role in the amalgamation of small and medium private enterprises. For this purpose it needs to carry out following activities. First, encourage entrepreneurs to develop more small and medium enterprises. Second, actively assist small and medium private enterprises to explore domestic and international markets (especially taking advantage of large SOEs in Guizhou) and encourage large SOEs to offer subcontracts and procurement orders to small and medium private enterprises. Third, encourage small and medium private enterprises moving towards advanced industrial districts to form the industrial amalgamation.

To ensure the implementation of the above six strategies, the following corresponding measures and policies need to be established.

1. Establishing a large social service system. First, promote the development of production service industry, especially the information and logistic sectors, to increase the integration of secondary and tertiary industries and the industrial coordination capability. Specific measures like tax reduction or tax exemption can be put in place to vigorously support the development of those highly-demanded types of service industries. Second, enhance the scientific and technological service systems. Under current situation in China, scientific and technological service is featured as a quasi-public resource. Promoting communication and cooperation between scientific research institutions, large SOEs and other enterprises will advance the research, development and transformation of applied science and technology, which is of great importance for the development of small and medium enterprises. Third, continuously increase the public service efficiency, improve governmental functions, and establish an enforceable legal system to support industrial development.

2. Strengthening modern industrial infrastructure development. First, strengthen infrastructure development in industrial parks (including planning, layout adjustment, transport, communication, water, power, and gas network infrastructure) and promote the construction of standard factories to increase use efficiency of land and capital in industrial parks. Second, strengthen two weak links (ie, transport and water conservancy) to enhance Guizhou’s overall level of infrastructure construction. In transport, implement the highway network planning of “six horizontal, seven vertical, eight connection and eight lateral highways” and the airport planning of “one main line and ten feeding lines”; in water conservancy, solve the problem of water shortage through the development of a series of water conservancy projects. Third, accelerate information network construction, increase information technology coverage, and promote the integration of telecom network, internet and broadcasting and television network to provide smooth, efficient and low cost information service for the industrial development in Guizhou.

3. Improving investment and financing systems to facilitate industrialization. First, diversify investment and financing channels (eg, domestic and overseas aiding funds and poverty
alleviation funds) to ensure continuous capital input and attract domestic and international financial institutions to set up more branches in Guizhou, establish government agencies to provide initiating and financing guidance for the development of small and medium enterprises, and help those enterprises with great growth potentials to raise funds on domestic and overseas stock markets. Second, ensure the investment and financing systems are oriented to serving industrialization, and strengthen capital supervision of those enterprises that have received aiding funds and politically favorable loans to prevent over-concentration of capital in non-industrial areas such as real estate. Third, provide an investment and financing platform that suits industrial development features (especially for transport infrastructure development) to create the essential conditions for the smooth progress of industrialization in Guizhou.

4. Vigorously attracting and retaining external talents. In order to effectively attract highly-demanded talents for industrialization, it is suggested to set up a provincial level Talents Attraction Team and a Special Office to recruit high-end talents and develop related policies. At the same time, specific funds should be allocated from the province’s budget to provide guarantee (eg, housing, salary and professional title) and incentive (eg, research funding for key projects) for those high-end talents.

5. Continuously deepening innovation and open-door policies. It needs to accelerate the “dry port” construction in Guizhou to make Guiyang City as a transport hub during the “Twelfth Five-Year” period (2011-2015) and complete the land and water transport connection by collaborating with coastal port cities in southeast China and upgrading existing transport system of airlines, railways and roads. In this way, the economic distance between Guizhou and eastern China as well as overseas markets will be reduced and the level of openness will be enhanced. It also needs to establish bond and logistics parks around transport hubs, export-oriented processing parks in Economic and Technological Development Zones and comprehensive bonded zones in Central Guizhou Economic Zone. The establishment of these open-up platforms will boost economic development and accelerate industrialization in Guizhou.

6. Soliciting for favorable national policy support. First, lower the admittance standards to an appropriate extent for industrial development in Guizhou. The Central Government can categorize Guizhou Province into favorable policy-protected areas that allow to lower admittance standards of heavy chemical industrial programs in terms of product structure, energy saving and emission reduction. This will facilitate the transferring of industrial production capacities in other regions of China to concentrate in Guizhou. Second, in the distribution of emerging strategic industries of national significance, Guizhou needs more attention and support to upgrade its industrial structure and accelerate the formation of modern industrial systems (eg, new energy and material, high-end manufacture, biological medicine). Third, adopt the poverty alleviation model used in Tibet and Xinjiang to enhance the degree of assistance for Guizhou from developed regions of China. For a long period, Guizhou’s average per capita GDP is the lowest among 31 provinces and municipalities that governed directly under the Central Government and autonomous regions of China. Many development indexes are lower than that of Tibet and Xinjiang, the existence and development conditions are extremely severe in some regions of Guizhou, and large number of ethnic minorities have inhabited in the province. All of these factors have huge impacts on
economic development and directly relate to the goal of realizing a relatively well-off and harmonious society in China. Therefore, specific attention and support from the Central Government of China are needed to support and accelerate the economic development and industrialization in Guizhou Province.
Sub-report 2:

Study on Urbanization Development Strategy for Guizhou Province

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Executive Summary

Urbanization level is an important indicator of the level of economic and social development in a region. In the historical period of overall transformation of China's economic and social development, Guizhou province is facing a development opportunity that economic and social development turns from the "good and fast" to "better and faster", and to speed up the development of urbanization in Guizhou province become an inevitable choice in the next five years or longer.

Guizhou has a pleasant climate, a significant advantage of characteristic agriculture, and is rich in natural resources and vegetation. But Guizhou also have vast mountains and scarce farmland, limited available land resources and fragile ecosystems.

Guizhou achieved a rapid economic development after the reform and opening. But compared with other parts of the country, it has a relatively low level of economic development. Per capita GDP in 2009 in Guizhou province has exceed 10 thousands, up to 10,309 Yuan, but it is still the lowest in the country. At the same time, the province's economic and social development is uneven and contributions to the economy aggregate are mainly from Guiyang and Zunyi. At present, industry and population in Guizhou is still agglomerated around the city of Guiyang.

Constrained by natural conditions and slow economic development and industrialization, the urbanization process in Guizhou Province has been slow. In 2009, Guizhou's urbanization rate has reached 29.9%, but still lower than the national average of 16.6%, the gap between the country's urbanization rates is constantly widening. The number of cities and towns is limited, city hierarchical level is not high, urbanization level is low, and secondary and tertiary industries is insufficient. In particular the support and promotion capacity of industrialization to urbanization is weak. All these facts bring limited space for urban development and employment, coupled with
the urban social security system is in phase of reform, leading to weak migration inside the province and lack of motivation to promote urbanization. At the same time, due to the immature structure of the existing urban system, unformed urban agglomeration, lack of core regional growth pole and shortage of support for characteristic cities, it is difficult for cities to have a radiation effect on regional economic and social development.

From point of view of the development stage of urbanization, Guizhou has come into the accelerated development stage of urbanization since 2009. The current stage of social development in Guizhou belongs to two different stages of transition. One type consists four designated cities whose urbanization level is more than 30%, and is represented by Guiyang. Their social development is undertaking the stage of transition from the subsistence type to the well-off living pattern, also it is in the persistently accelerated mid stage of urbanization. The other type consists any other regions and states whose urbanization level is less than 30 percent, and their social development is in the stage of transition from poor type to subsistence type, it is also in the initially accelerated mid stage of urbanization. At the same time, Guizhou is in the stage of urbanization characterized by the concentration of population as the main driving force, and it needs state government to support in order to accelerate the process of urbanization.

There are opportunities and challenges in the process of urbanization in Guizhou province. First of all, competitions between domestic regions are more and more serious; various contradictions will affect improvement of regions’ international competitiveness. In recent years, economic integration of Yangtze River Delta and Pearl River Delta are significantly enhanced, and the concept of "Pan-Pearl River Delta" proposed expands the effect of Pearl River Delta. In the long run, the internal provinces will face ever increasing pressure of competition. In addition, the pressure of urbanization and economic development thrown by Chengdu-Chongqing urban agglomeration to Guizhou has become more significant. At the same time, resource and environmental constraints are increasingly confining Guizhou’s urbanization, while the main-function-zoning to some extent enlarged the constraints. According to the main-function-zoning, most of Guizhou province was included in the "limited development areas" and "banned development areas". It will conducive to ecological protection on the one hand, but on the other hand it affects the normal industrial growth and upgrading, and brings constraints to the development of urbanization in Guizhou.

Accordingly, Guizhou’s urbanization should be based on the mountainous situation of the province. Make great efforts to optimize the distribution of urban space, do a good job in urban construction planning, strengthen the industry support, improve the overall carrying capacity of cities and towns, make innovations in the system and mechanisms, and strengthen the urban management, take a distinctive, intensive, diversified and green urbanization road of Guizhou mountainous area, and promote the sound and rapid development of the economy.

Promoting Guizhou urbanization development needs to rely on two main strategies, the leaping strategy and the sustainable strategy.

The leaping strategy is a leaping and short-term strategy. With a low level of economic development and urbanization, making the province strong through rapid urbanization
development boosted by industrialization is the dream of every Guizhou citizen. According to the urbanization history of different countries in the world, urban agglomeration is an important spatial carrier, but there is no real urban agglomeration in Guizhou. Therefore, Guizhou should make great efforts to cultivate Central Guizhou Urban agglomeration, with Guiyang, Zunyi, Anshun, Kaili, Duyun being the cores and take the leaping urbanization development strategy boosted by industrialization as the second strategy. The core driving force of the second strategy is a new type industrialization and a higher level of modernization. The main path is, with the construction of Central Guizhou Urban agglomeration and new type industrialization being the main part, large and medium enterprises being dominant, to attract investment in fixed assets, develop export-oriented economy and make full use of the radiation of large and medium sized cities to realize the target of “making the province strong”.

The sustainable strategy is a basic and the long-term strategy. According to the basic characteristics of Guizhou urbanization, including mountainous characteristics, an area dominated by agriculture, fragile ecology, etc, Guizhou should take the urbanization road on which small and medium sized cities and towns being the main part of the basic strategy, making full use of natural and humanistic resources, avoiding its weaknesses and initiate an urbanization road with Guizhou characteristics. The core driving force of the strategy is agricultural industrialization and urban-rural coordination. The main path is, with featured small and medium sized cities and small towns being the main part, small and medium sized enterprises being dominant, the layout of featured industries being the foundation, to construct green, recreational and ecological bases, forming the back yard garden of the south region of China, boosting coordinative urban and rural development and achieving the goal of “enriching people”.

The relationship of the two strategies is as follows: the sustainabale strategy is the basic strategy of Guizhou urbanization development, which is based on the fact that Guizhou is a mountainous area with fragile ecology, with the objectives of urban-rural harmony and enriching people, and is the long-term strategy. The leaping strategy is based on the fact that Guizhou urbanization is at a low level, which relies on Central Guizhou Urban agglomeration and new type industrialization to boost the rapid development of urbanization. It’s a leaping strategy and the short-term strategy.

Through the implementation of two strategies, Guizhou will be achieved the goals of enriching people and making the province strong. The short term is the accelerating period of urbanization, with emphasis on the construction of transportation, energy, water and other infrastructures, providing support and carrier for rapid urbanization, trying to make urbanization level reach 40 percent by 2015. The long-term strategy focuses on the development of public education, public health, public medical treatment and other public services, especially the solution of people’s livelihood problems, trying to make urbanization level reach 50 percent by 2020.

The choice of spatial strategy in Guizhou urbanization development should be based on Central Guizhou Economic Zone, construct an overall “core-periphery” structure of urban system, take metropolitan areas as tools to push forward Guizhou urbanization, and focus on creating and nurturing the Central Guizhou Urban Agglomeration; optimize the spatial layout of Central Guizhou Urban Agglomeration, define labor division and bring about complementary advantages;
relying on one-hour economic circle, push forward the construction and development of each metropolitan area; exploit national culture, enhance national culture taste and construct featured tourism towns.

To solve the “Three Rural Issues” and balance urban-rural developments in the process of urbanization, Guizhou needs to implement “four steps” strategy, including: promoting new type industrialization and increasing non-agricultural employment opportunities; constructing a people-oriented migration management mechanism; in the perspective of space, pushing forward the “three concentrations” principles, that is industries concentrated in industry development zones, people concentrated in towns and land concentrated in the form of scale management, seeking agglomeration economies; providing equal public services for large countryside areas.

To guarantee the implementation of the two strategies, push forward the development of new type industrialization, address “three rural” issues and achieve balanced and harmonious urban-rural development, we need to put forward the following countermeasures concerning system and institutional innovation and urbanization. First, it needs to implement system and institutional innovation, including accelerating the reform and innovation of social welfare and social security system related to household registration, pushing forward the innovation of land management system, innovating investment and finance system, pushing forward the adjustment of administrative divisions and accelerating the innovation of urban management system. Next, it should focus on national policy and measures to promote urbanization. At the national level, the main point is to try to get Central Guizhou Economic Zone included in the national “the 12th five-year” plan, and make it an economic area of key national supporting in the following five years; from the local level, in the same period, the focus is to cultivate Guiyang metropolitan area, establish consolidated metropolitan areas, construct Central Guizhou Urban Agglomeration and strengthen central cities boosting regional development as a whole. Meanwhile, the government should focus on promoting harmonious development of the primary, secondary and tertiary industries, strengthening the foundation of urbanization; doing a good job in urban planning and promoting urbanization through scientific planning; taking the strategy of large and medium cities’ driving force as a breakthrough, speeding up urbanization; doing a good job of small town construction, building a distinctive Guizhou urban system; accelerating the pace of green urbanization construction, promoting the construction of Guizhou ecological civilization; taking various measures to meet the need of land for urban construction; gradually lifting the urban-rural dual system, achieving balanced urban-rural development in the process of urbanization.
Executive Summary

In 2010, the Guizhou provincial government proposed a development strategy, namely, Sound and Fast, Better and Faster. Ecological agriculture development is the priority of this sound and rapid development of agriculture in Guizhou. Based on the SWOT analysis on current situation of agricultural development in Guizhou Province and the development of ecological agriculture, this chapter presents an objective to establish the pioneering area and demonstration area of ecological agricultural development in southwest China and to build a demonstration area for coordinated development of tourist resources such as sightseeing of ecological agriculture. Focusing on the objective, six strategic priorities, with four strategic measures and four action plans, have been put forward. Main points are as follows:

- Facing the problems of large population with less land and the ecological vulnerability, Guizhou Province has to develop intensive and quality-oriented agriculture by strengthening its internal factors. Development of ecological agriculture is the key to achieve "win-win" results for both the ecological development and agricultural promotion, and is also the precondition of realizing its sound and rapid development of agriculture.

- Although agriculture in Guizhou Province has been steadily developing and its structure has been further optimized, showing a characteristic of stability of the agricultural economy, the gap between Guizhou and other provinces is still widening.

- Guizhou Province retains advantages in ecological agriculture in many aspects such as ecological environment, variety resources, industries and leading enterprises, while being confronted with disadvantages at the same time in such aspects as lack arable land conditions for production-scale, the overall level of agricultural production on the low side, poor awareness of brand management for agricultural products with local characteristics.
Guizhou Province enjoys an opportunity in development of ecological agriculture. The international macro-background provides an external environment for the ecological agriculture development; the State has provided a policy guarantee for ecological agriculture development; the development strategy of industrialization and urbanization has provided a space for the integration of elements of ecological agriculture development; the consumption trend of the consumer groups has oriented the objectives of ecological agriculture development; and the improving traffic conditions have created necessary conditions for sharing external markets. Meanwhile, the challenges for Guizhou to achieve ecological agriculture development can be found in many aspects such as lack of land and water, poor farm labor quality, backward market management for local agricultural products with local characteristics and insufficient capability responding to the natural disasters, which have formed serious constrains for developing ecological agriculture.

The overall strategic objective of ecological agriculture development of Guizhou Province is to establish after 10-15 years a resource-saving and environment-friendly industrial system for ecological agriculture development with an optimized product mix and product space layout, including science and technology supporting system, service system and circulation system; and to take effective measures such as ecological agriculture compensation mechanism to encourage farmers and small and medium-sized enterprises to participate in the development of ecological agriculture.

In order to achieve the above strategic objective, Guizhou Province will give priority to the following areas: strengthening the infrastructure of development of ecological agriculture; protecting and improving the overall grain production capacity; speeding up the development of ecological animal husbandry and agriculture; accelerating the development of deep processing of ecological agriculture products; developing resource-saving and environment-friendly agriculture and promoting agricultural products circulation markets.

To develop ecological agriculture Guizhou Province needs concept innovation. The past concept for development of a single agriculture should be changed, that is, agriculture should be considered from the outside of itself. Thus a new development concept, “ecological environment is the productivity, the competitive edge and the potential”, will be built up. Meanwhile, Guizhou should, in course of the development of ecological agriculture, make full use of the two resources and two markets to promote fundamental transformations in agricultural production mode and increase the international competitive power of agricultural products.

Four major projects will be implemented for developing ecological agriculture. Specifically, they are: the ecological agriculture infrastructure project, (including farmland ecological program, soil fertility fertilization program, pollution-free program, ecological engineering program of rural environmental pollution control and water conservancy facilities program), the new farmer training project, brands building program of special agricultural products (including expanding and fostering the brands of the famous special quality agricultural products, strengthening the quality certification of agricultural products with high quality, and encouraging and supporting the integration of trademarks and brands of agricultural products with high quality),
ecological agriculture science and technology park project (Guizhou Qiannan Green and Organic Food Science and Technology Park and Guizhou Tongren Green and Organic Food Science and Technology Park).

- The central government could, from the national ecological safety strategy point of view, bring the project of ecological agriculture development in rock desertification in Guizhou Province into line with major national ecological project. Through the ecological agriculture development of rock desertification areas, this project will improve the ecological and production conditions in the rock desertification areas, which will become a main battlefield achieving “win-win” result, the ecological environment improvement and poverty alleviation of farmers. The state increases the investment with a focus on construction of ecological agricultural infrastructure. Due to the weak economic foundation, backward infrastructure for development of ecological agriculture and serious shortage of water for engineering, it is difficult for Guizhou to guarantee funding needs for the projects only relying on its own efforts. Therefore, in the "Twelfth Five-Years" period, efforts could be made to increase investment for water conservancy facilities, to improve the conditions for ecological agriculture development, and to improve the innovation and popularization of technologies and modern ecological agricultural production modes. As modern ecological agriculture needs to change the traditional patterns and methods of agricultural production and technology development, national key scientific and technological projects should be implemented to promote ecological technology innovation and application.

- With the vigorous support from the central government, the Guizhou provincial government should, focusing on the strategy of ecological agriculture development, effectively change agricultural development patterns to promote ecological agriculture in accordance with the ecological resources and the relative advantages of ecological agriculture; and carry out the coordinated development of all kinds of resources in the course of ecological agriculture development. Through introduction of the elements of modern ecological agriculture, the pattern of "resources - products - consumption - renewable resources" should be widely applied to induce the development of new industries. At the same time, Guizhou Province should coordinately develop such tourist patterns and modes as eco-agriculture sightseeing tourism, red tourism (touring Chinese Revolutionary Bases), natural ecological tourism and ethnic customs tourism; and boldly explore the models of ecological agriculture development. Guizhou Province should also make full use of artificial forage grass to develop ecological animal husbandry. As a result, the pressure of livestock on feed grain can be reduced on the one hand; it can fully mobilize the farmers to participate in eco-agriculture on the other. At the same time, the "four major projects" could be actively promoted.

- Guizhou Province, in development of ecological agriculture, needs ADB to provide the international experiences, to help the Province strengthen the cooperation and exchanges with international organizations and the countries that have been successful in the ecological agriculture development; and to provide them with technical aids and financial assistance for the ecological agriculture development in rock desertification areas to explore new patterns for achieving “win-win” result of modern ecological agriculture development and farmers’ poverty alleviation.
Sub-report 4:

Study on Strategies of Stony Desertification Control in Guizhou Province

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Executive Summary

Both evolution and distribution of rocky desertification in Guizhou rank first among other provinces in China. During 1975 to 1985, the annual increased area of rocky desertification was 508.2 sq km; that during the 13 years from 1975 to 1999 was 666.3 sq km; and that during the 5 years from 2000 was 334.7 sq km. By 2005, the area of rocky desertification reached 37597.36 sq km, accounting for 21.34% of the total land. Rocky desertification has accelerated the degradation of fragile karst eco-environment and behindhand development of regional socio-economy. As a result, there is a phenomenon in some areas that local people can’t live with local water and lands.

According to research in the Huajiang Demonstration Area in Guizhou Province by the Scientific Support for Planning Subject by Chinese Government, the following were found: 1) it is possible to rehabilitate rocky desertification; 2) intense rocky desertification can be converted to the moderate, and the moderate can be converted to the slight; 3) that all the slight converted to no rocky desertification within several years has been realized. Currently, under the condition that Chinese government is aggrandizing inputs in ecological rehabilitation the enlarging area and grades of rocky desertification in project areas have been relieved to some extent. But most areas of Guizhou Province are facing great population pressure and a large area of slope cultivated lands. Consequently, land degradation is still developing with some speed and the area of rocky desertification land is still increasing. Rehabilitation for rocky desertification is a long-term arduous task. Therefore, it is impossible to create a beautiful landscape with green mountains. To contain the increasing tendency of rocky desertification radically needs both national and local governments’ enlarging inputs in the Twelfth Five Plan and later years.

By 2020, the increasing trend of rocky desertification in most areas of the province would be contained fundamentally; situation of deteriorated eco-environment would be improved radically; land-use and agricultural production structures would be optimized constantly; animal husbandry
and characteristic industries would be developed; people’s living standard would be improved steadily; and rural economy would get into the road with sustainable development. From 2011 to 2015, new increased area of rocky desertification that will be rehabilitated would achieve 160.71 sq m and the annual average growth rate would be controlled by 0%. The trend of increasing rocky desertification and deteriorating eco-environment would be contained fundamentally. From 2016 to 2020, new increased area of rocky desertification that will be rehabilitated would achieve 63.41 sq m and the annual average growth rate would be controlled by -1%. The increasing tendency of rocky desertification would be contained radically. The deteriorating eco-environment would be reversed. Local people’s production and living conditions would be improved. Finally, ecological and economic system would get into a virtuous cycle gradually.

According to the fragile eco-environment, human-land contradiction, large area of rocky desertification and situation of backward social and economic development in mountain areas of Guizhou Karst Plateau, the strategic choices and modes are as below:

1. In the desertification areas with various habitats, plentiful resources and monotonous industrial structure, according to the ideology of systematically preventing and comprehensively rehabilitating for rocky desertification and developing in an all-round way, through planting fruit trees, grasses for livestock and constructing basic farmlands with small-scale water conservancy and rural energy projects, a mode guided by comprehensive rehabilitation for rocky desertification and ecological agriculture with core of “afforesting, cropping, planting trees and raising livestock” is established to promote multivariate development to local society and economy, benefit local peasants and promote harmonious development of ecology and economy.

2. In the remote mountainous areas where moderate-intense desertification occurs with low ecological carrying capacity, bad site condition, steep slopes and inaccessibility to human beings, according to the thinking of human management and natural ecological restoration, through implementing closing, planting, human management, protecting and closing hillsides to facilitate afforestation promoted by human beings and other measures, a compound mode guided by closing hillsides to facilitate afforestation and ecological restoration with core of “closing, protecting and cultivating” is established to promote positive succession of ecosystems and ecological restoration and improving the environment.

3. In the slight-moderate desertification areas with good water conditions, broken cultivated lands and obvious three-dimensional climate, according to the thinking of developing three-dimensional agriculture and forestry economy, through cultivating protection forests, forests for water and soil conservation, fuel forests and special fruit forests, a mode guided by man-made afforestation and forestry with core of “special fruits and three-dimensional agriculture” is established to improve eco-environment and enrich people ecologically.

4. In the slight-moderate desertification areas with suitable water and heat conditions, but shallow soil layers, inappropriateness for cropping and degradation of grasslands, according to the thinking of maintaining the productivity of grasslands and keeping balance between grasses and livestock, through planting grasses, improving conditions of grasslands and developing grass-eating animal
husbandry, a mode guided by grassland construction and ecological animal husbandry with core of “reconstructing rural industry” is established to both benefit ecological industry and local people.

5. In the slight-moderate desertification areas with serious water and soil loss, small per capita area of cultivated land and low land productivity, according to the basic thinking of improving the land productivity to ensure people’s lives and development, through improving the conditions of slope cultivated lands and constructing high standard basic farmlands with water conservancy, a mode guided by water and soil conservation and basic farmland construction with core of “conserving water and soil, protecting ecology and surviving” is established to control water and soil loss, protect farmlands, improve per area yield of cultivated land and guarantee the security of grains.

6. In the slight-moderate desertification areas with high mountains and water in low valleys, plentiful rainfalls but easy to loss, shallow soil layers easy to dry and difficulty in drinking for both people and livestock, according to the basic thinking of developing and utilizing water resources rationally to solve the water problem of people and livestock, through collecting and drawing water, conveying water by pipe nets, constructing pools and saving water by projects, a mode guided by water resources development and irrigating agriculture with core of “developing and saving” is established to solve the water problem for industrial production and people’s lives, improve water utilization ratio and develop irrigating agriculture that uses less water.

7. In the moderate-intense desertification areas with dense population, single energy structure, lack of energy in lives and serious situation of cutting trees for fuel, according to the basic thinking of developing rural circular economy with key point of developing bio-gas, through popularizing the utilization of bio-gas, cultivating fuel forests and developing courtyard economy, a mode guided by karst rural energy construction and courtyard economy with core of “biogas-courtyard raising-courtyard planting” is established to promote the development of circular economy and improve man’s dwelling circumstances.

8. In the intense-highly intense desertification areas with hard condition and limited resources, according to the basic thinking of rehabilitating ecology and ensuring people’s basic lives, through implementing ecological migration and natural restoration, a mode guided by both karst ecological migration and natural restoration with core of “migrating, construction-restoration” is established to improve peasants’ living circumstances, contain the development of rocky desertification and restore vegetation effectively.

9. In the well-preserved areas with unique and various landscapes and strong cultures, according to the basic thinking of harmonizing the rationalization of industrial structure, tourism development and rehabilitation for rocky desertification, through cultivating ornamental plants, discovering cultural connotation and perfecting tourism facilities, a mode guided by karst resources utilization and ecotourism with core of “tourism-ecology-economy” is established to promote tourism development and national culture conservation.

The strategic approaches of rocky desertification control in Guizhou include a) strategic planning
Sub-report 4: Study on Strategies of Stony Desertification Control in Guizhou Province

and comprehensive rehabilitation: plans should be made consistently and biological, engineering and technical measures should be combined to prevent degradation systematically and rehabilitate comprehensively; b) emphasizing key points and implementing step-by-step: points’ rehabilitation and areas’ rehabilitation together should combined, taking points’ rehabilitation to promote the areas’; key points should be emphasized; implementation should be advanced orderly to make those areas of rocky desertification effective that were rehabilitated; c) giving priority to ecology with consideration of economic development: the principle that where there is rehabilitation consequently there is economic benefits, and vice versa, should be pursued and an approach to eco-economic development for rocky desertification areas should be found to maintain the rehabilitating achievement; d) taking measures on local conditions and deploying rationally: the principle that the forest should be closed where it is suitable to close and the land should be planted where trees are suitable to plant should be pursued and biological measures that would accelerate ecological recovery and engineering measures that would increase the yield per area of land and the population carrying capacity for resources should be taken; e) supported by central government with multi-channel investments: with revenue mainly by central government, the existing investment channels should be stabilized and various resources should be integrated to form multivariate investment main parts, which would ensure the development of rehabilitation; f) technical supporting and popularizing the technologies: according to the thinking of experiments, demonstration and popularization, new technologies should be enhanced and new methodologies should be applied to select, assemble and form a mode with obvious ecological and economic benefit; and g) rehabilitating in accordance with laws and rules and participation of the whole nation: according to the relevant national laws and rules, rules should be established which activities must follow; the whole nations’ awareness of ecological rehabilitation should be improved; and the activity of peasants’ participation in rehabilitation for rocky desertification should be improved based on holding their desire in esteem.

In summary, this report has pointed out that rock desertification control must seize the "people-land relationship" as the main contradiction, control and development as the main line, people oriented, people and nature harmonization, and combine the implementation of water conservancy construction and ecological construction with stony desertification control; adhere to the strategic thinking of combining control and development, using control to promote development, and using development to improve control; adhere to the thinking of "systematic prevention, comprehensive control, and combination of prevention and control" in countermeasure, control technology and management system. In addition, stony desertification control is a long-term arduous task, "beautiful landscape" cannot be achieved overnight. In order to fundamentally curb the growing trend of stony desertification and deterioration of ecological environment, it needs to increase investment from national and local authorities, focus on developments with high efficiency, develop regional derivatives industries from stony desertification control, accelerate the implementation of Guizhou’s new “green” strategy of industrialization and urbanization, reduce overload bearing of land, and effectively promote people to getting rich in stony desertification areas. Through 10 to 20 years of tireless efforts to completely curb the growing trend of stony desertification, achieve beautiful ecological environment in potential stony desertification areas, fundamental improve the ecological environment in mild stony desertification areas, significantly improve the ecological environment
in moderate stony desertification areas, completely reverse the ecological environment in severe stony desertification areas, and fundamentally solve the problem of stony desertification to ensure sustainable economic and social development in Guizhou Province.
Sub-report 5: Study on the Strategies of Economic Development of the 50 Counties with the Priority of Poverty Alleviation and Development in Guizhou Province

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Executive Summary

Guizhou has 50 counties given the priority of poverty alleviation and development. The 50 counties have nearly 76% of poverty-stricken population of Guizhou, 66% of the total area, and 33.9% of the GDP. Without these 500 poverty-stricken people getting rid of poverty, there will be no the all-round well-off society of Guizhou. Therefore, it will be very meaningful to develop the 50 counties’ economy for the total economic and social development and poverty alleviation of Guizhou as a whole.

Guizhou is one of the provinces in China with the largest number, the largest area and the highest level of poverty. The poverty-stricken population is around one tenth of the total poverty-alleviation in China. Of the 28 million farmers, more than 5 millions are poverty-stricken. There are 83 counties in Guizhou implementing the central government program of poverty alleviation and development in the new century, accounting for 94.3% of the total counties. Fifty of the 83 counties are given the priority of poverty alleviation and development. The 50 counties account for 56.8% of Guizhou’s total counties. The area of the 50 counties accounts for 66.0% of Guizhou’s total areas. The farmland and population of the 50 counties account for 59.2% and 49.6% of Guizhou’s total farmland and population, respectively. In 2009, the poverty-stricken population in the 50 counties was 4.20 million, accounting for 75.58% of the total 5.55 million in

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The average poverty incidence of the 50 counties is higher than 20%; 36 of the 50 counties have a poverty incidence higher than 20%. In 2009, the per capita GDP of the 50 counties is 7,026 yuan, 68.15% of Guizhou’s average level (10,309 yuan) and 27.23% of China’s average level (25,796 yuan).

Guizhou is the only province in China that is inland but has no plains; most of the areas are mountains. Therefore, it is short of land suitable for agriculture. More farmland is on hill slopes. Erosion is serious. Natural disasters are frequent. Farmland is infertile. And the agricultural basis is vulnerable. The contradiction between more people and less land is severe. The general problem in all of the 50 counties is the double poorness – the farmers poor and the public finance poor. Because of the double poorness, it is short of the infrastructure investment, and the traffic transportation, communication, culture, education and sanitation are severely backward. Guizhou’s population growth rate was 6.96‰ in 2009, higher almost 2.10\(^{th}\) of percentage points than the average level of the country. Guizhou’s industrial added value accounts for 32.02% of GDP, lower than 39.20%, the country’s average level. Guizhou’s per capita industry output value is 9,022 yuan, one fifth of the country’s average level. Guizhou’s level of industrialization is over ten years behind the country’s average level, and the 50 counties’ further behind Guizhou’s. Almost all the 50 counties have a poor finance, and it will be very limited for the industry to support the agriculture and for the urban areas to support the rural areas.

After over 30 years’ efforts, the farmers’ per capita net income increased from 1,641 yuan in 2005 to 2,700 yuan in 2009. 96.9% of the administrative towns/townships and 29.6% of administrative villages can be reached by the paved roads. The poverty-stricken population continuously reduces and the poverty incidence continuously goes down. Totally 27 programs have been implemented, including “the training program of taking a lead to start a business and leading the women to become rich”, the training program of long-distance education in rural areas, the sunlight project, the rain program, the scientific and technical training project for new-type farmers, and so on.

It is an important part of Guizhou’s economic development to speed up the 50 counties’ economy and the key task to construct the harmonious society. The 50 counties have an important position in the province. From the indexes of population, total areas and farmland, the economic development of 50 counties is just passable, both the total amount and per capita amount are behind the provincial average level. Therefore, it is necessary to concentrate all strength in the province to help the poverty-stricken areas and the areas inhabited by the minority nationalities speed the development up.

At present, there is a favorable environment for the poverty alleviation and development. The central government has been giving the first priority to solving the problem of agriculture, farmers and rural areas. Guizhou provincial government also has a series of policies of poverty alleviation and development. These favorable policies have promoted and will further promote the improvement of the basic life and production conditions in the poverty-stricken areas, the improvement of the poor’s comprehensive quality, and the improvement of the ecological
During the practice of poverty alleviation and development, the officials, officers at all the government levels and the average people combine the central government’s policy and the practice, have explored various ways of poverty alleviation and development and accumulated a lot of experience in the poverty alleviation and development. Because of the natural and historical causes, people in Guizhou have been expecting to improve the conditions of their life and production. And their desire to get rid of poverty is very strong.

There are also many difficulties in the poverty alleviation and development in Guizhou. The natural conditions are very adverse. The quality of farmland is poor. The ecological environment is vulnerable. The 50 counties lack social development capacity and financial capacity, and have a weak capacity of self-development.

It should be guided by Deng Xiaoping’s theory and the three-representative ideas, in order to implement the viewpoint of scientific development, in the principles of “speeding the development up, speeding the transformation, and promoting the great-leap-forward development”, it should develop industrialization and urbanization, intensify the comparative advantage and develop specialty industry, make efforts to increase the farmers’ income and the counties’ capacity of self-development, optimize the environment and expand the investment, and promote the economy growth rapidly and soundly.

By 2020 Guizhou would primarily eliminate absolute poverty and the farmers’ income would be two times of that in 2008. It should work hard to reach the goal of doubling the total output value from 2010 to 2015, total financial revenue in half of the 50 counties over 400 million yuan, the farmers’ per capita net income over 5,000 yuan, poverty-stricken population reduced by a 50%. By 2020, it should raise the comprehensive economic strength of the poverty-stricken areas to a much higher level, the quality of poor people’s life to a much higher level, and the industries of poverty alleviation and eco-environment protection to a much higher level.

According to the overall ideas mentioned above, it should persist in the following principles to speed up the promotion of poverty alleviation and development in the 50 counties: promoting the transformation during the development and seeking the great-leap-forward development during the transformation; taking the measures based on local conditions and to guide by types; driven by the reform and opening up and developing the economy and society coordinately; combining helps from outside with local efforts.

It should intensify the construction of high-quality basic farmland, enhance the comprehensive capacity of agricultural production, take advantage of resources, and make great efforts to develop specialty products. It should promote the industrialization of agriculture and develop the industry led by agribusiness. The 50 counties are rich in natural resources and have the conditions to develop the industries of minerals, energy, and construction materials. It should make great efforts to make half of the 50 counties have an added value of the secondary industry more than the added value of the first industry by 2015. It should speed up the services, led by tourism. Guizhou has a
particular topography, karst, undisturbed natural environment, special styles of the minority nationalities, and the historical revolutionary traces. Most of the 50 counties are located in the places with good natural ecology and rich cultural resources. Therefore, it should combine the poverty alleviation with the development of tourism and increase the local people’s income. According to the statistics from Guizhou provincial bureau of tourism, during the Eleven Five-Year period, there were nearly 420,000 rural people relying on the tourism getting rid of poverty; almost all the rural families who operated tourism got rid of poverty within three years after they started the tourism business. It should speed up the construction of traffic transportation raise the capacity of transportation in the poverty-stricken areas, which is crucial to promote the economic development of the areas. It should make great efforts to implement the project of safe drinking water in the 50 counties, raise the utilization of water resources and the capacity to prevent flooding and drought, and further essentially solve the problem of lack of water caused by lack of the infrastructure. It should intensify the environment protection and pollution control, give the priority to the pollution treatment in areas of drinking water collection, food processing, county towns, and significant towns. It should deepen all types of reform and improve the environment for economic development. It should innovate in the construction of agricultural service system and establish an agricultural service system promoted by the governments at town/township and county levels. Private enterprises should be taken as the strategic emphasis of the 50 counties’ economic development, actively encourage social capitals to participate in poverty alleviation, and make the investment diversification. It should work out well the planning of Guizhou Province Program of Poverty Alleviation and Development during 2011—2020, the Twelfth Five-Year Planning of Poverty Alleviation and Development, the planning of poverty alleviation and development in a large area in the particularly poor areas, and the planning of promoting poverty alleviation and development in a county, town/township and village as a unit. The work of poverty alleviation and development should conduct following the planning; the funds follow the projects, and the planning follows the goals/objectives.

It is necessary for the central government to offer particular financial support. The central government should help Guizhou establish a relatively steady mechanism of financial funding growth for poverty alleviation. The growth of central government’s financial support to Guizhou should be rapider than the whole country’s financial support for poverty alleviation and development in the country. It should speed up the improvement of the mechanism of financial transfer payments to the counties with the priority of poverty alleviation and development. It should establish a system of special transfer payments for the promotion the economic development of the counties with a priority of poverty alleviation and development.

The growth of Guizhou’s financial support to the poverty alleviation and development should be faster than the growth of the finance revenue. On the basis of establishing the minimum financial guarantee transfer payments system to guarantee the 50 counties’ normal need, Guizhou provincial government should establish the special transfer payment and policy transfer payment systems. It should innovate in the mechanism of integrating the funds, support at county level to clear, sort and integrate the funds particularly used for agriculture, and use it together without change in the original purposes of funds.
It should actively establish rural cooperative banks, village/town (township) banks, micro-finance companies, rural mutual funding cooperatives, and other new financial organizations in the 50 counties. It should encourage and support banks to establish branches at county levels and establish a long-term system to provide loans to small enterprises and micro-loans to rural households. It should innovate in the micro-financial institutions, including commercial micro-finance and NGO micro-finance. The micro-finance should be able to be used for the purpose of adopting sciences and technologies, introducing investment from outside, supporting the education, supporting the poor women to start a business, and alleviating poverty.

The central government has selected Dalian, Qingdao, Shenzhen and Ningbo four cities to support Guizhou, and the performance is quite good. However, the tea will be an priority industry in Guizhou. In addition to lack of funds, it needs to improve the planting techniques, the management of tea trees, the processing of teas, and the sales. Therefore, it is suggested to add Zhejiang province as a help counterpart in the developed areas to provide assistance to Guizhou. Zhejiang also has advantage in the machinery industry of tea processing.

Another feature of poverty alleviation by sciences and technologies is relative less investment but quite remarkable effectiveness. The result is that the farmers have changed their mind, realized the benefits of sciences and technologies, and created new income sources.

It should consolidate the system of nine-year compulsory education, speed up the education during the high-school period, and make great efforts to develop professional education. A planning of human resources should be made as early as possible. It should cultivate a team of human resources suitable to modern agriculture, industry, and urban management.

In the light of principles to give the rights to local areas as much as possible, it should release part of regulation and authorization rights to the government of 50 counties, empowering the 50 counties’ governments. It should further reform the administrative approval system, reducing the items to be proved, and simplifying the procedure of approval.
Sub-report 6:

International Experience for Guizhou Provincial Development Strategy

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Executive Summary

Based on the theories of development economics and regional economics, this chapter summarizes and explains some general and specific international experience for the economic development in Guizhou Province, People’s Republic of China. The cases herein focus on economic development in mountainous regions and the role of industry in the early stage of “take-off” process in certain countries. How to promote the economic development in poverty-stricken areas is one of urgent global concerns. Governments around the world have been grappling with hard in the campaign against poverty. By summarizing international experience, we may find that the nature and causes of poverty are extremely complex and it is difficult and time-consuming to tackle poverty issues. The most obvious difference between a poverty-stricken area and a developed one lies in per capita real income and output. Generally, agriculture dominates in the economy in a poverty-stricken area. Local economy heavily depends on agriculture in these poor countries. Industrial development, which can change a country within a short term, relies on capital, labor, and technology that enhances productivity and improves the standard of living.

Each of the first five sections herein contains a case about global experience in the economic development. The first two cases present how the mountain areas make use of natural resources and environmental advantages for agricultural development and depict the idea to find strengths in the general weakness. The two cases that follow tell historical stories about how industry helped promote the economy in less developed regions. Old as they are, these cases are the fine examples to prove promoting the industry is the most efficient and powerful means to make change. The last case is about the U.S. defense procurement. It illustrates that some appropriate institutional arrangement and regulations system can make the defense industry another economic drive. During the process of economic development, we must focus on change of policy and institution.

The Agricultural Development Police in Mountainous Area of Austria The case in this section is about a national rural development policy for less developed mountain areas in a developed European country. Republic of Austria is a largely mountainous country. Only 32% of the country
is below 500 meters. The Alps is the highest mountain in Austria. Austria is a developed market economy, in which private business and farm owners are active players. Per capita income is high in general but the economy in mountain areas is relatively less developed. Austria's mountain development focused on (1) the ways and means of supporting the agricultural sector, and (2) measures aiming to preserve and manage land resources sustainably under the difficult production conditions in mountains. At the core of the mountain policy is a valuation of non-marketable goods (e.g. environmental advantages and natural resources). As the fundamental advantages, such valuation must be included in sustainable development plans. The experience of Austria’s mountain development highlights bottom-up development, grass-roots initiatives, the initiative of economic actors, coordinated cross-industry and inter-agency efforts, the coordination between governments and NGOs. The regional consulting structures are highlighted for the development of less developed mountain areas.

The development policy involved each level of the government but required most efforts at the provincial level. Therefore, it is a local government rather than the central government that frames and implements the policy. The decentralization enables a local government to use its knowledge of local economy and customize policy to suit local needs, and also stimulates the local government to promote local economy. To establish regional consulting structures, through which farmers can reach help from experts on a one-on-one basis, is the core approach in Austria’s mountain development.

The Experience of Developing Local Agricultural Products in Rhön Biosphere Reserve This case shows how to revitalize an economically decaying biosphere reserve in a central European country by developing local agricultural products. In the centre of Germany and 150km east of Frankfurt, the Rhön Biosphere Reserve, a part of former German Democratic Republic, was designated in 1991 after the reunification of Germany. It covers 1,850 square kilometers and has a population about 130,000. Settlements are mainly small villages and towns. In the 1980’s and during the transition to reunification, the Rhön region was a neglected land. After the reunification, the region revitalized economically by making use of local natural resources and promoting a new economy that features local natural and cultural resources in the undeveloped areas. Rhön sheep, Rhön milk and other local products as well as tourism economy powered its development. It illustrates that comparative advantages shift along with development. The advantages of less developed areas in terms of the environment and resources are increasingly recognized as the natural environment of developed areas suffers damages during economic development. Therefore, it may be a feasible development strategy for a less developed area to promote the economy by making use of such advantages. The higher degree of development in developed areas, the higher relative value of the unspoiled ecological environment of and quality products from less developed areas. It is a reasonable development option for a less developed area to promote the economy by making use of local ecological value.

Pittsburgh: Developing Metallurgical Industry by Utilizing Natural Resources This case is about early economic development in a developed country. Abundant mineral resources in mountains and great access to water transport, Pittsburgh became the metallurgical center in the eastern United States in the early 19th century. Pittsburgh was an industrial city where resource-oriented
enterprises gathered. As the transportation costs of iron ore, coal, and other raw materials for the metallurgical industry were high at the time, those resource-oriented businesses had to anchor near to the producing areas of such raw materials. Pittsburgh was a typical example of such industrial cities. In the process of development, Pittsburgh solved the bottleneck – transportation and labor shortage, and coupled the production with the market demands. In the middle of the 20th century, it successfully restructured its industrial chain. The case is adopted because in some cases, early instances in developed countries are more relevant (than recent ones) to less developed areas looking forward to an economic take-off. Pittsburgh, using its rich natural resources, gave full play to its comparative advantages and developed as "The Steel Capital of the World". This case illustrates that in the take-off stage, the economic growth must be accelerated by sufficient investment. Considering the small market in less developed areas, an economic take-off must rely on large-scale investments in interrelated businesses.

History of Early Industrialization and Urbanization in the United States

This case reviews the history of the early industrialization and urbanization in the United States and analyzes the driving factors of this industrialization and urbanization. The 19th century is an important period in the American history. Large-scale inputs in factors enabled the industry to have an economic take-off in the second half of the century, which enabled the U.S. to replace the UK as the largest industrial country in the world. Industrialization played a crucial role in the economic development of the United States in the 19th century. At the early 19th century, the U.S. economy built on agriculture and much relied on imports for manufactured products. In the 19th century, the U.S. economy experienced a major change, with the economic structure shifting from agriculture to manufacturing. Owing to the shortage of human resources, the American development in the 19th century was a capital- and resource-intensive growth, which helped save human resources. It was the inputs in factors of production other than the advance of technology that promoted industrialization in its early process. In the second half of the 19th century, capital investment increased significantly, and capital intensity increased. Capital investment structure changed significantly. More capital was put in machinery rather than buildings. There were fundamental changes of the productivity in manufacturing. Steam power (produced by coal-fired boilers) replaced manpower, horsepower and waterpower; and later at the end of the 19th century, electricity (generated by coal-fired power plants or hydropower plants) replaced steam power. Such change also transformed fundamentally manufacturing equipment and production process. The banking industry brought a substantial change to capital cumulation. Companies that once relied on self accumulation could tap into the stock market for external funds. Along with industrialization came urbanization – the result of industrialization, which also provided market for industrialization. It was the increase in labor, capital, and natural resources (rather than the advance of technology) that fueled the economic growth in the United States. The American economic growth in the 19th century featured large-scale capital investment, particularly investment in manufacturing plants and machinery for mass production. The case illustrates the early American industrialization, in the take-off stage of economic development, in order to overcome the enormous obstacles to achieve take-off, must have sufficient strength of the input, the first capital and labor inputs. This case also shows that industrialization is an important source for urbanization. Agglomeration economies that come along with industrialization reduce production costs and make cities hold appeal to companies, workers, capital and equipment. Such
agglomeration is self-reinforcing, which makes cities expand rapidly. In this sense, industrialization gives birth to urbanization.

**The U.S. Defense Procurement System and Its Role in Economic Development** This case illustrates how military supplies can be produced by non-military private companies. Defense procurement can drive local economic development. For a sound mechanism, strict regulations must be introduced to regulate the acts of government officials. This case is about the U.S. defense procurement system, rules and regulations for government behaviors to help small enterprises. It is designed to help the Government obtain the best products and services while cut down administrative costs and help private suppliers have open access to and fair treatment as to government contracts, so as to keep the government trustworthy. Federal Acquisition Regulations require the Federal Government must make public each procurement plan in designated publications and handle the process in an open and transparent manner. The U.S. defense industry is a huge drive for local economy. It illustrates that some policy arrangement and regulations system can make the military industry a positive factor for promoting regional economic development, and can integrate the military industry into the regional economy. It could be a reference for Guizhou Province regarding how large military enterprises can promote regional economic development.

Based on the above-mentioned international cases, a preliminary conclusion and some lessons go as follows:

The development of remote mountain areas must depend on local resources and comparative advantages; and the right development strategy must be based on local characteristics. As developed areas have rapid economic growth at the cost of natural resources, the unspoiled nature in less developed areas may become a comparative advantage. By making use of such an advantage, less developed areas may surpass developed areas in some aspects.

The development of mountain areas must rely on joint effort of residents, investors, government and NGOs. The enthusiasm and creativity of local residents are necessary elements for the development of less developed mountain areas. The Government is expected to make necessary incentive policy, release necessary information, and offer help and support.

The development of less developed areas must rely on the bottom-up initiative of local residents and communities. As basic units of production and social life, communities are important to economic development and dynamics. The bottom-up influence of communities cannot be completely replaced by the functions of the executive agencies. Community development must be carefully nurtured and protected.

Mountain areas must be open to the outside world. The linkages with other areas, especially trade ties, must be strengthened.

Government and NGOs must provide residents with (1) financial and technical support, (2) information services and consulting structures. This is the core means for the development of less developed rural areas. One-on-one contact directly between experts and farmers can help farmers
obtain production and management of information, technology and means.

Sufficient capitals are vital at the take-off stage of the economic development. Capital and labor inputs come first. The economy can only take off when the intensity of the input reaches its critical point. Reviewing the history, we might observe that the industrialization, though, at the huge expense of the environment and resources, is still the most important way to drive the leapfrog of the economic development.

Industrialization and urbanization are complementary. The effect of agglomeration in cities results in lower production costs, helping promote industrial development. Urban development provides market labor and capital for the industry. The wealth created by industrial development lays the material basis of modern urban development. Urbanization also provide demands for further industrial development.

The process of the economic development also implies the changes the economic institutions. Only continuous innovation and restructuring of the economic institutions based on existing systems of the undeveloped countries can bring new path for the economic development.
Executive Summary

1. Sustainable Strategy Development and Guiding Principles

Sustainable strategy development is a process involves situation analysis, formulation of policies and action plans, implementation, monitoring and regular review. It is a cyclical, interactive and adaptive process of planning, participation and actions in which the emphasis is on managing progress towards sustainable goals. Sustainable strategy development process should not intend to produce a ‘plan’ as an end result, but steering through short, medium and long-term action plans in order to achieve a vision of sustainable development.

Sustainable strategy development provides a framework to institutionalize the processes for consultation, negotiation, mediation, and consensus building on priority social, economic and environmental issues. It can empower Guizhou government to address complex socio-economic problems such as poverty alleviation, population growth, and globalization through public participation and improved decision-making.

There is no single type of approach or method can be applied in preparation of sustainable development strategy. Guizhou provincial government should determine the best approach in sustainable development strategy preparations and implementation on the basis of the prevailing political, historical, cultural, economic, and ecological situations. Emphasis must be given to apply principles for strategy development in formulation of policy and project.

There are five guiding principles for sustainable strategy development:

- Equity
- Adaptability
- Sustainability
- Certainty
- Flexibility

2. Agricultural Sustainable Development in Guizhou

The Guizhou Government has consistently paid special attention to the development of agriculture and rural areas, and has made substantial headway in ensuring food self-sufficiency and
development of the rural economy. However, the Guizhou Government is well aware of the great challenges confronting province’s agriculture: large population, agricultural resources scarcity on a per capita basis, and outdated agricultural infrastructure. The development of ecological agriculture is not only an important component of Guizhou's overall sustainable development strategy, but also a major task for Guizhou to ensure its food security, social stability and environmental sustainability.

Agricultural sustainability is now a central focus for agricultural researchers, government leaders and policy makers throughout the world. Many of them have criticised modern conventional agriculture, which is based on high use of chemical and technological inputs and oriented to maximising returns and profits, as often being detrimental and nonviable when considered from social and ecological perspectives. In order to meet increased demands created by growing populations and rising incomes, sustainable agricultural development emphasises the need to enhance agricultural productivity in a manner that provides affordable, efficient and healthy diets to all at the lowest environmental cost. This approach represents not only a new way of thinking about agricultural production, but also a potential alternative to conventional resource management.

As the evolution of an agricultural system is a biophysical phenomenon and socio-cultural construct, no single blueprint of sustainability will be found, as economic and social systems and ecological conditions differ widely among countries or regions. Each nation or region will have to work out its own concrete development strategies and policy implications. As Guizhou’s agriculture is increasingly challenged by the constraints of population, resources and environment emerging from its modern development, it is imperative to explore a sustainable agricultural paradigm that could accommodate economic and socio-cultural needs within an already stressed natural resource base.

Sustainable agricultural practices provide profitable alternatives to farmers who are increasingly asked by society to reduce externalities. Although it is much too early to predict whether the alternative agricultural paradigm will significantly modify or even replace the conventional paradigm, it represents the first stage of a ‘paradigm shift’ occurring within agriculture. The key theme is the development of ecological agriculture in concert with the principles of ecological economics. Based on a core of traditional agriculture and supported by advances in modern science and technology, this approach is consistent with the international trend of exploration on agricultural sustainability and attempts to avoid the resource and environmental problems caused by petrochemical-based agricultural development. Methods, techniques, and materials used in ecological agricultural development must be tailored to the specific conditions and resources available. Therefore, ecological agriculture applies to specific sites, and is a management-intensive, resource-conserving process that considers both productivity and sustainability. It values the local empirical knowledge of farmers, and the sharing and application of this knowledge to the common goal of sustainability.

Given the different situations between Guizhou and Western countries, there will be differences in the recognition and practice of sustainable agricultural development according to their specific
conditions. In Guizhou, agricultural systems must have high productivity without causing degradation of natural resources and environment, to fulfill the needs of a growing society. As a result, greater emphases are put on food security, rural industrial employment, and income-generation options compared with that of developed countries, which stress environmental protection and health aspects. In contrast, ecological agriculture in Western countries takes a radical position in environmental conservation and rejects the use of agrochemicals. Guizhou ecological agriculture takes advantage of a big population to overcome the disadvantage of relatively small resources per capita, and makes up for the deficit in scientific expertise and capital with the rich experience of traditional agriculture.

3. International Case Studies and Summary of Experience

This subproject report reviews the latest international theory and practice on sustainable strategy development, especially related to agricultural sustainability and natural resource management. It aims to provide an international perspective on the potential of ecological agriculture to address sustainable human–environmental interactions in Guizhou province. Six selected international cases studies include areas of industry development, globalisation and sustainability, poverty alleviation and community development, strategy development, higher-value urban markets, and infrastructure development.

Highlighted is the view that the acceleration of economic development and adjustment of industrial structure in a region is meaningful only when it is tailored to specific ecological, economic, political and socio-cultural settings. Key international challenges, experiences and lessons are discussed, identified and learnt through six case studies. Total 83 experiences from case studies are summarised as below.

4. Experience from case study 1 (industry development) – Mining Industry Development in Australia

(1) Production increased largely because of industry capacity increases and achieved economies of scale

(2) Industry development focuses on further improving efficiency and safety of operations and movement towards globalisation

(3) Mining operations are not typically labour intensive once in production, but during construction they provide employment for a great many skilled workers

(4) Industry downstream processing projects often result in improved local infrastructure including roads, schools and community leisure and health facilities

(5) It creates efficiencies in regulatory systems by placing greater importance on achieving desired outcomes than on enforcing compliance with standards

(6) Governments set the general conditions for individual projects, and companies have flexibility
as to how they meet the conditions

(7) Environmental management plans developed and approved before mining commences

(8) If particular mines or plants are not performing acceptably, action can be taken, ranging from financial penalties to closure

(9) Governments release a policy statement to demonstrate commitment to the industry

(10) Develop favourable investment environment and establish various laws and regulations to protect the interests of investors

(11) Governments provide a new generation of geo-scientific maps and datasets of strategically important areas

(12) Safety and health are identified as the number one priority of industry development

(13) Industry becomes a part of the knowledge-based economy and is very adept at using state-of-the-art technologies, such as e-commerce and internet

5. Experience from case study 2 (globalisation and sustainability) – Recreation, Tourism and Sustainable Mountain Development in Canada

(1) Protect ethnic groups’ rights to have input and guide development in their community

(2) Developing unique agricultural producing business for an international market has grown into a viable way of life for many farmers

(3) Community takes a proactive stance on development and encourages the protection and promotion of cultural and natural resources

(4) Develop heritage villages as a tourism point of interest, and provide cultural tourism and traditional menus to customers visiting the community

(5) Market the "Guizhou Experience" to the world by coordinating promotions and assistance to visitors

(6) All facilities, hotels and apartments have underground parking, so very little surface area is used for parking lots

(7) Communities have comprehensive long-term plans for their sustainable development

(8) Encourage the use of an efficient public transit system by imposing high parking fees for private automobiles
(9) Educating the public and enforcing appropriate garbage storage practices are spear-headed by local residents and other local environmentalists.

(10) Provincial government has officially recognised the importance of Aboriginal traditional knowledge and given serious weight in the development of forests and roads in and around their communities.

(11) Ethnic groups have different notion of sustainability.

(12) Sustainability is deeply tied to historical, cultural, and spiritual values in tandem with managing deficits and real poverty.

(13) The needs of the communities are as diverse as the communities themselves, and the political strategies for achieving their goals to deal with increasing populations are interrelated.

(14) Ethnic groups draw upon their own economic development organisations to further their interests.

6. Experience from case study 3 (poverty alleviation and community development) – Sustainable Community Development and Natural Resource Management in Pakistan

(1) People living in a community are the best source of information and the best resource to manage their needs.

(2) While communities may develop in different ways, community development is often identified with increasing the skills, knowledge and abilities of local residents.

(3) Most rural residents depend in some way or another on local resources for their survival and development.

(4) The development and strengthening of community-based organisations and village-based organisations is essential.

(5) Integrated rural development focuses on market orientation, product diversification and management of environmental issues.

(6) Applying the "bottom-up" approach to enable residents and local organisations and institutions are all actively participating in community development.

(7) Community members participate in all phases of the rural infrastructure development, thus making them stakeholders who derived direct benefits.

(8) Adopting integrated crop management to consolidate farming practices in an environmentally friendly and sustainable manner where ecological and economical factors are equally considered.
(9) Strengthen effective law enforcement from government authorities

(10) Sustainable community organisation development is a long and difficult process that requires time and commitment

(11) The development of community organisations and institutions needs to become financially and managerially self-sustaining and work in close collaboration with government bodies

(12) Only collaborative efforts from respective stakeholders can bring about the needed transformation

(13) Increased public awareness of and participation in local environmental, economic and social issues will be essential

(14) Governments must undertake the required investments for improving health and education facilities and services in communities

7. Experience from case study 4 (strategy development) – South Australia’s Strategic Plan

(1) Strategic plan as a means for tracking progress, with the targets acting as points of reference that can be assessed periodically

(2) Strategic plan provides a framework for the activities of the government, business and the entire community

(3) Strategic plan is a living, dynamic plan which will evolve to meet changing circumstances

(4) Government set up a Strategic Plan Update Team, and charged it with overseeing a community engagement program in relation to the strategic plan

(5) Only comprehensive and coordinated effort sustained over many years will begin to narrow the gap between conditions experienced by ethnic and non-ethnic groups

(6) Develop coordinated regional approaches to pursuing those strategic plan targets that reflect priorities specific to each region

(7) Neither strategic objectives nor any individual targets stand alone, they are all part of a larger inter-related framework

(8) Achieving one strategic target should not come at the expense of another

(9) Developing new green industries such as environmentally sustainable building design and technologies, while reducing the ecological footprint
(10) It needs to establish a committee to oversee the implementation of the strategic plan throughout the government and into the community.

(11) Built on the engagement process, a new body – the Community Engagement Committee – needs to be established to serve as a conduit between government and the community.

(12) The committee performs an independent monitoring function and produces a public report every two years on the overall progress towards the strategic plan targets.

(13) Strategic plan is the main instrument for determining strategic priorities for government agencies, and is an important element of performance assessment for chief executives.

(14) Each region needs to develop their own approaches to pursuing the strategy targets which line up with local priorities.

8. Experience from case study 5 (higher-value urban markets) – Linking Rural Producers to Modern Supply Chains

(1) Increase consumers’ attention to food quality and safety.

(2) Inadequate infrastructure and services in physical markets add to the transaction costs and cause quality deterioration and high spoilage losses.

(3) Investments in market facilities will be pro-poor because sales by poorer farmers will increase proportionally more than those by the wealthy farmers.

(4) Dominating the supermarket’s product selection are processed foods, gradually expands to semi-processed foods, and the last category is fresh produce.

(5) Use supply chains to reduce coordination costs, capture economies of scale, and increase food safety and quality.

(6) Coordinate supply chains by standardizing product requirements, enhancing efficiency and lowering transaction costs.

(7) Ensure public food-safety standards are met in all markets served by the retail chain or food-processing firm.

(8) Supermarket buying agents prefer to source from large and medium-size farmers.

(9) Supermarkets rely on small farmers to satisfy consumers’ demand for specialty or niche products.

(10) The most important determinant of small farmers’ participation is not always farm size.
(11) The number of small retail stores often declined with rising market share for supermarkets, with implications for employment

(12) Invest in education, rural infrastructure, and support formation of producer organizations

(13) Support farmer training on good agricultural practices for quality enhancement and food safety

(14) Foster development of commodity and futures exchanges, and train firms on use of market instruments to hedge risk

9. Experience from case study 6 (infrastructure development) – Australia’s Infrastructure National Reporting

(1) The condition and performance of a nation or region’s infrastructure critically influences its growth and international competitiveness

(2) The planning, operation and management of infrastructure affects environmental sustainability and everyday living standards

(3) The accelerated international flows of capital and information, and the trend towards greater trade liberalisation have combined to expose much of the economy to greater competition

(4) It is important for both export industries and import competing businesses to have access to infrastructure services that are reliable and competitive by world standards

(5) Income levels will influence future consumer choices and demand

(6) Climate change issues will influence policy decisions in infrastructure sectors

(7) There is a much more diverse pattern of infrastructure ownership and operation arrangements

(8) Governments ensure policy development, planning processes and regulatory arrangements, encourage timely investment in productive infrastructure, and there are incentives for its efficient and innovative use

(9) Governments’ own infrastructure investment programs are subject to rigorous assessment of economic, social and environmental costs and benefits

(10) Ensure competition is able to occur in markets, and both investor and user interests are properly recognised

(11) Quality infrastructure is critical to a country or region’s economic and social development

(12) Industry development depends on reliable and competitively priced energy, transport, water
and other infrastructure services

(13) Development of a strategic approach to future infrastructure demands needs a comprehensive planning framework to identify future demands and challenges

(14) Need government’s ongoing support to identify emerging constraints and to implement action to ensure the economic infrastructure remains efficient and effective

10. Recommendations for Guizhou’s Strategy Development

Through the above summarised experiences from six international case studies, major recommendations that could be provided for Guizhou’s strategy development include:

(1) High-level government commitments and influential lead institutions – Such commitment is essential from Guizhou government on a long term basis with assured financial resources allocation;

(2) Comprehensive and integrated – Strategy should be developed integrating both the long-term and short-term economic, environmental, social and equitable objectives. Where full integration is not possible, trade-offs need to be negotiated;

(3) Based on comprehensive and reliable analysis – Priorities need to be set on the basis of a comprehensive analysis of the present situation and of forecasted trends and risks, examining the links between local, national and global challenges;

(4) People centered – Decisions and actions should provide for broad community involvement on issues affecting them, and ensure long-term beneficial impacts on disadvantaged and marginalized groups (protecting ethnic groups’ interests);

(5) Develop and build on existing capacity – At the outset of the strategy process, it is important to assess the political, institutional, human, scientific and financial capacity of Guizhou, and built on existing policies and projects; and

(6) Incorporate monitoring, learning and improvement – Indicators should be developed into strategies to monitor and evaluate the processes, track progress, and capture lessons and experience.
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Final Report on
Provincial Development Strategies for
Chongqing Municipality and Guizhou Province
(Package T2, Guizhou Province)

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1. Macro Background and Foundation for Development

1.1 The macro background for setting up the strategy

1.1.1 The theme of “transformation of economic development mode”

After 30 years of rapid economic development, The People's Republic of China (PRC) has gradually stepped into a new phase of development, namely the middle and late stage of industrialization. The high speed of growth will be replaced by a steady growth. In this new phase the speed of economic growth will be more closely integrated with structural quality, and the transformation of economic development mode will be the theme of economic development.

In recent years, with the changes of development mode and the principal contradictions that the PRC is faced with, the guiding principles of the PRC’s economic and social development are significantly changed. In 2003, the CPC Central Committee put forward the “Scientific Outlook on Development” on the 3rd Plenary Session of the 16th Central Committee of CPC. And afterwards “to build a harmonious socialist society” was put forward. In 2007, the 17th National Congress of the CPC put forward in its report the concept of constructing “ecological civilization”, and made clear of the goal of “building a moderately prosperous society in an all-round way” by the year 2020. Recently, acknowledging the prominent contradictions in the process of the PRC’s economic and social development, the Central Committee clearly emphasized the need for “transformation of economic development mode” in the 12th Five-Year Plan draft.

The 5th Plenary Session of the 17th Central Committee of the CPC pointed out that in the future we should pay more attention to the people orientation, the overall, coordinated and sustainable development, overall
planning and all-round consideration, and pay more attention to safeguarding and improving people’s livelihood and improving social justice. The Session put forward five “upholds”, namely to uphold the strategic readjusting of the economic structure as the main direction of accelerating the transformation of economic development mode, to uphold scientific and technological progress and innovation as the important back-up of accelerating the transformation of economic development mode, to uphold safeguarding and improving people’s livelihood as the starting point and foothold of accelerating the transformation of economic development mode, to uphold the building of a resource-conserving, environment-friendly society as the key focus of accelerating the transformation of economic development mode, to uphold reform and opening up as the powerful engine of accelerating the transformation of economic development mode; and to improve the comprehensiveness, coordination and sustainability of development, making economic and social development better and faster.

The 2010 economic work conference held by the Central Government in December further requested that the main focus of work should be placed on the transformation of economic development mode, to consolidate the growth rate with structure, quality and efficiency, to coordinate economic development and population, resources and environment, and to make possible “transformation in development and development in transformation”. The conference also emphasized that different regions should take account of their own realities and work in line with the requests of “Scientific Outlook on Development”, set reasonable goals, pay more attention to the quality and efficiency of growth, pay more attention to stimulating employment and improving people’s living standards.

As is shown above, to thoroughly apply the “Scientific Outlook on Development” and accelerate the transformation of development mode is the main theme of current economic and social development of the PRC. If we compare the PRC’s strategic focus before as to start and speed up the “train” of economic growth, now the focus is shifted to the sustainability, stability and equity of the “train”. Economic growth regardless of resources and environment and social equity is hard to continue now. The current principles of benefits distribution also need to be changed. Resources and environment are the property of the whole society. We cannot place our eyes only on the economic benefits, but should take the ecological and social costs into account. We should not let the fruits of development go to only a small group of people while the cost shouldered by the general public. These changes will be gradually written into the criteria for the appraisal of the work of governments of all levels. GDP growth rate will not be the single most important criterion in the appraisal of the local governments’ work. This will give them more room for thinking of and experimenting on new ways of development.

1.1.2 New requests for developing the western regions
Since the implementation of the Go West Campaign Strategy, the economic and social development in this grand area has been very fast. Infrastructure is fundamentally improved. Ecological deterioration has been curbed. Featured and competitive industries have seen a good trend. However, the income gap with the national average level is widening, and resource extraction and initial processing are still the major ways of industrial development, without any other competitive industries. On the 10th anniversary of the implementation of the Go West Campaign Strategy, faced with the new situations, the CPC Central Committee and the State Council promulgated “Opinions on the Further Implementation of the Go West Campaign Strategy”, asking to “steadily push forward the Go West Campaign Strategies”, stressing that the Go West Campaign is a priority in the general plan of coordinating regional development of the PRC.
Therefore, whether in policy or with the allocation of resources by the Central Government, the “Go West Campaign Strategy” is still a key factor for the economic and social Go West Campaign.

For the first 10 years the strategy placed emphasis on infrastructure construction, ecological construction and basic public services. It was the “founding” stage. With the changes in macro environment, the emphasis of the past 10 years should be adjusted and more attention should be given to social and regional equity. Specifically to further push forward the Go West Campaign, there are two “transitions”, three policy zones, and a strategy of “grasping the two ends and leading the middle”. The two “transitions” are: the transition from the “founding” stage to a stage of further economic development centered on improving people’s livelihood, the transition from holistic policies to differentiated policies for different regions. Three policy zones are key economic zones, key aiding zones and key ecological function zones. The key economic zones are the main carriers for the “joining points with lines and constructing areas with points” strategy. The key aiding zones are the basic guarantee of building a moderately prosperous society in an all-round way in western regions. The key ecological function zones are the guarantee of national ecological safety.

The “Opinions on the Further Implementation of the Go West Campaign Strategy” adopted by the conference on the development of western regions held by the CPC Central Committee and the State Council in July, 2010 pointed out that policy support should be enhanced and more effective comprehensive measures should be taken to support the poverty-stricken areas and accelerate their development. The “Opinions” formally put forward the contiguous stretches of poverty-stricken areas development program, namely to establish key aiding zones. The aim is to provide basically equitable development conditions for the backward areas, to help the backward areas follow the leapfrog Go West Campaign, to ensure that the benefit of social and economic development goes to the people of various nationalities in the western regions to its maxim. The Central Government will increase manpower and material support and aid to the contiguous stretches of poverty-stricken areas.

In addition, Premier Wen Jiabao pointed out in the “Notes on Formulating the 12th Five-Year Plan for Economic and Social Development” that promoting coordinated regional economic development is an important strategic task of the 12th Five-Year Plan period and is the focus and difficult part of building a moderately prosperous society in an all-round way. Further implementation of the overall regional development strategy should focus on making the most of the comparative advantages of the different regions, solving their outstanding contradictions and problems. More effective measures should be taken to support old revolutionary base areas, ethnic minority areas, border areas and poor areas to accelerate their economic and social development. This shows that the country will further intensify its efforts to solve the development problems of poor areas.

1.1.3 Request of low-carbon economy and ecological civilization

On the UN Climate Change Summit on September 22, 2009, President Hu Jintao promised to the world on behalf of the Chinese Government that in 2020 the PRC’s non-fossil energy consumption will account for 15% of the total energy consumption of the PRC. On November 25, 2009, Premier Wen Jiabao chaired a State Council executive meeting to study and plan the work of addressing climate change. The meeting decided that the PRC’s per unit GDP carbon dioxide emission will decrease by 40% to 45% on a 2005 basis by the year 2020, and this will be a binding indicator in the long- and medium-term national economic and social development program. On the World Climate Change Conference in Copenhagen, Premier Wen
Jiabao promised to the world of this emission reduction target and expressed Chinese Government's determination. Regardless of how the international political competition around climate change will proceed, from the perspectives of energy supply, environmental change and sustainable development, low-carbon economy has become a way that the PRC must take.

Good ecological environment is an important condition for the sustainable development of the economy and the society, and is the foundation for the survival of a nation. To accelerate the construction of ecological civilization and fully implement the strategy of sustainable development is an important support to the society for embarking on a civilized development featuring a thriving economy, affluent life and sound eco-system. Ecological construction and environmental protection have always been the concern of the Chinese Government. The State Council has convened four national environmental protection conferences, six soil and water conservation meetings, two working meetings on desertification prevention and control and developed and issued a number of environmental protection and ecological construction policies. But the ecological problems are still very severe. There is still such phenomenon as constructing by one while damaging by many, and treatment is far slower than the rate of damage. To achieve sustainable economic and social development, we must do a good job in ecological construction. Environmental protection and ecological civilization is one of the core issues that local government must consider when they are formulating development strategies.

1.1.4 Request of better and more rapid development
In 2010, the new Guizhou provincial government stressed that “to unify our thinking to development, to ensure sound and rapid economic and social development, to make the development better and faster.” The goals of the government are set centered on this thinking, namely to thoroughly implement the scientific outlook on development, to speed up the transformation of economic development mode, to adjust the industrial and economic structures, to enhance the capability of independent innovation, and to constantly improve people's livelihood. Provincial government leaders stressed the need to adjust and optimize industrial and economic structures with increasing investments and expanding the incremental, to steadily promote urbanization based on reality and lay a foundation for integrating urban and rural economic and social development, and to deepen reform in all fields and open wider. Therefore, the “better and faster” principle is the guiding principle that the Guizhou province Party Committee and provincial government have for Guizhou’s development of the next period. Therefore, accelerating the development and achieving a historic leap for the economic and social development is a factor that must be fully considered when formulating development strategies for Guizhou Province.

1.2 Characteristics of Guizhou’s natural resources foundation

1.2.1 Guizhou has rich mineral reserves but mining is becoming more difficult.
Guizhou Province is rich in resources, especially mineral resources. It is one of the PRC’s provinces that have the richest mineral reserves and is an important energy base in South China. 122 types of minerals have been found, of which 76 have proven reserves. 14 types rank among the top five on the highest reserves list of all provinces, which are: aluminum, phosphate, coal, antimony, manganese, mercury, iodine, gallium, rare earth, silica, smelting crystal, optical crystal, cement ingredients and heavy clay. Bauxite and phosphate reserves rank the second of all provinces. Barite reserves rank No. 1. Manganese the third, and coal reserves rank the fifth.

Mineral resources development is a competitive industry of Guizhou Province, but now it is faced with
various difficulties and the advantages are gradually weakening. The industry is faced with short industrial chain, single product structure, low added value, extensive development mode, low comprehensive utilization rate and damage to the resources and the environment. Take the coal industry as an example. The sector is the leading industry of Guizhou, of which the output value accounts for 10.75% of the secondary industry. But restricted by a variety of conditions the industry has a very low growth rate. On the one hand, due to poor geological conditions and the depth of coal reserves, mining cost is high. On the other hand, transport passage has limited capacity and transportation is strained. Transportation cost is also high.

1.2.2 Guizhou has distinct advantages in climate resources.
Climate resources are an important influencing factor for a region’s development. It is not only a factor that affects the agriculture, but is also crucial for the developing the tourism, leisure industry, and health cultivation industry. Guizhou Province has a subtropical humid monsoon climate. The annual average temperature in most parts is 14-16 °. The actual value of solar radiation is comparatively low, 3349-3767mj/m2 in most areas. The frost-free period lasts for 220-340 days in a year; the heat is adequate. There is moderate rainfall with annual volume between 1100-1300mm in most areas. This climate condition shaped the typical karst landscape of Guizhou, and is the major supply source for a large number of surface water and groundwater systems. It also provides suitable growth conditions for plants and Guizhou has a great variety of plants. The climate and geological factors together provide Guizhou with a very rich reservoir of natural scenery for tourist development, including waterfalls, lakes, karst caves, underground rivers, stone forests, canyons, peaks and karst forest vegetation and ecological environment.

Pleasant climate is a prerequisite for tourist activities. Guizhou Province has no biting winter and hot in summer. As shown in Table 1, Guiyang, for example, its biggest comparative climate advantage is summer, when it is cool and pleasant, an ideal place for tourists. According to the report Advantages of Climate Resources in Guizhou’s Tourism issued by the Meteorological Bureau of Guizhou Province in December 2007, except for the two cities Kunming and Dali which are also located on the Yunnan-Guizhou Plateau, there are no other cities in the same latitude that have the same summer temperature conditions like the cities Guiyang, Liupanshui, and Anshun. Compared with summer resorts abroad, Guiyang’s temperature in summer is similar with the well-known tourist city Florence in Italy.

<table>
<thead>
<tr>
<th>City</th>
<th>January average (°C)</th>
<th>July average (°C)</th>
<th>Annual average (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guiyang</td>
<td>4.9</td>
<td>24.0</td>
<td>15.3</td>
</tr>
<tr>
<td>Guilin</td>
<td>8.0</td>
<td>28.3</td>
<td>18.8</td>
</tr>
<tr>
<td>Changsha</td>
<td>4.8</td>
<td>29.5</td>
<td>17.2</td>
</tr>
<tr>
<td>Chongqing</td>
<td>7.5</td>
<td>28.5</td>
<td>17.3</td>
</tr>
</tbody>
</table>

1.2.3 Featured by karst landforms and broken terrain.
Guizhou Province is located in the eastern part of Yunnan-Guizhou Plateau and is dominated by western China's mountainous landscape. The west part is higher than the east, and the land tilted from the center to the north, east, and south. There are more mountains and less plateau surfaces. The whole area is 1000-1500 meters above sea level and 92.5% of it is mountains and hills, known as "eight mountains, one
strip of water and a tiny fen of arable land". It has very typical karst landforms with an exposed area of 109,084 square kilometers, which take up 61.9% of the total area of the province. Karst landforms are widely spread in Guizhou and the morphological types are fairly complete, constituting a special karst ecosystem. Below the plateau surface there are distributions of basins (Bazi), which are the main agricultural zones. Due to the large volume of rain, the rivers have large water discharge and long-term cutting has formed deep and steep gorges. The Wujiang River valley is as deep as 300-500 meters. Big mountains and deep valleys are huge obstacles for traffic organization and socio-economic exchanges.

![Chart 1 Topographic map of Guizhou Province](image)

**Legend**

Only 47 Bazi have an area of over 10,000 acres each, over 80 Bazi have an area of 5000 ~ 10,000 acres, and over 5900 have an area of 500 ~ 5000 acres. Land conditions for production and living are poor. 58.07% of the unused land in Guizhou Province is covered by bare rocks and gravel, which is hard for cultivation. Little arable land, poor quality, high reclamation rate and large proportion of sloping land result in the high input and low output of agriculture. There is very limited land for construction, only 3.07% of the total land area. And there is serious shortage of reserve land resources.

**1.2.4 The eco-system is fragile and there is severe stony desertification.**

With the special geological conditions of karst areas, Guizhou is basically at the provenance of modern erosion and corrosion. When the natural vegetation in such areas remains intact the soil and water conservation is still easy and the ecological balance is kept. Once the natural vegetation is impaired, intense soil erosion will happen, which is a great damage to the ecological environment and a threat to the subsistence and development of people. The bedrock of most of the Guizhou area is carbonate rock. As carbonate rock has a slow process of erosion, the weathering crust is thinner and the surface stone buds develop. The soil layer is thin and broken, so that once the soil flows away it is hard to restore. In some locations with lower groundwater level, the precipitation rapidly sinks through the thin soil layer to the bedrock to form karst groundwater. Therefore the land has poor capacity to hold water and fertilizer. Currently 7.32 million hectares (109.8 million mu) of land in Guizhou has been eroded, accounting for 41.55% of the total area of the province. Stony desertification area reaches 3.76 million hectares (56.4 million mu), accounting for 21.35% of total land area.
Guizhou’s land productivity is lower than the national average, and carrying capacity of resources is low. As there is more sloping land than basin land, the arable lands are broken and disconnected and the soil is thin, as well as the poor irrigation conditions, food production in Guizhou has a weak foundation, and the yield per unit area is low. As shown in Table 2 below, in 2007, Guizhou’s grain yield per unit area is 5.01 t/ha, 5.82% lower than the national average of 5.32 t/ha. Beans yield per unit area is 1.18 tons/ha, 19.26% lower than the national average of 1.46 t/ha. Potato yield per unit area is 2.52 t/ha, 27.32% lower than the national average of 3.47 t/ha. In general Guizhou Province has been relatively overloaded with its population since 1990 till 2008. Natural resources utilization and the imbalance between the actual population and the carrying capacity of economic resources are problems hindering the sustainable development of Guizhou Province.

<table>
<thead>
<tr>
<th>Table 2 Per unit area production of grain crops</th>
<th>unit: kilogram/hectare</th>
</tr>
</thead>
<tbody>
<tr>
<td>National average</td>
<td>Guizhou</td>
</tr>
<tr>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>Grains</td>
<td>5319.9</td>
</tr>
<tr>
<td>rice</td>
<td>6433.0</td>
</tr>
<tr>
<td>wheat</td>
<td>4607.7</td>
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<td>corn</td>
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<td>Beans</td>
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<td>Potato</td>
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<tr>
<td>potato</td>
<td>2924.9</td>
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</tbody>
</table>

1.3 The development momentum of Guizhou and its problems.

1.3.1 Low economic development level

Between 2000 and 2009 the per capita GDP of Guizhou Province increases from 2,819 yuan to 10,302 yuan\(^1\), an increase of 2.65 times. But compared with the national and the western regions average, Guizhou Province is still lagging behind in its economic development. The per capita GDP of 2009 is far less than the national average of 27,369 yuan and the western regions average of 18,234 yuan (Chart 2).

The ratio of Guizhou Province per capita GDP to the national average remains at 0.37 for the period from 2000 to 2009. For the same period, the ratio of the western regions per capita GDP to the national average rises from 0.61 in 2000 to 0.67 in 2009. As for the GDP growth (Chart 3), while the western regions as a whole have an average growth rate higher than the national level, Guizhou is below the national average. For the period from 2000 to 2009, the average annual GDP growth rate of Guizhou Province is 10.87%, high enough though, is still below the national average (12.26%) and the western regions average

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\(^1\) Because of the statistical standards, the sum total of the GDP of all provinces is generally about 10% higher than the national GDP figure. For the convenience of comparison between the per capita GDP of Guizhou Province and that of the western regions and of the nation, the per capita GDP of Guizhou Province here is a figure from the total GDP divided by the total population of the province. The national per capita GDP is the sum total of the GDP of all provinces divided by the total population of the country at the end of the year. The per capita GDP of the western regions is a figure from the sum total of the GDP of the western provinces divided by the total population of the provinces at the end of the year. Therefore, there might be some discrepancy between the per capita GDP figures presented here and the data in the Statistical Yearbook. The data below is processed in the same way.
(12.14%).

Chart 2 Comparison of per capita GDP of Guizhou, the western regions and the whole nation

Chart 3 Comparison of the GDP growth rate of Guizhou, the western regions and the whole nation

Chart 4 Comparison of the urbanization level of Guizhou, the western regions and the whole nation
1.3.2 Low urbanization level and inadequate public services

Compared with the national and western regions average, Guizhou Province is lagging behind in its urbanization level (Chart 4). In 2009, the urbanization rate in Guizhou Province is 29.89%, well below the national average (46.59%) and the western average (39.42%), ahead of Tibet only in all the provinces. Between 2000 and 2009, the urbanization level of Guizhou Province rises only 0.67 percentage point annually, far less than the national average (1.08 percentage points) and the western regions average (1.19 percentage points).

The quality of the population in Guizhou needs to be improved. Take the number of people that have received college education for example (Chart 5). In 2000 and 2009, the number of people that have received college education in Guizhou Province are respectively 190 and 312 out of every 10 million, a rapid growth though, only 52.67% and 45.71% of the national level, 78.01% and 77.76% of the western regions level of the same period. The figures show that there is widening gap in the quality of the population between Guizhou Province and the national average and the average level of the western regions.

![Chart 5](image1.png)

**Chart 5 Comparison of the number of people that have received college education in Guizhou, west China and the PRC**

![Chart 6](image2.png)

**Chart 6 Comparison of the education and medical facilities allocated to every 10 million people**

Note: the figures are the ratio to the national level.
For the public service facilities such as educational and medical facilities, Guizhou Province is also below the national average and the western regions average level (Chart 6). Although the number of general secondary schools per 10 million people in Guizhou is higher than that of the western regions and the country, the number of secondary school teachers per 10 million people is relatively low. Given the more complex terrain, the actual level of educational facilities of Guizhou Province may be still lower than the national and the western regions average. And the medical services facilities per capita of Guizhou Province are far below the national average and the western regions average level. For 2009 the number of hospital beds and medical personnel allocated to every 10 million people are 25.67 and 25.47 respectively, 77.60% and 61.43% that of the national average, 98.53% and 90.90% that of the western region average. There is the trend that the hardware (number of schools and hospital beds) is improving but the software (number of teachers and medical personnel) is declining.

1.3.3 The infrastructure construction grows rapidly but the facilities are still at a low level.
With the implementation of the Go West Campaign Strategy, infrastructure construction in Guizhou Province has been greatly improved (Chart 7). From 2000 to 2009, the railway mileage increased from 1641km to 1982km and highway mileage increased from 34643km to 142561km, including the expressway mileage increase from 258km to 1189km. Airport passenger throughput increased from 1.3895 million to 5.68 million.

Chart 7 Guizhou’s infrastructure construction increase in 2000-2009

Chart 8 Comparison of Guizhou’s per capita infrastructure with the western regions and the nation
Yet compared with the country and the western regions average level, Guizhou is still lagging behind in infrastructure. As shown in Chart 8, from the per capita terms, railway, expressway and airport throughput density in Guizhou Province is far below the national average and the western regions average level. In 2009, the railway mileage per capita, the expressway mileage per capita and the airport passenger throughput of Guizhou Province are 0.522km, 0.313km and 1495.52 persons per 10 million people respectively, 87%, 64% and 43% of the national average and 66%, 65% and 52% of the western regions average.

1.3.4 People’s living standards are greatly improved, but are comparatively low and there is a huge gap between urban and rural areas.

With the economic development people’s living standards in Guizhou have also been greatly improved (Chart 9). Per capita disposable income of urban residents increases from 5,122 yuan in 2000 to 13,798 yuan in 2009. Per capita net income of rural residents increases from 1,374 yuan in 2000 to 3,005 yuan in 2009. The non-Engel’s coefficient\(^1\) for urban residents rises from 37.32 in 2000 to 58.49 in 2009. The non-Engel’s coefficient for rural residents rises from 37.32 in 2000 to 54.83 in 2009. Urban per capita housing area increases from 18.4 square meters in 2000 to 27.57 square meters in 2009.

![Chart 9 Increase in people’s living standards in Guizhou, 2000-2009](chart)

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\(^1\) Engel’s coefficient is the most commonly used indicator for the measurement of residents’ living standards. It is the proportion of food expenses to consumption expenditure. In general, the smaller the Engel’s coefficient, the higher the living standards. For the convenience of comparison with other indicators (All follow that the higher the indicator value, the higher the level), the proportion of non-food expenses to consumption expenditure is temporarily named the non-Engel’s coefficient here.

---

11
Chart 10 Comparison of people’s living standards in Guizhou with the western regions and the whole nation

But compared with the national average and the western average level, people’s living standards in Guizhou are still relatively low, and there is a large gap between the urban and the rural areas. As shown in Chart 10, in 2009 per capita disposable income of urban residents and per capita net income of rural residents are 13,798 yuan and 3,005 yuan respectively, 80.33% and 58.31% of the national average, 97.08% and 78.74% of the western regions average. Gap between urban and rural areas of Guizhou Province in 2009 (ratio of per capita disposable income of urban residents to per capita net income of rural residents) is 4.59, much higher than the national average (3.33) and the west regions average (3.72). In addition, non-Engel’s coefficients of urban and rural areas are also lower than the national average and the average level of the western regions. In 2008, the non-Engel’s coefficients of urban and rural areas are 58.49 and 54.83 respectively, lower than the national average (63.48 and 59.03) and the western regions average (61.37 and 56.90). This means that in Guizhou people spend more of their income on food and their living standards are below the national and the western regions average.

1.3.5 Fixed assets investment increases slowly and is far less than the national and the western regions average.

The total investment in fixed assets in Guizhou Province is far less than the national and the western regions average (Chart 11). In 2009 the per capita fixed assets investment in Guizhou Province is only 6,420 yuan, 38.15% of the national average and 47.46% of the western regions average. From 2000 to 2009, the per capita fixed assets investment in Guizhou Province increases from 1,072 yuan to 6,420 yuan, an average annual growth rate of 22.01% (current prices), while the national average and the western regions average growth rates are 23.07% and 25.00% respectively, higher than that of the Guizhou Province. The figures show that the per capita fixed assets investment in Guizhou Province is far below the national and western regional average level and grows more slowly.
Chart 11 Comparison of the per capita fixed assets investment of Guizhou, the western regions and the nation

Table 3 Comparison of the sources of fixed assets investment of Guizhou and of the PRC

<table>
<thead>
<tr>
<th>Year</th>
<th>The PRC</th>
<th>Guizhou Province</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>government funding</td>
<td>foreign capital</td>
</tr>
<tr>
<td>2000</td>
<td>26.69%</td>
<td>5.12%</td>
</tr>
<tr>
<td>2001</td>
<td>25.76%</td>
<td>4.56%</td>
</tr>
<tr>
<td>2002</td>
<td>26.68%</td>
<td>4.63%</td>
</tr>
<tr>
<td>2003</td>
<td>25.13%</td>
<td>4.43%</td>
</tr>
<tr>
<td>2004</td>
<td>22.86%</td>
<td>4.41%</td>
</tr>
<tr>
<td>2005</td>
<td>21.64%</td>
<td>4.21%</td>
</tr>
<tr>
<td>2006</td>
<td>20.40%</td>
<td>3.64%</td>
</tr>
<tr>
<td>2007</td>
<td>19.16%</td>
<td>3.40%</td>
</tr>
<tr>
<td>2008</td>
<td>18.81%</td>
<td>2.90%</td>
</tr>
<tr>
<td>2009</td>
<td>20.78%</td>
<td>1.85%</td>
</tr>
</tbody>
</table>


As for the sources of investment (see Table 3), the main source of the fixed assets investment in Guizhou is self-raising and others. The proportion of government funding (including the State Budget and domestic loans) is declining over the years and the share of foreign capital is small. In 2009 the self-raising and other funding sources account for 65.37% of the total investment funds, while the government funds account for only 34.25%. But compared with the national level, the government funding is still an important source of investment for Guizhou Province. In 2009 the share of government funding in the fixed assets investment in Guizhou Province is nearly 15 percentage points higher than the portion for the whole nation. Despite the relative importance of government funding, the level of state investment in fixed assets in Guizhou Province is low. As is shown in Table 12, the per capita state investment in Guizhou Province has always been far below the national average level, and this gap has been widening. In 2009 the per capita state investment in Guizhou Province is 2,546 yuan, only 65.37 percent of the national average. Therefore, lack of government funding and the low level of foreign capital utilization are the main reasons for the low fixed assets investment rate and its slow growth in Guizhou Province.
Chart 12 Government funding in the per capita fixed assets investment of Guizhou and the PRC

Chart 13 Contribution of different industries to the GDP growth of Guizhou Province in 2000-2008


1.3.6 GDP growth is mainly contributed by service industry, agriculture and raw material industry. Industrialization level is low.

The GDP growth of Guizhou Province from 2000 to 2009 is mainly contributed by the service industry, agriculture, electricity, wholesale and retail trade and the mining industry (Chart 13 and Chart 14). The industrialization level is low. For this period the contribution of service industry to GDP growth is 53.10%, followed by agriculture, forestry, animal husbandry, sideline production and fishery, which account for 9.6%. In the various industries electricity and mining contribute the most, taking up 8.4% and 6.0% respectively. Contribution of the manufacturing sector to GDP growth is only 17.7%, and is mainly in light industries such as beverages and tobacco and heavy industries such as metal smelting and petrochemical. In general, the industrial development of Guizhou is weak, and the industrialization level is low.
1.3.7 A large poverty-stricken area, poverty alleviation with difficulty
Guizhou is one of the provinces with the largest area and the highest poverty-stricken proportion. Guizhou has a tenth of poverty-stricken population in the country. In 2009, the poverty-stricken population in the 50 counties was 4.20 million, accounting for 75.58% of the total 5.55 million in the whole province. The average poverty incidence of the 50 counties is higher than 20%; 36 of the 50 counties have a poverty incidence higher than 20%. In 2009, the per capita GDP of the 50 counties is 7,026 yuan, 68.15% of Guizhou’s average level (10,309 yuan) and 27.23% of the PRC’s average level (25,796 yuan). Accelerating economic development of poverty counties is an important part of coordinatively and rapidly great-leap-forward development, is also a key task to construct a harmonious society in Guizhou.

1.4 Review and appraisal of the past development strategies of Guizhou
1.4.1 Development priorities and appraisal in comparison
Table 5 shows the development priorities of Guizhou during the 10th Five-Year Plan and the 11th Five-Year Plan periods.

Table 5 The development priorities of Guizhou during the 10th and the 11th Five-Year Plan periods

<table>
<thead>
<tr>
<th>10th Five-Year Plan</th>
<th>11th Five-Year Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. To accelerating economic growth, to improve the quality and returns of economic growth.</td>
<td>1. To strengthen the poverty alleviation work in the new stage, to strive to build new socialist countryside.</td>
</tr>
<tr>
<td>2. To readjusting the industrial structure—consolidating and strengthening the status of agriculture as the foundation of the national economy, readjusting the structure of agriculture and rural economy; Optimizing and strengthening industry, fostering and developing competitive feature industry; to forcefully develop the service industry, to speed up the development of tourist industry.</td>
<td>2. To strengthen infrastructure construction, especially transportation and water conservancy works.</td>
</tr>
<tr>
<td>3. To strengthen infrastructure construction, especially the transportation infrastructure.</td>
<td>3. To readjusting and optimizing the industrial structure, to accelerate the building of featured economy systems.</td>
</tr>
<tr>
<td>4. To optimize the regional structure, to accelerate urbanization and improve the urban-rural structure.</td>
<td>4. To accelerating urbanization, to promote the coordinated development of regional economy.</td>
</tr>
<tr>
<td>5. To enhance the ecological construction, to protect the environment and curb pollution.</td>
<td>5. To establish an ecological province, to strive to build a resource-conserving, environment-friendly society.</td>
</tr>
</tbody>
</table>
With the above priorities, the result of the actual implementation of the plan shows that: the infrastructure construction in Guizhou progresses rapidly; agriculture and rural areas develop rapidly, but the issues concerning the agriculture, farmers and the rural areas are still outstanding; industries and services have basically achieved the desired result; tourist industry has made breakthroughs; regional pattern is gradually optimized, but the process of urbanization is slow; ecological construction is progressing well, but the energy conservation and emissions reduction are faced with tremendous pressure.

**a. Infrastructure construction in Guizhou progresses rapidly.**

Since the implementation of the 10th Five-Year Plan, with the advance of the Go West Campaign, infrastructure construction in Guizhou Province progressed rapid. Especially in the 11th Five-Year Plan period, a number of major projects were started or completed. By the end of 2009, the province's highway mileage had reached 142,561 km, of which 1,189 km were expressways, 68,046 km were graded highways. As for railway construction, the Guizhou-Guangxi railway capacity expansion, railway from Huangtong to Zhijin, Guiyang railway hub expansion and other key projects were pushed forward rapidly. Guizhou-Guangdong express railway construction and the Liupanshui to Zhanyi section second line project were launched. As for airport construction, Guiyang Longdongbao Airport was upgraded into an international airport and the Libo Airport was put into service.

The 11th Five-Year Plan put forward the request to basically solve the problem of water shortage due to the lack of water conservancy works in five years. In the 11th Five-Year Plan period, Guizhou launched 11 medium-sized key water conservancy projects such as Zunyi irrigation area project phase I, stepped up with the construction of the “three small” projects and the “smoke water supporting” project, adding 239,100 new “three small” water conservancy facilities and 2.29 million mu of the “smoke water” irrigation areas, and implemented a number of flood control and drainage, soil conservation and watershed management projects.

**b. Agriculture and rural areas develop rapidly, but the issues concerning the agriculture, farmers and the rural areas are still outstanding.**

The 10th Five-Year Plan of Guizhou Province requests “to consolidate and strengthen the status of agriculture as the foundation of the national economy, to readjust the structure of agriculture and rural economy”, while the 11th Five-Year Plan requests “to strengthen the poverty alleviation work in the new stage, to strive to build new socialist countryside”.

Judging from the implementation results, over the past decade agricultural production conditions have been greatly improved in Guizhou Province. Featured agriculture and agricultural industrialization have gone through significant progress. Since the implementation of the 11th Five-Year Plan, 315 pollution-free agricultural products bases including those for high-quality grain, high-quality livestock products, vegetables and fruits were constructed; provincial agricultural industrialization leading enterprises developed to a number of 99; farmer cooperative economic organizations and intermediary organizations developed to a number of 4,022; pre-employment training for the transfer the rural surplus labor was carried out and the number of trainees reached over 800,000. In 2009, the province's rural per capita effective irrigation area increased to 0.43 mu, and the total output of grain reached 11.6827 million tons.

However, in Guizhou Province the issues concerning the agriculture, farmers and the rural areas are still outstanding. First, the transportation, water conservancy and other infrastructure facilities in rural areas are
weak. Education, medical services, culture, social security and other social undertakings lag behind. The production and living conditions of farmers need to be further improved. Second, the foundation of agriculture remains weak. The capacity to withstand natural disasters is low. Agricultural structure adjustment and industrialization is slow. Agriculture is still developing in an extensive way. The proportion of agricultural products entering the market is small. Third, farmers’ income level remains low. Poverty is still a prominent issue in rural areas.

c. Industrial economy achieved a fast development with enterprises becoming stronger

The tenth five-year plan emphasized “optimizing industrial sector and nurturing characteristic and advantageous industries”; while the 11th five-year plan further pointed out “sticking to new industrial development path and accelerating characteristic economy system construction”.

Over the past decade, industrial economy in Guizhou province has achieved a fast development, and its support to economic growth become more obvious. In 2009, the industrial added-value of above-scale enterprises reached 117 billion Yuan, and the proportion of it to the total production volume increased from 21.84% ten years ago to 30.05%. However, the growth was still quite extensive, and highly dependent on resource- and energy-consumption industries.

With regard to enterprise development, the tenth five-year plan proposed to “adopt proactive support policies and optimize organizational structures.” The eleventh five-year plan further suggested “implementing the plan of nurturing and building big-scale enterprises with over ten billion Yuan income.” Up to 2008, 7 enterprises had reached this goal, including the PRC Tobacco (Guizhou) Industrial Co. Ltd. and Guizhou Power Grid Co., etc. At the same time, small- and medium-sized enterprises were supported to sharpen their unique competitive edges, some of them grown to be small giants with over 1 billion Yuan annual sales income.

d. Service sector developed better than expected, and tourism gained break-through

The 10th five-year plan proposed to “devote major efforts to service sector and tourism,” with the objective of raising the proportion of tertiary industry’s added value against GDP to 36%. The eleventh five-year plan suggested “tapping overseas tourist markets and building Guizhou’s tourism brand image,” with the goal of further increasing the ratio of service sector’s added value against GDP to 42.2%.

In 2009, the added value of tertiary industry reached 186.516 billion Yuan, with a rapid increase of 507% over that of the year 2000. And the proportion of it against GDP of the province increased to 47.9%, with the plan over fulfilled. However, the overall development of service sector is still lagging behind, mainly reflected in its low-level market-orientation and insufficient ability to drive consumption.

In the tertiary industry, tourism maintains a sound growth momentum and becomes a new shining spot of the provincial economy. Across the province, A-rated scenic area has increased to 37, 28 more than that in 2005. Transportation to the scenic areas has continually been improved and tourist information center risen to 37. A diversified tourist products system has been formed, represented by natural ecology, ethnic minority culture, villages tourism, revolutionary base tourism, and leisure tourism, of which a new series of refined specialty tourist destinations were put on the market.
e. Regional economies were gradually optimized, but urbanization advanced slowly

In the 10th five-year plan, priority was given to the development of Qianzhong industrial belt. While in the eleventh five-year plan, the development of western economic belt became a key part of the regional economic development strategy. Since the implementation of the eleventh five-year plan, the development of the western area (including Bijie, Liupanshui, and Xingyi) was accelerated. And to take full advantage of the local mineral resources and build a revolving and economical industry base, a series of big projects were carried out on energy sector, coal chemical industry, and phosphate chemical industry. The development of northern economic area centered around Zunyi municipality was under way. And obvious progress was made in building national and provincial development zone.

Promoting social and economic development of ethnic minority-inhabited area was continuously an important task in both the 10th and 11th five-year plan. At present, all the ethnic-inhabited areas had access to third-class highways, of which three autonomous prefectures, Qiannan, Qiandongnan, and Qianxinan, respectively, even had access to express highways or high-class roads. Particularly, the Guizhou-Guangzhou express highway and Guizhou-Guangzhou express railway under construction would pass Qiannan and Qiandongnan prefecture, bringing new opportunities to these ethnic-inhabited areas.

According to the goal of the 11th five-year plan, 35% of the province will be urbanized by 2010 with an average annual increase of 1.6 percentage point. By the end of 2009, only 29.9% of the province was urbanized, still lagging behind the planned progress.

f. Ecological environment improved as planned, but energy conservation and pollution reduction was still a big pressure

According to the 10th and 11th five-year plan, Guizhou made great efforts in ecological improvement work, such as integrating all sorts of resources, creating new system and mechanism, adjusting ecological improvement plan. Big ecological projects were carried out, including reconverting farmland into forestry and pasture, conserving natural forestry, strengthening Zhujiang ecological shelter forests, harnessing stone desertification, constructing fast-growing and high-yielding timber base, and building green corridors. Through these measures, the ecological environment was greatly improved.

However, energy conservation and pollutants reduction is still a big pressure for Guizhou. For the first two years of the 11th five-year plan period, energy consumption and major pollutants emission didn’t catch the planned progress. There were four reasons to it: First, industrial scale continuously enlarged, the industries heavily dependent upon mineral resource exploitation, like metallurgy, thermal power and chemical sector. Second, some enterprises still adopted extensive growth model, without making efforts to innovate technologies and discard backward capacities. Third, present urban environmental protection facilities couldn’t meet demand, mainly because the under-construction sewage treatment facility made sluggish progress and some completed sewage treatment facility malfunctioned due to high operational cost and insufficient complementary facilities. Fourth, installed thermal capacity continuously increased and some of the thermal plants’ desulphurization facility failed to meet requirement.

1.4.2 Retrospect and appraisal of policy-supported key sectors over the tenth and eleventh five-year plan period

As table 6 shows, there’s no major change to policy-supported key sectors from the tenth to the eleventh five-year plan, mainly energy sector, raw material sector, tobacco and spirit sector, food and
pharmaceutical sector, tourism and high-tech sector.

**Table 6: Policy-supported key sectors in the tenth and eleventh five-year plan**

<table>
<thead>
<tr>
<th>The tenth five-year plan</th>
<th>The eleventh five-year plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. energy sector focused on electricity</td>
<td>1. energy sector</td>
</tr>
<tr>
<td>2. raw material sector</td>
<td>2. raw material sector</td>
</tr>
<tr>
<td>3. tobacco and spirit as pillar industry</td>
<td>3. traditional tobacco and spirit sector</td>
</tr>
<tr>
<td>4. bio-pharmaceutical and specialty food sector</td>
<td>4. tourism and ecological stockbreeding</td>
</tr>
<tr>
<td>5. high-tech sector</td>
<td>5. ethnic pharmaceuticals and specialty food sector</td>
</tr>
<tr>
<td></td>
<td>6. high-tech sector represented by aerospace, electronic information and advanced manufacturing</td>
</tr>
</tbody>
</table>

**Table 7: Policy-supported key sector growth analysis**

<table>
<thead>
<tr>
<th>GDP (100 million Yuan)</th>
<th>Year 2000</th>
<th>Year 2008</th>
<th>Nominal growth rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public utility</td>
<td>993.53</td>
<td>3333.4</td>
<td>335.51%</td>
</tr>
<tr>
<td>Mining</td>
<td>50.13</td>
<td>274.61</td>
<td>547.75%</td>
</tr>
<tr>
<td>Ferrous metal metallurgy</td>
<td>18.26</td>
<td>181.56</td>
<td>994.14%</td>
</tr>
<tr>
<td>Chemical materials and products manufacturing</td>
<td>24.39</td>
<td>103.85</td>
<td>425.87%</td>
</tr>
<tr>
<td>Tobacco processing</td>
<td>23.38</td>
<td>93.46</td>
<td>399.67%</td>
</tr>
<tr>
<td>Non-ferrous metal metallurgy</td>
<td>17.61</td>
<td>57.10</td>
<td>324.24%</td>
</tr>
<tr>
<td>Medicine production</td>
<td>17.61</td>
<td>125.61</td>
<td>222.77%</td>
</tr>
<tr>
<td>Non-metal mineral production</td>
<td>3.02</td>
<td>14.16</td>
<td>469.30%</td>
</tr>
<tr>
<td>General-purpose equipment manufacturing</td>
<td>3.64</td>
<td>11.49</td>
<td>315.53%</td>
</tr>
<tr>
<td>Metal products manufacturing</td>
<td>4.93</td>
<td>8.30</td>
<td>250.67%</td>
</tr>
<tr>
<td>Communication equipments, computer and other electronic equipments manufacturing</td>
<td>2.00</td>
<td>315.53%</td>
<td></td>
</tr>
</tbody>
</table>

Table 7 shows the growth rate of the policy-supported key sectors from 2000 to 2008. All the sectors maintained a high speed growth with nominal growth rate over 200%. Seven sectors’ growth rates are lower than GDP growth rate, including tobacco processing, non-ferrous metal metallurgy, medicine production, non-metal minerals production, metal products manufacturing, communication equipments, computer and other electronic equipments manufacturing.

**a. Energy sector’s position as pillar industry was strengthened**

Energy sector’s position as pillar industry was strengthened since the implementation of the 10th five-year plan. Both the tenth and eleventh five-year plan proposed to accelerate the development of energy sector with electrical power as emphasis, by grasping the opportunity brought about by the west-to-east power transmission project. Over recent years, power plant construction had been further advanced, 6 plants completed including Nayong no.2 plant, and some follow-up plants’ construction went smoothly, such as
Goupitan, Silin and Guangzhou hydro power plant. By the end of 2009, total installed centralized capacity reached 25.4 million kilowatt. According to the present progress, the goal of the eleventh five-year plan could be reached on time, that is to have an installed capacity of over 30 million kilowatt by 2010 and delivery capacity of 10 million kilowatt.

b. Advantageous raw materials sector grew fast
The 10th five-year plan proposed to develop new construction materials sector and high energy-consumption industries focused on aluminum production and processing, phosphate chemical industry, metallurgy and metallurgical products, quality abrasives and abrasive tools. The eleventh five-year plan further suggested planning and building coal chemical industry belt in the Western part of the province. Since the beginning of the tenth five-year plan, industrial structure adjustment was accelerated, with advantageous raw materials sector grew stronger, such as coal chemical, phosphate chemical industry, aluminum processing. Greater than ever efforts were made in adjusting the structures of high energy-consumption and high pollution industries, like iron alloy and cement. The construction of three coal chemical bases (Biqing, Qianbei, and Liuxing) advanced smoothly, and a big series of projects were launched. Kailin Group and Wengfu Group were growing their refined phosphate chemical, and an industrial belt had been formed along Xifeng, Kaiyang and Wengfu. The preliminary work for Zhijin phosphate mine base was under way. And the integration of coal, power and aluminum production and deep processing was pushed forward. In 2007, the value added from advantageous raw material sector reached 15.38 billion Yuan, and its proportion against that of total added value of above-scale enterprises increased from 16.5% in 2005 to 17.3%.

c. Specialty sectors achieved a rapid development
The 10th five-year plan proposed to solidify tobacco and spirits’ position as pillar industry and nurture bio-pharmaceutical and specialty food industry. The eleventh five-year plan specified the growth model as “intensive and scaled” and “develop ethnic medicine industry.” Since 2000, specialty sector achieved a rapid development. Through resources integration and structural adjustment, tobacco industry was concentrated, and it can better allocate resources. With better product quality and brand image, in addition with stronger competitive edge and anti-risk capacity, tobacco industry maintained its growth momentum. By 2008, above-scale tobacco enterprises realized 11.699 billion Yuan added value. Spirits making industry represented by Maotai also stepped on a sound growth track. For the first half of 2008, spirits industry realized 3.968 billion Yuan added value and a total profit of 4.831 billion Yuan, each performance factors better than ever. As another specialty sector, pharmaceutical industry achieved good results, too. Above-scale enterprises realized 4.831 billion Yuan added value in 2008. Above-scale traditional Chinese medicine enterprises reached 80, of which 28 had annual income of above 100 million Yuan. The industry was further concentrated, with 41 standard experimental base established for planting traditional Chinese medicinal material.

d. High-tech sector developed fast
The 10th five-year plan proposed to “promote the market application of key technologies” and “innovate and upgrade traditional industries with high technologies.” On this basis, the eleventh five-year plan suggested accelerating the construction of key industrial bases and promoting technology development and industrialization.

Since the 10th five-year plan, led by high-tech application in leading enterprises, the sector made some new
progress. Especially after the implementation of the eleventh five-year plan, high-tech development was pushed forward in some key industries, such as biology, electronic information, new materials, advanced manufacturing, and aerospace, etc. By ways of resources integration, structural adjustment, technology introduction and innovation, high-tech sector achieved a relatively quick development. By 2009, it realized 9.84 billion Yuan added value, an increase of 13.7% over the previous year, and its proportion against GDP reached 2.5%. But compared with other sectors, high-tech sector was still sluggish in development. Since its industrial concentration and resource application was still in low level and its technological equipment inferior, the high-tech sector had much work to do in the future.
2. Constraint factors and competitive edges

2.1 Constraint factors

2.1.1 Broken terrain and serious engineering water shortage

Broken terrain has always been a key constraint factor for Guizhou to develop its agriculture. Guizhou has the biggest karstified area, and it is the only province in the PRC that doesn’t have plains. Mountains and hills account for 92.5% of its total area. And lands between the mountains and the hills are mostly covered by bare rocks and gravels, so it is difficult to exploit. Arable lands are scattered and with sharp slopes, thus cultivating machines can hardly apply. Due to soil erosion, fertility can’t be sustained, which led to low and unsteady yield.

This terrain not only constraints agricultural development but also brings about inconvenience to industrial development. Construction in this terrain is hard and with relatively high cost. Transportation and telecommunication infrastructure is backward, and some very inconvenient areas like mountain tops even had no access to electricity up to now. Thus, the broken terrain has raised cost for developing industries. Only concentrated and characteristic industries can prevail in Guizhou.

Except for the broken terrain, engineering water shortage is another constraint factor for Guizhou’s development. Although Guizhou is rich in water resources, hydro-projects construction can’t meet water demand due to the karst geology and the fact that areas benefited from those projects are scattered around. Over a long period of time, engineering water shortage has been a common phenomenon in karst mountain areas, which makes it a very prominent problem for people and animals to get safe drinking water. Most of the drought lands lack irrigation, and water for urban residents and industries can’t be ensured. The rarely seen drought in 2010 clearly exposes what a serious problem the engineering water shortage has caused.

2.1.2 Prominent Contradictions between big population and limited resources, population and environment

The contradiction between population and ecological environment is prominent in Guizhou province. Due to its steep slopes of mountains and hills and concentrated rain, its carbonate basement rocks easily weathered and slowly evolved into soil, the ecological environment in Guizhou is very fragile. Water and soil is easily lost, and fertility is hard to kept. The problem of rock desertification is very serious. Under this condition, land resources in Guizhou has always been overloaded with production tasks, and ecological safety faces big potential challenges. All these factors seriously constraint local social and economic development.

Firstly, the contradiction between population and ecological environment constrained agricultural productivity. In 2009, crops yield per hectare in Guizhou was 5.13 tons, 5.8% lower than the national average level of 5.44 tons per hectare; cotton yield per hectare was 0.63 tons, 51.1% lower than the national average level of 1.28 tons per hectare; flue-cured tobacco yield per hectare was 2.0 tons, 10.24% lower than the national average level of 2.22 tons per hectare (see graph 15). Other produces' yield was also far lower than the national average, such as peanut, rapeseed, sesame, sugar cane, sugar beet, etc.
Chart 15  Comparison of farm produce yield per unit between Guizhou and national average

Secondly, fragile ecology reduced the land's carrying capacity and narrowed human activity space. If the contradiction between human activity and land carrying capacity couldn't be effectively resolved, ecological problems like water and soil loss, rock desertification, and drought and flood they brought about, would become more prominent. People's economic and social activity would be continuously narrowed. Since 1990, Guizhou had been overloaded with population. So to achieve leap and frog development, it is necessary for Guizhou to balance the relationship between human activity and land carrying capacity.

Thirdly, the contradiction between population and ecological environment brought about safety concern to human activity. Ecological problem such as water and soil loss and rock desertification not only caused drought and flood in Karst area, but also brought inconvenience to people's economic activity. For example, rock desertification bore direct or indirect influence to the operation of hydro facilities in the Yangtse River and Pearl River.

2.1.3 Weak development foundation
AFFECTED by backward economy, Guizhou had a relatively weak foundation in finance, industry, education, and human resource. Besides, state investment in the province was inadequate. All these factors had long restrained Guizhou from rapid economic growth.

Firstly, local government fiscal revenue was relatively low and economic foundation was weak. In 2009, Guizhou provincial general budgetary revenue was 41.65 billion Yuan, accounting for only 1.28% of the general budgetary revenue of local governments of the country, far lower than neighbouring provinces and municipalities, such as Sichuan, Hunan, Chongqing, Yunnan and Guangxi (see graph 16). And the state investment in Guizhou is obviously inadequate, per capita state investment much lower than the national average. In 2009, state budgetary investment and state loans for fixed assets investment totalled at 96.72 billion Yuan, accounting for only 1.86% of the total across the country. Besides, limited by its geographic position, Guizhou was less attractive than other provinces to foreign and domestic capital. In 2009, foreign investment in Guizhou was 3.6 billion USD, accounting for only 0.14% of the total foreign investment in the PRC, much lower than that in neighbouring provinces (see graph 17). Thus, inadequate state investment, limited ability to attract foreign investment, together with relatively low fiscal revenue had long constrained fixed asset investment and economic development in Guizhou.
Secondly, industrial foundation was weak. Due to the limit of natural conditions and economic development, the overall industrial sector in Guizhou was weak and irrational in structure, mainly energy raw material and tobacco and spirits. In 2009, the industrial added value accounted for 32.02% of GDP, lower than the national average of 39.20%. Per capita industrial product value was 9022 Yuan, about 1/5 of the national average. From the perspective of industrial structure, coal mining and electricity made up of the biggest proportion. In 2009, product value of these two sectors accounted for above 1/3 of the total industrial added value. Manufacturing was relatively backward, and its product value accounted for only 60.89% of the aggregate industrial product value, much lower than the national average of 87.4%. Manufacturing sector mainly consisted of light industries, like tobacco and spirit. The added value created by these two industries accounted for 17.9% of the total industrial added value. Although Guizhou was once the base of military defence and there were a lot of aerospace and electronic enterprises left behind, they had been gradually rid of the pillar industries due to low technology and profit level.

Thirdly, talent base was weak due to insufficient investment in education. Affected by complex terrain, Guizhou was scarcely populated. Inconvenient transportation led to high education cost and low efficiency. Besides, influenced by local hardship living conditions, high-level full-time teachers are seriously inadequate. And local residents, especially those low-income mountainous residents, couldn’t afford
education. Thus, education had always been a problem of Guizhou’s development, especially to those mountainous children. Although non-government organizations and individuals paid a lot of attention to education in Guizhou and provided much capital support, educational input was still not enough. In 2009, per capita educational input in Guizhou was 713 Yuan, equivalent to only 73.6% of the national average of the same period, and lower than the neighbouring provinces (see graph 18 below). Inadequate input in education caused relatively low quality population. Big parts of rural surplus labor were semi-illiterate. Weak talent base had become one of the major constrain factors to local economic and social development.

Chart 18 Per capita educational input comparison between Guizhou and its neighboring provinces

2.1.4 Forgotten by regional development policies without taking strategic position in the macro-economy

Guizhou is a relatively remote inland province, not next to seas or rivers or borders. Since the reform and opening up, the development of Guizhou had never been rise to national macro-strategy, and thus never benefited from the support of special regional policies, except from poverty reduction policies.

In the beginning of the reform and opening up, the PRC adopted non-balanced development strategy, coastal area as emphasis and Middle and Western areas as raw material base for Eastern processing industries. Thus the whole Western area including Guizhou was relatively underdeveloped. After the ninth state five-year plan, attention was paid to the development of the Middle and Western areas. And policies was adopted to narrow the development gap between different regions. The tenth five-year plan clearly proposed “adopting the Western Development Strategy and promoting coordinated regional development.” However, the implementation of the Western Development Strategy mainly “gave priority to efficiency with due consideration to fairness,” with emphasis on relatively better developed areas, such as Chengdu-Chongqing, Guanzhong, Xining-Lanzhou, and energy concentrated areas like Shaanxi and Inner Mongolia. While Guizhou as one of the underdeveloped area, didn’t get much state investment from the Western Development Strategy.

Although infrastructure in Guizhou was improved after ten years of implementation of the Go West Campaign, the province’s major role was still delivering energy and raw materials. As one of the key provinces to transmit power from the West to the East, Guizhou had transmitted over 170 billion kilowatt electric power to Guangdong. Electricity generation sector had jumped to be a pillar industry in Guizhou,
but relatively low on-grid power tariff and the state-owned enterprise management structure, together with low resource tax, led to low fiscal income and few benefit to the economic development of Guizhou. At the same time, coal mining and thermal power generation brought very serious influence to the local ecological environment. Particularly, the southern-west part of Guizhou, as energy and raw material base, was confronted with serious water pollution, heavy metal pollution and stone desertification.

With the beginning of the second phase of Western Development, developing economic regions of Chengdu-Chognqing, Guanzhong-Tianshui, and Northern Gulf of Guangxi had been included in the state development strategy category. Some new Western economic centers would be created, including Huhehaote-Baotou-Yinchuan, Tianshan Mountain North Slope, Lanzhou-Xining-Geermu, and Shanxi-Gansu-Ningxia. Guizhou was still left in marginal position.

2.2 Competitive edges

2.2.1 Transportation improvement would greatly raise Guizhou’s position in regional economies

With broken terrain and its non-seashore, non-rivershore, non-border location, Guizhou was highly dependent upon transportation. In the past, limited by inconvenient transportation, Guizhou was far from regional traffic economic belt and easily marginalized. Besides, hard to obtain external production factors constrained economic development to some extent. Improvement of infrastructure would reduce travelling time from Guizhou to neighboring regions, thus allow people travel more frequently and raise Guizhou’s position in regional economy through strengthening economic relations with other areas.

Over recent years, Guizhou made great efforts to improve transportation infrastructure and plan a comprehensive transportation network, especially the construction of express roads. In respect of highway construction, the provincial government approved Express Highway Network Plan in February 2009. According to the plan, the express highway network consisted of 6 horizontal highways, 7 vertical and 8 joint ones, as well as 4 ring roads. The total mileage of the highway network would reach 6851 kilometers, and each county would be connected by express highways by 2020. With regard to express railway, three railways connecting Guizhou and other provinces were under construction, including Guiyang-Guangzhou, Guiyang-Changsha, and Guiyang-Kunming. Two railways had been approved, Guiyang-Chongqing and Guiyang-Chengdu, respectively. At the same time, internal railways construction were accelerated, such as Tongyu railway, Zhinashui railway, and Longbai railway.

When these transportation facilities were finished, travelling time from Guizhou to other economic regions would be shortened to a great extent, like to Beijing-Tianjin-Hebei area, Yangtze River Delta, Pearl River Delta, and Guangxi Northern Gulf area. By then, express transportation system would be in place. And it would take just 2 hours from Guiyang to Chengdu, Chongqing, Kunming, and Changsha; 3 hours to Wuhan; 4 hours to Guangzhou, Xi’an; 5 hours to Zhengzhou; 6 hours to Shanghai, and 7 hours to Beijing. This would greatly raise Guizhou’s position in regional economies, bringing a lot of benefits, such as transportation cost from Guizhou to other areas lowered , travelling time shortened and output delivery increased, especially more investment and talents inflow attracted. All these would be of help in promoting the economic and social development of Guizhou.

Higher position in regional economies would bring obvious positive effect to Guizhou’s agriculture, tourism and trade. In agro-sector, shortened transportation time would make it possible to deliver fresh
farm produce to economically developed areas like the pearl river delta. This was critical to Guizhou, since it is one of the few places in the PRC that can plant and produce vegetables in fall and winter. And benefited from its good environment, the quality farm produce had very strong competitive edges, because it met people’s pursuit of green and healthy. In tourism sector, benefited from shortened travelling time, Guizhou, with its advantageous climate and beautiful scenery, would be more attractive to tourists from the Pearl River delta, Chengdu-Chongqing area, and Changsha-Zhuzhou-Xiangtan area. There’s a lot of potential to develop tourist products, cater to people’s need of escaping the summer heat, leisure and life nurturing. With regard to trade, the improvement of transportation would increase cargo carrying capacity, reduce delivery time and lower transportation cost. Convenient business exchange with other areas would promote trade growth and push forward the development of other sectors, like manufacturing.

Once the transportation improvement plan was finished, Guiyang would return to the position of a railway hub, which was also very important for Guizhou’s position promotion. Back in the 1990’s, Guiyang was a railway hub of the Southwestern area. However, with the operation of Nanning-Kunming railway and Chongqing-Changsha railway, both the trains connecting the Southern coastal area and Kunming and that linking Eastern area and Chengdu pass by Guiyang. This gradually eroded Guiyang’s position as a railway hub. After the completion of the new express railway network, trains connecting its northern west area and the South and trains linking its southwest and the East would all pass Guiyang, making it a railway hub once again.

2.2.2 Solid foundation for military defense sector

Military defense was developed in Guizhou from the 1960’s when it was preparing for war or making the so-called “third front construction”. Under the special historical background, Guizhou, a remote province at the southern west of the PRC, with high mountains, thick forest, multiple caves and rich energy and mineral resource reserve, became an important base for the third front construction. On October 14th 1964, the Ministry of Metallurgy began moving equipments from Dalian Steel Mill, Benxi Steel Mill, and Anshan Steel Mill to Guiyang Steel Mill. The third front construction was led by railway construction and focused on military defense, complemented by energy, steel, machinery, and chemical industry development. In those periods, Guizhou built not only a series of key military defense projects but also 92 civil projects. Along with the third front construction was a big inflow of talents of over 180,000. And the year-on-year investment in military related sectors greatly improved transportation and formed a modern industrial structure in Guizhou.

Through over 40 years of construction and development, military sector had formed three research and production bases as the main body, aviation industrial base (also called 011 base), aerospace base (061 base), military electronics base (083 base), respectively. The defense sector had a military and civil combined research and production system, consisting of nuclear industry, arms, military supplies and complementary enterprises. Guizhou’s competitive edge in defense sector was reflected in talents, technology and equipments. In 2008, there were altogether 78 military enterprises in Guizhou. Above-scale military enterprises created an aggregated output of 30.405 billion Yuan, accounting for 11.2 of the total created by above-scale enterprises in the province. And their added value reached 7.188 billion Yuan, accounting for 7.8% of the total. These figures indicated that the military sector had become an important part of the province’s industry.
Solid military defense sector foundation is an important advantage for Guizhou to develop manufacturing sector and lead other sectors’ growth. At present, Guizhou has planned to establish military and civil combined industry base in military resources concentrated areas, aiming to integrate high-tech sector into local industries. Based on the 011 aviation base, Guizhou can develop aviation and equipment manufacturing, such as universal plane, civil unmanned aircraft system, aero parts, and special-purpose vehicles, etc. Based on the 061 aerospace base, aerospace and equipment sector can be developed, including aerospace high-tech, alternative energy (industrial power sources), mechatronic equipments, precision machinery parts, etc. And based on the 083 military electronic base, information sector can be developed focused on communication products and new type of electronic parts.

2.2.3 Mineral resource and energy advantages

Bestowed with mineral and energy resource advantage, Guizhou has an important foundation for developing industries. Based on developing rich mineral resources, mining industry including selection and processing has long been a pillar industry of Guizhou. For many years, the mining industry’s output made up over 30% of the total output value of the province. The development of advantageous mineral resources makes Guizhou a key national production base of phosphate chemical, aluminum, ferro-manganese alloy, and barium salt. Besides mineral resources, Guizhou also has a rich reserve of energy resources. Guizhou is ranked the fifth in the PRC in terms of coal reserve, with big potential of coal, coal-bed methane, natural gas, petroleum, oil shale, and uranium mine. Land area with coal reserves accounts for 40% of the total provincial area. Given its big quality coal reserve and various coal types, Guizhou is called “coal sea.”

The mineral and energy resources advantage is mostly reflected in power source development. Comparatively, the North enjoys coal reserves but without hydro power resource, while the South vice versa. Only Guizhou is bestowed with both of them. Its advantage in power generation is obvious because Guangdong province as its economically developed neighbor faces a big problem of power shortage. This has laid a solid foundation for Guizhou to be a Southern energy base and a key production base for the “west-to-east power transmission.” Despite the international financial crisis, Guizhou’s power grid still sold out 107.76 billion kilowatts electricity in 2009.

The rapid growth of energy sector creates a good foundation for the province’s advantageous mineral resource development. At present, several industrial chains have been formed, like the coal-power-aluminum, coal-power-phosphate, and coal-power-steel. Three coal chemical bases, Biqing, Qianbei, and Liuxing, will be gradually established. Projects under construction also include Zhijin coal-power-phosphate industrial base, refined phosphate chemical base in Wengfu and Kaiyang, coal-steel-power revolving economy base in Pan county, and special steel new materials revolving industrial base in Guiyang and aluminum industrial base in Guiyang and Zunyi.

2.2.4 Superior ecological environment

Industrial process is a gradual destruction of environment. Under a certain conditions, the economic development, especially during industrial process, is always at the cost of environment destruction. It is no exception for the PRC. However, with economic growth and higher income, people begin to realize the
importance of environment protection and the rarity of ecological environment. Superior ecological environment begins to be a valuable resource and product, and an important advantage for the areas that are slow in the industrial process. Guizhou is such a place.

According to the 2009 Guizhou Environment Communiqué, the province enjoyed a superior and stable ecological environment. The centralized drinking water source is of high water quality and the qualification ratio rising year on year. Urban air quality improves steadily, fine ratio of Guiyang and Zunyi reaching 94.8%. Noise and radiation is under natural range. Generally speaking, with every ecological factor not beyond natural background radioactivity, Guizhou is a suitable place for living, working, and leisure.

Superior ecological environment as a kind of resource and product, plays an important role for the development of agriculture and tourism in Guizhou. Under good environment, farm produce in Guizhou is not only of high quality and delicious taste but also without pollution, so it can meet people’s pursuit of green and healthy food. In addition, transportation improvement makes it possible to delivery the farm produce to economically developed areas. All these factors are beneficial for developing ecological and organic agriculture. In respect of tourism, Guizhou, with beautiful scenery and comfortable climate, is suitable to develop heat-escaping and life-nurturing products, thus attractive to tourists seeking health. Besides, many people are willing to buy local housing for the purpose of leisure, holiday and investment, which to some extent plays a positive role in the local real estate development.

2.2.5 Multi-ethnic culture
Guizhou has rich and unique ethnic cultural resources. According to the fifth national census, there were 56 ethnic minorities in Guizhou Province, 18 of which has lived there from ancient times, including Han, Miao, Buyi, Dong, Tujia, Yi, Gelao, Shui, Bai, Hui, Zhuang, Mongolian, She, Yao, Maonan, Mulam, Manchu, and Qiang. People of these nationalities maintain their ethnic cultures and integrate with each other in the long history, thus displaying a rich and distinctive multi-ethnic culture.

The ethnic minorities have many kinds of festivals that are rich in contents. Their traditional festivals are numbered at over 1000 and they gather at over 1000 places. Of the most famous festivals are Sisters festival, Dragon Boat Festival, and Lusheng Festival of Miao minority, Song and Wine Festival of the Dong Minority, Horse Racing Festival and Torch Festival of the Yi festival. The multi-nationalities have abundant sorts of songs and dances. Miao has “passionate flying Songs” and simple & rusticity toast songs, Dances with Lusheng music, dances with drums. Dong has resonant ka lau. In particular, the Buyi has dozens of dancing steps and rhythm songs. The essence of Guizhou’s folk-custom are folk operas. They mainly consist of high stage Miao opera, Dong opera, Buyi opera, and Nuo opera, etc. among which Han nationality’s opera and Nuo opera are honored as “living fossil of ancient operas.” Besides, “lusheng culture” represented by lusheng music and dance, especially Dong Ka Lau without music, is spoke of highly in the international stages. Bronze drum culture represented by “Leishanlangde village” is not only an integral part of bronze culture but also a major content of Miao culture. It integrates together rich cultural contents, such as “fish culture” and “drum culture” in the Miao culture.

Multi-ethnic culture is an important resource to attract tourists’ attention. Folk-custom tourism is a high level cultural tourism, which meets people’s psychological pursuit of “new, difference, pleasure, and knowledge,” and thus becomes a major development content. A sampling survey shows that among
European and American tourists visiting the PRC, 26% come to appreciate scenic spots and historical sites, while 56.7% are interested in Chinese people’s living styles and customs. Prosperous folk-custom tourism in Lijiang, Yunnan province, is a good proof. Over recent years, folk-custom tourist line has gradually become people’s first choice. For example, Miao village in Xijiang and Dong village in Liping have achieved rapid development.

Developing multi ethnic cultural resources and folk-custom tourism is of significance to the economic and social growth of ethnic minorities in Guizhou. As a labor intensive industry, tourism can create big profits in a short time with low investment. Thus it is a good way to accumulate construction fund and improve people’s living standard. Besides, tourism can also promote cultural exchange and harmony among different nationalities.

2.2.6 Rich labour resource
Guizhou has rich labour resource, and still faces rapid labour growth. In 1949, the population of Guizhou was 14,164,000, accounting for 2.62% of the total population of the PRC. In 2009, Guizhou had permanent residents of 37,980,000, accounting for 2.85% of the total population. Over the six decades since the PRC was established, Guizhou Province has maintained a rapid population growth, with an average annual growth rate of 1.65%, which is 1.4 percentage point higher than the national average. When the fifth national census was conducted in 2000, people within the range of 15 years old and 64 years old were numbered at 22.53 million, accounting for 63.92% of the total population of Guizhou province. Guizhou has few arable lands, only 0.69 acres per capita in 2009, which is only 43% of the national average of 1.59 acres. And thanks to higher productivity, Guizhou has a surplus labor resource. It is known that about 5 million people go work out of Guizhou, among which over 3.1 million from poor mountainous areas.

Rich labor resource is an important advantage for industrial development in Guizhou. With the economic development of Guizhou and the acceleration of the industrial process, a large number of workforces will be needed. Particularly, labor-intensive processing industry, ecological agriculture, and tourism have the biggest demand of surplus labors, because their requirement for skills is relatively low. Moreover, ethnic minority labors play a very important role in developing tourism industry. As cultural carrier, minority nationalities themselves are not only important labor resource but also a kind of irreplaceable tourist resource.
3. Strategic Orientation and Choices

3.1 Strategic Orientation

3.1.1 Strategic Supporting Region for the Go West Campaign
The Go West Campaign is the key strategy to promote coordinated development among different regions in the PRC, and also a high priority in the PRC’s overall strategy of regional development. After a decade of development, fundamental changes have been made both economically and socially in many areas in the west. Some areas, such as the Beibu Gulf Region, the Chengdu-Chongqing Region, and Central Shaanxi Plain, enjoy fast economic growth. “The Go West Campaign should be promoted steadily,” as is pointed out in Some Opinions on Further Promoting Go West Campaign issued in July 2010 by Central Committee of Chinese Communist Party and the State Council. In the new round of Go West Campaign, the “adding flowers to bouquets” and “offering charcoal in snowy weather” policies will be closely integrated to actively build a relatively well-off society in the western region. On one hand, priority will continue to be given to developing major economic areas. On the other hand, more attentions will be given to large poor areas with concerted efforts.

The economic dynamos are insufficient for the vast western region to reach the well-off goal. Guizhou Province has the fourth biggest population, around 38 million in 2009, among its western provincial counterparts. With such a large population, it would be difficult to build a well-off society relying on aids from outside the province. Only when the development is promoted and central Guizhou Province is supported to become a new growth dynamo can the goal of building well-off society in western region be guaranteed. In effect, central Guizhou has been identified as one of the new growth poles in Some Opinions on Further Promoting Go West Campaign.

3.1.2 Key Eco-Safety Guarantee Areas in South China
The water source of Wujiang River, a tributary to Yangtze River, and Xijiang River, a tributary to Pearl River, are within Guizhou Province, which as a result has an important role to play in guaranteeing the ecological safety in both Yangtze River and Pearl River basins. Ecosystem in Guizhou has enormous ecological service function for downstream regions, particularly the Pearl River delta; changes of surface vegetation, water environment, and water and soil erosion in Guizhou will have a direct impact upon water quantity and quality in the lower reach of both Yangtze River and Pearl River. Currently soil erosion and stony desertification have already been serious in Guizhou, with 7.32 million hectares of eroded land, 41.55% of the whole province, and 3.76 million hectares of desertificated land, 21.35%. It is estimated that, in Wujiang River basin, production of every ton of grain will lead to 47 tons of eroded soil. According to the National Ecological Function Zones (2008) issued by Ministry of Environmental Protection, Guizhou, with the ecological function zone of soil conservancy, plays an important role in ensuring the PRC’s ecological safety. While at the same time, the province is also the key stony desertification control area (see figure 18). Viewed in a nationwide and larger-scale perspective, the province is the important area for guaranteeing ecological safety in south China.
3.1.3 Key Base of Energy and Raw Material Industries in the South

Guizhou, with double advantages in minerals and energy, is the important base of energy and raw material industries in south China. As the only one province rich in coal resources in the south, Guizhou ranks 5th among other provinces in coal reserve, with prospective reserve exceeding 260 billion tons, and is famous as the coal sea in the south. Coal production in 2009 reaches 137 million tons in Guizhou, accounting for one third of the total production in the 10 southern provinces. In addition to its rich hydropower resources, Guizhou is important in south China’s energy ensuring system, and the important power base for the south route of the West-to-East Power Transmission project. In 2009, Guizhou exported more than 100 TWh of power to Guangdong Province. Based on its rich energy and mineral resources, Guizhou now has advantageous industries in non-ferrous metallurgy (particularly electrolytic aluminum), ferrous metallurgy, and phosphorous chemicals. In 2009, production of phosphorous fertilizer, electrolytic aluminum and sulfuric acid in Guizhou accounts for 11.5%, 8.6% and 6.2% respectively in the PRC. By making use of advantageous resources and enhancing resources transformation, Guizhou will have a even stronger position as the base of energy and raw material industries in south China.

3.1.4 Key Base of Green Industries in the South

With pleasant climate and largely quality environment, Guizhou has the rare advantageous and future resources to become the important base of green industries in south China. In the past three decades, the extensive industrial development mode of polluting before controlling has taken heavy toll on the environment. It will take quite a long time for “green mountains and clean rivers” to reappear in the coastal industries regions, which are also densely-populous and heavily polluted. By contrast, environmental quality in Guizhou is largely and generally in good condition, suitable for working, living and tourism. As
the transportation means keep improving (particularly the building of high-speed railway), Guizhou, now temporally nearer to the developed regions, can make use of its rich tourist resources to play an important role in tourism, summertime resort, entertainment, health preserving and other high-end consumption activities in the Greater Pearl River Delta, and become the key base of green industries in south China.

In addition, with its per capita GDP exceeding US$ 3000, the PRC is now a moderately developed country, with most regions already sufficiently fed and clothed and coastal regions stepping into the well-off consumption stage. That means a trend of eating sufficiently, deliciously and now healthily has began. The upgrading of consumption structure helps green and ecological agricultural and livestock products to expand market shares. Guizhou has good conditions to develop ecological agriculture, and its products have gained recognitions among consumers. Such advantages should be made full use of to develop distinctive, advantageous and efficient ecological agriculture and further processing industry, and build the PRC’s key production base of high-end, green and organic agricultural products.

3.2 Strategic Choices and Goals for Development in Guizhou

3.2.1 General Thoughts

The need of building well-off society should be taken into full consideration. Guizhou Province is one of the less-developed provinces in the PRC, and also the difficult point for the PRC’s overall “building well-off society” strategy. Development in Guizhou should be accelerated to ensure the goal is achieved by 2020. Of course, development is not equal to GDP growth. The focus for Guizhou is to increase the income of the people, particularly those living in rural areas. So far, the income per capita in rural areas of the province is less than 3/5 of the nation’s average, and 3/4 of the average in western region. To accelerate development in Guizhou is not about fast GDP growth, but fast increase of resident income. This means, between “strong province” and “rich people”, priority will be given to the latter. This is the basic point of departure of selecting development strategies in Guizhou.

The change of national overall development phase should be taken into full consideration. The PRC is stepping into the middle and later phase of industrialization, and is now already a lower and medium developed country in terms of income. Industrial development, structural transformation and change of resident consumption structure are all entering a new phase, while high-end consumer and producer service industry, as well as hi-tech industry, will be the key direction of development. Meanwhile, change of international and domestic environment is forcing the nation to change developing modes, and domestic demand instead of export should be the main driving force for economic growth. As a result, the heavy industrialization driven by the rapid growth of export after the PRC joined WTO will gradually fade out. New characteristics and trends will appear in industrial development. New industrialization based on technology and innovation will be the mainstream of industrial development.

The Implementation of main function zones strategy should be taken into full consideration. National main function zones are drafted to deal with the misunderstanding of prioritizing GDP. Based on the strategy, the nation is an integral entirety consisting of different zones, whose main functions and governmental administration differ from each other; particularly for those zones with main function of ecology, “ecological compensation” should be provided. That is to say, in the nationwide system, zones can produce and sell products, and can also provide “paid” ecological service. Premier Wen Jiabao pointed out in the Explanation of Suggestions on Making the 12th Five-Year Plan for National Economic and Social
Development that main function zone strategy is the inevitable requirement to respect the nature and
develop according to local situations. Guizhou is tasked with important function of guaranteeing ecological
safety in south China, and should make as one of the major developing directions providing quality and
paid ecological service function.

**The new thoughts of Go West Campaign strategy should be taken into full consideration.** After a
decade of implementation, the Go West Campaign has moved from “laying foundations” to “enrich people”
to sustainably promote economic development. In addition, while priority will continue to be given to key
economic zones, more attentions will be given to poor areas. It is pointed out in Some Opinion on Further
Promote Go West Campaign issued by Central Committee of Chinese Communist Party and the State
Council, policy support should be stepped up and stronger integrated measures taken to accelerate
economic development in poor areas with concerted efforts. The State Council has issued directives to
basically tackle large impoverished areas by 2020. Currently, governmental departments are working on
concrete measures and policies, including National Development and Reform Commission, Poverty Relief
Office of the State Council, and Ministry of Finance. According to the preliminarily-drafted scheme, most
prefectures in Guizhou are included in the large impoverished areas. As a result, development strategy of
the province should be related to the nation’s poverty relief project, and Guizhou should accelerate its
development with national supports.

**Basic Natural Conditions in Guizhou should be taken into full consideration.** Broken landscape is the
basic characteristics of Guizhou Province, with only 47 “plains” larger than 10,000 mu (666.67 ha). Under
such circumstances, it is difficult for the province to conduct large-scale agricultural production, while
large-scale industrial constructions are also faced with difficulties and additional cost. It is safe to say that
many areas in the province are not suitable for large-scale industrial construction. When developing
featured agriculture and manufacturing industry, or industrializing agriculture, we will have to take this
hard-to-change condition into consideration. It is more advisable to build small characteristic enterprises,
which take up less land, on such landscape.

**Comprehensive advantages of Guozhou should be taken into full consideration.** As is mentioned above,
the province has lots of advantages. Development of the province should not be based only on energy and
mineral resources. The round of heavy industrialization starting after the PRC became a WTO member is
going to fade off in the near future. As the PRC’s developing pattern changes, energy consumption and
emission will decrease, leading energy and raw material industries to a steady growth period.
Over-dependence on energy and mineral resources will lead to unsustainable risks. Only when Guozhou
make good use of its “green” card and make breakthroughs in ecology, environment, climate, culture and
other advantageous resources can the province enjoy sustainable development.

### 3.2.2 Strategic Objectives

To sum up the above-mentioned analysis, it can be predicted that conditions will be improved and
economic development accelerated in Guizhou in the next decade. If there is not big changes in the PRC’s
overall economic development, it is optimistically estimated that the development gap between the
province and the whole nation will be decreasing starting from the 12th Five Year Plan period. Based on
this, the following strategic objectives are identified.
In about ten years of hard work, economic strength of Guizhou will be remarkably increased, people get rich, urban and rural areas be basically balanced, and the ecological environment suitable to live and work in. By 2020, social and economic development level of the province will have a remarkably narrower gap with the whole nation, basic public service reach national average level, people living in absolute poverty decrease to zero, modernized road network and relatively developed urban-rural transportation system be built, and the characteristic “green” economic system be established. By 2020, the goal of building well-off society will be achieved in central Guizhou economic zone, which takes Guiyang, the capital city of the province, as the center. By 2025, the whole province will achieve the goal of well-off society.

Major economic goals are listed below:

- **GDP per capita:** 70% of national average and 87% of western region’s average by 2020;
- **Disposable income of urban residents:** 85% of national average and 95% of western region’s average by 2020;
- **Net income per capita in rural areas:** 75% of national average and 88% of western region’s average by 2020;
- **Public expenditure per capita:** up to national average by 2020.

If the average national GDP growth is 8% for the 12th Five Year Plan period, 7% for the 13th (making the GDP per capita to reach 52,000 yuan in 2020), to realize the above-listed goals, GDP growth in Guizhou Province should be 13% in the 12th five years, and 12% for the 13th. That is to say, the province’s GDP should be 780 billion yuan by 2015 (based on the price of 2008, same below), and 1,375 billion yuan by 2020.

To realize the GPD growth rates, calculated according to experience (see Appendix 1), annual growth of fixed assets investment in the province should be 20% for the 12th five years, and 18% for the 13th (constant price). If price factor is taken into consideration, nominal growth of fixed assets investment should be around 23-25%. Total amount of fixed assets investment should be 2.6 trillion yuan for the 12th five years, and 6.3 trillion yuan for the 13th.

### 3.2.3 Strategic Choices

The strategic ideas of promoting vigorously the industrialization and urbanization conform to not only the development stage of Guizhou, but also to the building a moderately prosperous society. However, currently Guizhou has concerned with the major projects and capital-intensive industries excessively, has not paid much attention to small enterprises that can provide more employment opportunities. Therefore, we believe, based on the existing strategy, Guizhou should choose the strategy of “rich people and strong province” for the future. That is, integrating internal and external resources of the province, putting people’s livelihood as the core, and focusing on green industrialization. This strategy should highlight the important roles of small companies (including micro companies) in the process of industrialization. It will take a decade to “reserving water to breed fish,” setting up a large number of small and micro companies, and making breakthroughs in non-agricultural employment. Only through these activities can the driving force be created to sustain the industrialization and urbanization in Guizhou. On the other hand, Guizhou should also increase anti-poverty efforts, through increased investment, economic activities with local characteristics and private economy, enhancement of public services, and other measures, striving to eliminate absolute poverty basically in ten years.
a. The key of accelerating development in Guizhou is to promoting Newly-Industrializing progress vigorously, with guide to "green" concept

All countries have similar experience that industrialization is the stage difficult to leap over in the process of modernization. Though for a country, not all regions will enjoy fast industrial growth, it is the common characteristics for all industrializing regions to have an increasing non-agricultural population. In terms of structures of employment and output value, industrialization in Guizhou is still at a very low level, transforming from primary to intermediate stage, making it inevitable choice to continue promoting industrialization process. Though tasked with the important national function of guaranteeing eco-safety, the province is not going to have fast social and economic development only by providing ecological service. In the near future, “industrially strong province” will be the top choice of Guizhou, and the choice should be understood as accelerating social and economic development through industrialization (increasing employment in non-agricultural sector).

Due to the change of development phase in the PRC and the restraints of basic natural conditions in Guizhou, the province should adopt the “green” and new industrialization road. Here “green” is not simply indicating ecological functions, but means a development road with recycling economy, ecological economy, energy saving and emission reduction, and low-carbon industries.

- Firstly, development of energy and mineral resources in Guizhou should depend more on technological innovation, focus on energy saving and emission reduction, make integrated use of resources, and protect ecological environment in the process of development. Energy and mineral resources will still be the relative advantage of the province for a certain period of time. However, due to the state’s macro-regulation and the restraints the province has, the quantity-based expansion of advantageous resources transformation will be faced with lots of bottlenecks. The only way for the province to break the bottlenecks is to actively promote recycling economy, extend industrial chains and promote upgrading of products.
- Secondly, the province should work hard on “green” industry and play the “green” card. The advantageous climate, environment and culture should be made good use of to increase the proportion of “green” industries, such as tourist and entertainment industry, high-efficient ecological agriculture, and biological industry. Special attention should be given to tourist and entertainment industry. With the completion of several high-speed passenger railways, Guizhou is likely to become the important green and health-preserving base in South China (particularly in the Pearl River Delta).
- Thirdly, former military industry should be made good use of to develop advanced equipment manufacturing industry that has low unit energy consumption, and build “low-carbon” economic system.
- Fourthly, provision of “paid” ecological service functions should be uplifted to the strategic level, and such service should be used to create development opportunities, particularly opportunities that combine regional cooperation and aids.

b. The core to accelerate the province’s development is to increasing employment opportunities and “enrich people”

Experience accumulated in many regions shows that high growth of GDP does not necessarily increase residents’ income and substantial benefit. Areas with top priorities of fast GDP and revenue growth will
have to depend on large-scale expansion of existing raw material industry that features high energy consumption and serious pollution. New projects will have to be launched, existing ones expanded, to ensure a 2-digit GDP growth rate, sucking up the resources of the government and the public. While a big resources and environmental price will have to be paid for such large-scale building and expansion, they create only limited jobs and low substantial benefit to the public. This is the “low-level development cycle” frequently seen in less-developed regions. The correct choice for Guizhou, still a less-developed province, is to break such vicious cycle and accelerate development with a focus on “enriching people”. It is not the rational choice to blindly compete with other provinces in GDP growth rate and total quantity, nor is it in alignment with the spirit of the national planning for the 12th five years (2011-2015).

Guizhou should not excessively depend on energy and mineral resources for development because of its basic natural situation and main function division. Since both “prosperous people” and “strong province” are focused, the province will work on “large enterprises and small companies” and “enrich people through small companies”.

- On the one hand, more attention should be paid to large enterprises in energy, raw material and equipment manufacturing sectors, which is the so-called “large enterprises nurturing project.” Supports will be given to large enterprises to upgrade their ecological standard, resources utilization efficiency, and output, so as to achieve the object of “strong province.”
- On the other hand, investment environment should be actively improved, and support be stepped up, to implement the “reserving water to breed fish” plan. Small companies and private economy will be actively promoted in the sectors of ecological agriculture, processing of agricultural produces, tourism and entertainment, and biological industry, so as to create jobs and increase income, and achieve the objective of “enriching people”.

Between these two objectives, priority should be given to “enrich people”, though they are in fact tightly intermingled. To meet the “prosperous people” objective, the traditional governmental working style of focusing on big projects should be changed. The leading role of both the market and the government should be made full use of, and the work of improving investment environment and “reserving water to breed fish” should be prioritized to attract investment, technologies and human resources, and accelerate the development of private economy and small companies. Special attention should be given to the development of small companies (including micro companies).

Small companies have an important role to play in creating jobs and promote industrialization. The tradition plan-economy minds prefer large projects and enterprises to promote industrialization. However, experience shows that, in the less-developed regions.

What small companies create is a large number of jobs, not revenues. For less-developed regions like Guizhou, it is the ability of creating jobs and the function of enriching people they have that should be valued, not the function of increasing revenue. Tax should be cut or exempted to “reserve water to breed fish,” so that small companies can make breakthroughs in a short time. Small companies have a high “mortality rate.” Good soft and hard environments should be created to increase their “birthrate” instead of worrying their shutting down.
c. Support and investment from in and out of the province is urgently needed for development

Guizhou is one of the PRC’s poorest provinces. With weak infrastructure and self-supporting functions, it is difficult for the province to catch up with other provinces in building a relatively well-off society. In short-term, it is not likely that the province will have a great leap forward with a single key opportunity. A province like Guizhou deserves more care from the public, more attention in the overall regional development strategy, more support from the central government, and more aids from other provinces. Among others, it is an important aspect to increase investment in Guizhou, whose fixed assets investment per capita has been much lower that the national average for years. Because the province is still at the primary stage of industrialization and capital accumulation is of great importance, investment has an apparent effect in driving economic growth. As a result, more fixed assets investments will be the principal driving force to accelerate development in the province.

Only by combining external support and internal hard work can Guizhou accelerate its development.

- On one hand, the central government should give Guizhou preferential priority in national investments and projects and promote comprehensive matched aids to increase investments in the province and make its fixed assets investment per capita at or higher than national average.
- On the other hand, the province should seize the opportunity that the nation is dividing main function zones and working on large areas in poverty. Support from the central government should be made use of to apparently improve the developing conditions and the level of basic public service in the less-developed areas of Guizhou.

d. Guizhou needs “centralized” and “decentralized” spatial strategies to accelerate development

The outstanding characteristic of the ecological environment in Guizhou is that ecologically fragile areas and ecologically stable areas coexist. Vegetation in east Guizhou is of good condition, and the pollution is low, making it a “pure land” and the “backyard” for Pearl River delta. In contrast, stony desertification problem is prominent in the central and western regions of the province, where ecology is fragile. In addition, Guizhou is a typical mountainous province that is short of flat lands for large-scale production. In the light of such natural basis, the province should promote “green” industrialization to accelerate development. Spatial layout should be well arranged while the relationship between development and environment well handled for scientific development.

Firstly, the main part of industrial development in Guizhou (particularly the energy, heavy, chemical and equipment manufacturing industries) should be deployed in the central area of the province as well as Liupanshui-Bijie and Zunyi, where recycling economic parks for heavy and chemical industries should be built so that high-polluting companies are gathered to form industrial chains of recycling economy, share pollution controlling facilities, minimize the impact of resources-intensive industry upon the ecological environment, and realize “greenized” development. Equipment manufacturing industry has a high requirements for supporting facilities, so it would be advisable to build these companies around Guiyang, where the basic industrial infrastructure is better.

Secondly, the large number of small companies, which is needed for the goal of “enriching people” should be deployed according to the “decentralized centralization” principle, meaning every county (and key township) should have industrial parks for small companies. The need of small companies, instead of their
scale and level, should be the focus. Guizhou is similar to the mountainous region of Zhejiang Province in terms of landscape and geological conditions, making it suitable to develop “block economy,” and such economy in Zhejiang is developed as small companies keep growing. Most companies in Zhejiang have a spatial moving process from villages to towns, and then to urban industrial parks, indicating the different need companies have in different development stages. Of course, economic parks for small companies should be up to the environmental standards, and the government will be responsible for making public facilities environment-friendly.

e. Pay more attention to solving the problem of poverty to accelerate development in Guizhou

Guizhou is one of the provinces in the PRC with the largest number, the largest area and the highest level of poverty. Without these 50 state poverty counties getting rid of poverty, there will be no the all-round well-off society of Guizhou. On the one hand, broken landform conditions (karst) led that more farmland is on hill slopes, erosion is serious, natural disasters are frequent, farmland is infertile. And the agricultural basis is vulnerable. On the other hand, the problem of the poor in Guizhou also related to the long-term lack of investment and the historical issue of public services. In poverty counties, there were common problems such as difficult roads, difficulties for the children to go to nurseries, the shortage of drinking water for people, difficulty of getting medical service, bad communications and so on. Hence, the strategy “Antipoverty” in Guizhou should focus on production capacity and characteristic economic development, also on the proportion of supportive funds set by the Central Government and improving the level of public services.
4. Strategic Means

4.1 Accelerating “Green” Industrialization Process

Guizhou will take the scientific concepts of development as its guidance, “prosperous people and strong province” as its objectives, ecological protection and resources saving as the binding forces, and human resources development as the key, to accelerate its “green” industrialization process that features ecology, low-carbon, high efficiency and sustainability by making the full of its comparative and late-development advantages, attracting capital and applicable technologies, and improve the scale, benefit and competitiveness of its industries.

In the short run, industrialization in Guizhou will be promoted by expanding industrial scale, mostly expansion in the scale of employment, capital and output value. However, against the major background of changing developing mode throughout the PRC, industrialization in Guizhou should not be promoted simply through large amount of input and intensive mode of production. Instead, the intensive mode of production, which is resources-efficient and environment-friendly, should be adopted strictly to increase industrial quality and benefit. As a result, the province should expand its industrial scale by putting green heavy and chemical industry at the leading position, increase industrial benefit by facilitating industrial migration and developing recycling economy, and invigorate its industry by supporting small companies with large enterprises as the lead. Put in details, the following means should be included (see the more detailed industrialization research report):

- Green heavy and chemical industries as the lead. The development depth of natural resources should be increased to decrease waste of resources while developing heavy and chemical industries. Ecological assessment standards should be raised and strictly implemented to ban industrial projects that has or might have serious impact upon the ecological environment. Heavy and chemical industries should be centralized in economic parks to decrease waste of land resources while increase benefit of agglomeration economy. Traditional energy and raw material industries should be upgraded with modern technologies to increase their ability of saving energy, reducing emission and protecting the ecology. Vertical expansion of industrial chains in raw material industry, such as power generation and mining, as well as featured agriculture should be promoted to develop follow-up industrial chains, such as metal processing, electric equipment manufacturing, and deep processing of agricultural products, raise local transformation rate of resources, and shift from “sales of resources” to “sales of finished goods.” The scale and level of related industrial links, such as research and development of technologies, product design, wholesale and retail, should be enhanced to extend leading industrial chains to both ends of the “smile curve” and build a relatively complete industrial chain. Horizontal expansion among major industrial chains should be promoted to increase their coordination level, while priority should be given to finance, insurance, advertisement, logistics and other service industrial chains that have an important meaning to the leading industries.

- Industrial migration should be well facilitated. First is to ensure the soft and hard infrastructure in the industrial parks so as to create proper spatial medium for receiving migrated industries. Second is to optimize investment environment, improve the efficiency of governmental service, and shorten the time needed for migrated industry to relocate. Third is to draft detailed lists of
preferred and restricted industries based on the leading and potentially advantageous industries, encourage the migration of industries that are in line with the regional comparative advantages and that were formerly lacking in developing force in the province, and strictly restrict industries that are highly polluting, technologically outdated and surplus in production capacity. Fourth is to enhance communication with the eastern regions, promote cooperation with local government and companies in the eastern regions, and form effective and equal information and benefit sharing mechanism in the process of industrial migration.

- Recycling economy should be developed. The scientific concepts of development should be determinedly adopted and implemented, technological and institutional innovations taken as motive power, increase of resources utilization rate and decrease of waste discharge rate calculated as evaluation factors, and laws and regulations formulated and amended, so that the concepts of recycling economy be carried out, with concerted efforts of the government, companies and the public, in every link of production, circulation, consumption and recycling to realize sound interaction between recycling economy and the industrialization process. Recycling industry, agriculture and service should be actively developed, water and land resources utilized intensively, and related industry developed to turn wastes into resources and increase the recycling rate of the three major industrial wastes. Economical government should be built to spur the establishment of economical community, campus, and society.

- Small companies should be actively developed. Efficient industrial agglomeration should be formed among private intermediate and small companies, already agglomerated spatially, by borrowing international experience and making use of governmental driving forces. Entrepreneurship should be encouraged to increase the number of small companies. By making use of the advantages large state-owned enterprises have to encourage large enterprises to subcontract their orders, support should be given to help intermediate and small companies to explore domestic and oversea markets. Private intermediate and small companies should be guided to the gathering zones of advantageous industries to form industrial agglomerations.

4.2 To vigorously develop efficient ecological agriculture

Guizhou, a province with a large population and limited land resources, has acute problems in engineering water shortage and soil erosion, and large proportion of lands with medium and low yields. Development of modern agriculture is restricted, to a certain degree, due to the fragmentation of farmlands since it is difficult to conduct large-scale production. Under these circumstances, the province should make the full of its advantages in diversified agricultural resources and ecological environment to develop ecological agriculture, and adopt the strategy of “changing the mode of agricultural development, adjusting the development structure of ecological agriculture, optimizing the spatial deployment of ecological agriculture, protecting the ecological environment of agriculture, and improving the industrial system of ecological agriculture.” After a decade of efforts, an industrial system of ecological agriculture centering on recycling economy, a safety system featuring beautiful environment, and a supervision and service system based on standards, have been gradually established.

Based on its advantages in diversified agricultural resources, production of nuisance-free, green and organic products will be the focus, ecological agricultural bases the carrier, science and technology the support, and industrialized operation the important means, to guide the development of agriculture with modern industrial concepts and market economy theories, aim at increasing market competitiveness of
agricultural produces and farmers’ incomes, actively develop a pioneer and demonstration zones of ecological agriculture in southwest China, and become the major supply base of ecological agricultural products for Pearl River delta. The key is to develop high-quality and characteristic agricultural products. By creating the product structure that meets the market demand and fits the local situation, improved industrial system of ecological agriculture and smooth marketing system of modern agriculture, agriculture in the province will gradually have diversified functions, effective structure, high technology and standardized production. In addition, rich tourist resources in the province should be combined to create demonstration zones that integrate sightseeing of ecological agriculture and tourist resources.

To develop efficient ecological agriculture, the first thing to do is to renovate the concepts, gradually establish the development philosophy of “ecology being the productive force, competitiveness and potential,” and fundamentally change the development mode of agriculture. First, the tradition mindset of developing agriculture for the sake of agriculture should be changed, and agriculture should be developed with a perspective of greater agriculture. Second, the working style of government operating agriculture should be changed to make innovations in organization and make the full of the role professional associations and farmer’s cooperative economic organization play. Third, operational mechanism should be changed to establish a win-win benefit-sharing mechanism between companies and farmers. Fourth, land management mechanism should be changed to set up farmland transfer mechanism.

Development strategy of ecological agriculture in Guizhou consists of two aspects. One is to step up agricultural infrastructure construction, increase the comprehensive productive capacity of agriculture, and develop ecological animal husbandry. Two is to accelerate the development of characteristic agriculture, processing industry of agricultural produces, and resources-efficient and environment-friendly agriculture, and establish circulation market for agricultural products (for the details, see research report on ecological agriculture). Special attention should be paid to new farmer training, brands creating for characteristic agricultural products, and development of scientific and technological parks for ecological agriculture.

4.3 Actively promote urbanization with Guizhou characteristics

To actively promote urbanization with Guizhou characteristics is the important component of the province’s developing strategy. Currently in Guizhou the number of cities and counties are small, urban scale and level are low, industrial development is inadequate, urban development and jobs are limited, and the driving force to promote urbanization is not enough. Urbanization of the province is lagging behind the other regions of the nation. A trend to leap forward is needed when urbanization is transforming from primary stage to a fast development. In addition, a multi-phase urbanization strategy should be implemented in an orderly manner.

In general, in the future development, based on the local mountainous conditions and the developing pattern of urbanization, industrialization and urbanization should be coordinated, speed and quality of urbanization be equally focused, and urbanization and the building of new socialist countryside be combined. Efforts should be made to optimize urban spatial layout and development planning, strengthen industrial support, increase urban integrated carrying capacity, renovate systems and mechanisms, and step up urban administration, so that urbanization in the mountainous areas of the province will be green, characteristic, intensive and diversified, and the economic and social development of the whole province will be sound and fast.
To both develop industry and meet the requirement of low-carbon and energy saving in regions with an
urbanization rate higher than 30%, urban development should be driven by new industrialization. For the
rural areas with a rate lower than 30%, due to the restriction of ecological and environmental conditions,
urbanization cannot be driven by industrialization. Instead, industrial development should be driven by
characteristic cities to absorb surplus rural working force.

To promote urbanization in the province, a road of organic development should be taken to carry out two
major strategies:

**Strategy No. 1 (leaping-forward strategy – developing strategy in the near run):** the core driving force
will be new industrialization and high-level modernization. City group development and industrialization in
central Guizhou province will be the main body, and large and medium companies the leading force, to
attract fixed assets investment, develop export-oriented economy, make use of the radiation function of
large and medium cities, and realize the objective of “strong province.”

**Strategy No. 2 (basic strategy – developing strategy in the medium and long run):** the core driving
force will be agricultural industrialization and the integrated planning of urban and rural areas. Characteristic medium and small cities and towns will be the main body, small and medium enterprises the
leading force, and the layout of characteristic industry the basis, to build the backyard in south China,
coordinate urban and rural development, and achieve the objective of “enriching people.”

The two major strategies will be implemented to realize the developing objectives of strong province and
enriched people: in the short run by the year 2015, urbanization will be accelerated, and the emphasis will
be given to construction of infrastructure in transportation, energy and water resources, so as to provide
support and carrier for fast urbanization, and the target of urbanization rate will be 40%. In the long run by
the year 2020, the emphasis will be the development of education, sanitation, health care and other public
services. Special attention will be given to the problems of livelihood arising from the urbanization process,
and the target of urbanization rate will be 50%.

In terms of spatial layout, the existing urban areas will be the leading forces for urbanization process, and
the overall urban system of “core-periphery” will be established. The core will be the city groups in central
Guizhou Province based on the economic region. This is the important support for urbanization of the
province to have a leap forward, and also the spatial medium for the province to realize Strategy No. 2. The
periphery will be 6 regions bordering neighboring provinces, including Liupanshui, Bijie, Xingyi, Tongren,
Congjiang and Wuchuan. This is the basis for the province’s urbanization process, and the spatial medium
for the province to realize Strategy No. 1. The major tasks will be developing characteristic industries,
building characteristic urban areas, and a coordinated development between urban and rural areas.

Based on the “core-periphery” overall urban framework, the province-wide urban structure of “metropolis
– big cities – characteristic cities – small towns” will be developed.

- Metropolis: downtown Guiyang, the political, economic and cultural center, also the capital city,
of the province. With a population more than 5 million, it is the central city of the city group in
  central Guizhou, and is also the iconic modernized metropolis in southwest China.
Big cities include Zunyi, Anshun, Duyun, and Kaili in the city group of central Guizhou. These cities share part of the population and economic functions from Guiyang, the central city, have their own characteristics featuring tourist, folk culture and agricultural industrialization, and are big cities to drive the development of regional economy. Their population is around 1-2 million, and is relatively independent.

Characteristic cities are places with characteristics in resources processing and tourism, such as Liupanshui, Bijie and Xingyi with advantages in climate, ecology and mineral resources, Tongren with tourist advantages in Wuling Mountain, Wuchuan with advantages in mineral resources and energy, and Congjiang with advantages in transportation. These cities have a population of around 0.5-1 million, and are the important components to accelerate the urbanization process of the province.

Small towns are the important spatial medium for coordinated development between urban and rural areas, and solutions to the issues of agriculture, countryside and farmers. Key towns will be the support, township enterprises the main body, and agricultural industrialization the leading force.

In addition, as a province with multiple ethnic minorities, in the process of urbanization, special attention should be paid to the development of cities with ethnic characteristics. Put in details, on one hand, agricultural industrialization should be the driving force to strengthen development of small towns, change life style, promote production and processing of characteristic agriculture products, increase added value of agricultural products and farmer’s income, eliminate the urban-rural structure, and realize coordinated development between urban and rural areas. On the other hand, the connotation of ethnic culture should be fully explored to raise the level of ethnic culture, build characteristic tourist towns, attract residents from big cities to come for entertainment, and realize the objectives of enriched people and development of small towns.

4.4 To actively develop tourist and entertainment industry

Tourism in Guizhou province is at a key fast-developing stage facing good opportunity and grave challenges. The historic opportunity of national economy changing its developing mode should be seized to position tourism as the strategic and driving industry for economic growth, change of developing mode, optimization of industrial structure and investment environment, and social development. Supported by the unique ethnic culture and karst landscape, Guizhou will be built as the important tourist destination and strong province in the western region of the PRC. The focuses will be ecological conservation, environmental protection, infrastructure construction, competitive projects nurturing, and industrial level upgrading. Around ten years will be spent strengthening regional cooperation, exploring oversea market and improving development environment to realize a leap-forward development of tourism, and a shift from a province rich in tourist resources to a strong province with tourist economy.

To establish greater tourist industrial system. Tourism is a open and highly related industry, and thus the development concepts of greater tourism and greater industry should be adopted. That is to say, tourism will be the driving force to extend to other industries through demands of transportation, accommodation, food, traveling, shopping and entertainment, so as to form an industrial group consists of multiple industrial links. Economic development of the province lags behind, and support from other related industries to tourism is inadequate. As a result, tourism
should be positioned as the strategic driving industry. Revolving around all factors of tourism, including transportation, accommodation, food, traveling, shopping and education, cross-sectoral and trans-regional integration and cooperation will be promoted to establish greater tourist industrial system. As tourism extends to and connects with other industries, development will be spurred in tourist agriculture, sightseeing, agriculture with characteristic advantages, transportation, food and catering, entertainment, trade and business, finance, meeting and exhibition.

- To spur tourism with characteristics and competitiveness. Tourist industry features choice and time sequence competition, not exclusive competition, making characteristics the determining factor for the vitality of tourism development. Its development can leap forward as long as the characteristics are prominent. Guizhou is rich in tourist resources, but the neighboring provinces of Yunnan, Guangxi and Hu’nan also have their advantages in ethnic culture and landscape. So the key is to make characteristics stand out. There are few top tourist products in the province, and even the Huangguoshu Waterfall needs development compared with the selected tourist products in other provinces. Due to the low economic development and limited investment, to seize the dominant point, concerted efforts should be made to explore unique resources to spur the development of the whole tourist industry. Based on the world natural heritage, also the national 5A tourist spot, the karst region around Libo, as well as the Anshun tourist zone and the Liping-Congjiang-Rongjiang tourist zone, top tourist products will be nurtured to spur the development of general tourist spots.

- To work together with multiple sectors. Tourist industry is related to 6 links, namely food, hotel, transportation, traveling, shopping and entertainment, and any weak link will incur “bottleneck effect.” As a result, links of hotel, restaurant, tourist agency, cultural entertainment, and production and marketing of tourist products should be integrated, while an inter-connected and coordinated supporting system should be established. In addition, benefit and responsibility should be coordinated among tourist enterprises, planning bureau, construction bureau, tourist bureau, administrative office of tourist spots, office of gardens and parks, cultural relics bureau, and forestry bureau, to establish an inter-connected system for public service, tourist safety, and quality ensuring.

- To enhance regional cooperation. First, integration of tourist transportation, market, information and administration should be achieved province-wide to promote rational work division among regions and linked development. Concerted efforts should be made to develop top tourist products and routes and realize integrated development of regional tourist industry. Second, the province should play a role in connecting southwest China, central China and Pearl River delta and enhance cooperation with neighboring provinces to build a greater tourist region and greater tourist routes together, and expand the development space of tourist industry. Tourist information database can be built together to set up information network and share information. Concerted marketing network can also be built in the region to explore domestic and oversea markets together. Based on Kunming City, the market can be extended to Southeast Asia and Indo-China Peninsula. Centered at Zunyi City, cooperation among Sichuan, Guizhou and Chongqing can be promoted to build a golden tourist triangle in southwest China. Cooperation will also be promoted with Hainan Province to raise the recognition and popularity of Guizhou through the platform of international tourist island Hainan Province is now building.
4.5 To enhance stony desertification control

Guizhou has the nation’s large area and proportion of karst stony desertified land, with 78 townships (cities and districts) included into the controlling list of national karst stony desertification, and 55 as the pilot townships for the 11th five-year period (2006-2010). By 2005, the province has a stony desertified area of 37,597.36 square kilometers, accounting for 21.34% of total provincial territory. The result of stony desertification control will have a direct impact on whether the province can leap forward and build a well-off society. Regions with serious desertification problems are all the poorest areas in Guizhou. In addition, stony desertification control is also the important work for building ecological screen on the upper reaches of Yangtze River and Pearl River. As a result, it is the important guaranteeing measure to accelerate development of the province, and also the important component for the province to carry out scientific concepts of development and build ecological culture.

Escalation of conflicts between human and land is the main cause of stony desertification in the province, thus “pressure reduction and benefit increasing” is the main means to soften the human-land conflict. With national support, the province has been implementing a serial of controlling projects to address ecological problems of vegetation damaging, water and soil erosion, and land degeneration, while great efforts have been made to conduct an integrated controlling of mountain, water, forest, farmland, road, grassland and marsh. In the process of stony desertification controlling, measures of “changing slopes into terrains”, “planting trees and grasses”, “returning farmland to forest”, “new energy projects”, “rural water conservancy projects” and “ecological relocation” have played an important role. However, due to the simplicity of controlling measures, inadequate cross-sectoral coordination, as well as big differences of natural, economic and social conditions among regions, controlling and development have not yet been closely connected, and the effective way to control stony desertification and develop local economy while at the same time increase resident income has not yet been found.

For a certain period of time in the future, principles of coordinated planning, integrated controlling, ecology and protection first, measures fitting into local situations, and differentiated guidance will be adopted to control stony desertification. Emphasis will be given to “decrease pressure and increase benefit.” Ecological and economic development should be combined to build a long-term mechanism for project development. Actual situation should be respected to propose scientific and technological methods, identify construction contents of agriculture, forestry and water resources, make sure all measures are coordinated and promoted. Stony desertification control should be organically combined with industrial restructuring, local economic development, poverty reduction, industrialization and urbanization. Relations should be well handled between ecological and economic development, current and future benefits, partial and overall interests, and development and protection, so as to coordinate ecological, economic and social benefits.

Measures for stony desertification control should be differentiated according to the local situations. Strategic emphasis should be given to slightly and moderately desertified regions, and the principle of “controlling while developing” should be adopted. For regions without desertification or with potential problems, the principle of “paying equal attention to utilization and prevention.” Severely desertification is the result of human-land conflict in fragile ecological environment, and the emphasis of work it ecological restoration, meaning utilization will be strictly prohibited, and measures of natural restoration and restricted development will be taken for favorable evolution of vegetations.
Controlling methods and integrated supporting measures should be selected according to the local situations to establish a multi-purpose, multi-layer, multi-function and high-benefit integrated prevention and control system. Different desertification level and local development among different regions will be taken into consideration to promote integrated management within small river basins, integrated management of fragile ecology, as well as development of ecological agriculture, characteristic forestry and fruit industry, ecological relocation, garden ecological economy, and ecological tourism. On one hand, the control objectives should be achieved in the process of changing the development and operation mode of agriculture. On the other hand, population growth should be strictly controlled, and part of the population relocated, to relieve human pressure on the stony desertified regions. In addition, alternative energy should be actively explored and more methane tanks built to address the energy problem in rural areas, and decrease their dependency on firewood.

4.6 To implement the strategy “Antipoverty” in line with local conditions

It should combine the development with the real situation of the poverty counties, developing agriculture in the area suitable to agriculture, developing industries in the areas suitable to industries, and developing tourism in the areas, based on the locations, resource endowment, industry structures and the level of economic development. In addition, it should guide the development by the situations, allowing the differences between areas, and supporting the counties with a better foundation to develop rapid and earlier. In the new period, it is crucial to alleviate poverty by specialty industries. It must take the development of industrialization as the start point, making the planning and constructing the specialty industries and advantageous industries as soon as possible.

Guizhou should intensify the construction of high-standardized basic farmland, increase the comprehensive capacity of agricultural production, and take advantage of resources and to develop specialty products. It must speed up the improvement of the basic agricultural conditions and the intensification of the material and technical equipment in agriculture. It should particularly intensify the construction of middle and small irrigation projects. Guizhou should be driven by the urbanization to actively develop park-district economy. It should intensify the construction of infrastructure and public services and intensify the village integration and dangerous houses refurbished. It should speed up the extension of urban infrastructure, improve the infrastructure of rural water, electricity, roads, gas, and houses, and speed up the improvement of the conditions of rural people’s life and production. It should actively promote the model of new rural construction. It should promote the public services for everybody, improve the infrastructure for rural education, culture, sanitation, recreation, exercise, and so on, intensify the conservation and development the particular nationalities’ villages, and speed up a number of new rural communities. By scientific planning and reasonable distribution, the 50 counties should establish various industrial park-districts and lead funds, human resources, and techniques gathering to the towns and small cities as quick as possible. It should put the strategic emphasis on the development of private economy, actively encourage social capitals participating in the local economic development, and realize the investment diversification.
5. Supporting Measures and Major Operation Plan

Guizhou is the bottleneck for building a well-off society in the PRC. Restricted by its weak basis and capability in development, Guizhou is met with great challenges to realize a relatively low target set forth in this report, i.e. in 2020, GDP per capita reaches 70% of average national level. Therefore substantial support from Chinese central government and all social sectors is called for in order to speed up Guizhou’s development. Combination of internal and external effort is needed to enable Guizhou keep up with national development pace in building a well-off society.

5.1 Supports needed from central government

Constructing a well-off society in an all round way means every region and each level may benefit from economic development fairly and squarely. Guizhou province, with multiple ethnics and below average natural conditions and low economic development level, needs special attention and support from government in realizing a well-off society in an all round way. For many years, GDP per capita in Guizhou is always the lowest compared to other provinces, less than two fifth of national average. Among its more than eighty cities and county-level cities, fifty are trapped in nation-level poor cities. Besides, minority people in Guizhou amounts to 40% of its population, making it the only region with high rate of minorities, yet not an autonomous region. The actual achievement of a well-off society in an all round way is only a castle in the air if problems concerning Guizhou is not resolved. This study evidences that Guizhou has received less than enough investment and support from central government. With the PRC entering into a new development stage and a shift in its strategic targets, it is time for central government to focus on Guizhou’s less development condition. Special support is needed to help Guizhou speed up its development pace.

5.1.1 Implementing ‘Central Enterprises’ Partner Assistance Plan in Guizhou

Considering extreme difficult situations in Guihou, it should be listed as one of the provinces where ‘Central Enterprises’ partner assistance plan is implemented. As 19 developed provinces and regions in eastern and central China have initiated all aspect ‘partner assistance to Xinjiang’, it is suggested that the responsibility of one-to-one supporting should be borne by large-scale central government-led enterprises. These enterprises, having participated in previous ‘partner assistance to Xinjiang’ project, are not in other partner assistance projects currently. As a way of fulfilling its social obligations, each of these ‘Central Enterprises’ may provide assistance and support to one nation level poor city or county following partner assistance model implemented in Xinjiang and Tibet. The focus is to help these poor cities and counties to build up one or to industrial development zones, as well as providing applicable technical support, management guidance and talents.

5.1.2 Establishing ‘Growing Core Enterprises’ in Guizhou

According to development economics, establishing ‘leading and motivating enterprises’ is able to motivate economic development in less developed regions. Many countries have utilized government controlled investment to balance regional development, and the most common measure is allocating location-insensitive national defense enterprises to less developed regions. One example is the development of California in US is closed related to national defense industry. In the PRC, some military industrial enterprises set up during ‘Three-Line’ construction period have also played a substantial role in leading local economic development. As market economy policy implemented in the PRC, economic resources
controlled by central government has decreased, but it doesn’t mean that our government has no controlling and regulating measures. One obvious example is the project of setting up a plant to manufacture civil aircrafts with 30 or fewer seats. Guizhou province has military airplane manufacturing experience and it needs a ‘Growing Core Enterprise’ to bring up its equipment manufacturing industry. Therefore, allocating such a motivating industrial project in Guizhou is of great significance for balancing regional development. Instead of allocate this project in coast regions, it will bring more comprehensive benefits if it is implemented in Guizhou. Thus I suggest the government make decision of allocating the project of manufacturing civil aircrafts with 30 or fewer seats to Guizhou as soon as possible.

5.1.3 Expediting Targeted Project of Developing Concentrated and Adjacent Poor Regions
Targeted project of developing concentrated and adjacent poor regions (‘targeted project’ below) is one of the significant measures in promoting development of western China raised in Some Opinions on Further Promoting Go West Campaign promulgated by CPC Central Committee and the State Council, indicating that the central government will pay more attention on problems emerged in developing concentrated and adjacent poor regions. Though specific measures are still in brewing, the main purpose of ‘targeted project’ is to help especially poor regions improve development conditions and fundamental public service. According to the social economic development status, most counties and cities here can be defined as concentrated and adjacent poor regions and deserve special support from the government. It is proposed that specific policies and measures can be enacted to initiate targeted project of developing concentrated and adjacent poor regions, enabling poor counties and cities in Guizhou to share benefits brought by the ‘targeted project’.

5.1.4 Making ‘Central Guizhou Economic Zone’ Development Plan to Build Up Increasing Pole for Guizhou
In Some Opinions on Further Promoting Go West Campaign promulgated by CPC Central Committee and the State Council, central Guizhou is listed as the increasing pole that needed to be built up in developing western China. Setting up ‘Central Guizhou Economic Zone’ around the city of Guiyang is a necessity for both in-depth developing western China and expediting development of Guizhou. More over, it is the major regional vehicle for building up a well-off society in an all round way in Guizhou. Currently, ‘Central Guizhou Economic Zone’ has equipped with some development conditions. From the perspective of creating a ‘Policy Frame’ and ‘Hope Window’ for 40 million Guizhou citizens, the government may organize to draw up Development Plan for Central Guizhou Economic Zones, including development of central Guizhou in national strategy, in order to encouraging social capital to make contribution to social and economic development in Guizhou.

5.2 Significant Measures that Local Government May Focus

5.2.1 ‘Opening the Watergate and Nurturing Fishes’ Plan-Reducing Enterprises’ Burdens and Nurturing Ventures
‘Enriching People’ is the development core of Guizhou and the development of small-scale enterprises is the focus of ‘enriching people’. In order to developing small-scale enterprises, the local government may, relating targeted project of relieving concentrated and adjacent poor regions, appeal to the central government to draw up and implement ‘Opening the Watergate and Nurturing Fishes’ plan, exempting tax and fee for small enterprises. Generally, a small-scale enterprise has marginal profit and thus the tax it may submit is slim, while many small-scale enterprises may provide a lot of job opportunities. The development basis of Guizhou is so weak and unstable that small-scale enterprises may find it difficult to propagate
shortly without special policy support. The core of ‘Opening the Watergate and Nurturing Fishes’ plan is to exempt company registration fee as well as income tax and added-value tax for five years for non-polluted small-scale enterprises with 10 or fewer employees in concentrated and adjacent poor regions of Guizhou to largely reduce the starting and managing cost of small-scale enterprises. At the same time, thoughts and ideas have to be changed so that the function of government is to provide service instead of imposing control. Besides, ‘high-voltage wire’ (one will be electrified to death once touch it) needs to be set up to stop people from asking for bribes or interrupting official business on purpose.

5.2.2 Building up Recycling Economic Industrial Zones

Recycling designs and ecological remodeling need to be fully implemented in industrial zones and development zones of the whole province and recycling industrial model zones or industrial function zone block has to be build up through models like ecological conjunction of industrial chains, comprehensive utilization of resources, intensive utilization of land, reuse of intermediate water, central treatment of waste and recycling, thermo-electric resources sharing.

Industrial zones (industrial function zone block) have to be guided to make plans for recycling economic development, building and improving infrastructure like road construction, logistics, telecommunication, heating system, water supply and drainage, waste treatment to realize unified planning, concentrated building, business scale operation and market operation of the public infrastructure in the zone. It is also necessary to guide industrial zones to upgrade through importing key cooperation projects and recycling internal resources, widening and extending industrial links to form ecological ones to realize comprehensive use of resources. Promote clean production and get rid of projects that may cause heavy pollution so that all enterprises in the zone have to abide by national industrial policy and most of those enterprises must undertake clean production examination or ISO14000 environmental management system certification. Control environment actively and comprehensively to achieve co-building and sharing environment-friendly facilities, diversion of rain water and sewage water, and that sewage water will be channeled into municipal management network or central treatment facilities in the zone before being released and recycled. Besides, construction of transferring system for treating or collecting solid waste is an urgent need and specific development plan needs to be made to build recycling model industrial zones.

5.2.3 Brand Creation Project for Characteristic Agricultural Products

Broaden brand entities for famous, characteristic and high-quality agricultural products. Implement strength-leading industrial supporting policy and make great effort to nurture and support leading enterprises with strong market development and exploration capabilities. Develop and consolidate cooperation beginnings for farmers and guide enterprises, cooperation organizations and farmers to sign up more stable production-selling sales orders and service contracts so that quality control measures strengthened, farmer’s production behavior standardized and links created between small-scale production and wide spread market.

Enhance quality attestation and certification for famous, characteristic and high-quality agricultural products. Certification of safe food, green food, organic food and food with geographical marks should be treated as one important element and the basic condition in nurturing brands of famous, characteristic and high-quality agricultural products. Insist on development principle of ‘strict standard, standardized procedure, powerful supervision’ and working guideline of ‘emphasize on both quality and quantity, uphold both certification and supervision’. Strictly execute and implement each management policy to
speed up base construction and achieve break-through development for certification of local famous, characteristic and high-quality agricultural products.

Encourage brand registration and brand combination of famous, characteristic and high-quality agricultural products. Strengthen the brand awareness of production and selling entities like production, processing and selling enterprises, cooperation economic organization especially for farmers, agricultural agents and outstanding farmers in raising live stocks and planting and encourage them to undergo brand registration. Many good measures can be borrowed from home and abroad to guide and support production and processing enterprises, professional cooperation organizations of famous, characteristic and high-quality agricultural products of the same kind or with similar quality to merge in order to streamline band resources for agricultural products.

5.2.4 Project of Constructing Characteristic Towns
Guizhou is the only one province in the PRC which has no plains, thus the development of cities is largely restricted by land, water and other resources. In promoting urbanization, emphasis has to be put on constructing and developing small towns with characteristics. Firstly, make use of advantages to build up powerful towns that rely on industrial development. Urbanization has to be connected with industrialization, but to each specific town, industrialization is not a necessity and it is impossible to develop all sectors of industry at the same town, therefore focus should be on industries with relative advantage and steady progress will be made gradually. Secondly, make use of outstanding characteristics to build up cultural towns which rely on development of ethnic culture. Guizhou is a muti-ethnic province with ‘mixture of peoples nd concentration of population’, forming diversified and characteristic ethnic culture, so it is necessary to negotiate relations between urbanization and protecting and enhancing good traditional culture, as well as displaying characteristic style and cultural taste of small towns in Guizhou. Thirdly, make use of superior tourism and climate resources to build up tourism towns that rely on development of leisure and vacation industry. Guizhou is teemed with tourism resources and enjoy wholesome climate. Making use of its unique tourism and climate resources, thus building up tourism towns that rely on development of leisure and vacation industry is a major direction for small towns’ construction and developing rural tourism. In constructing small towns, not only the mixture of tourism spot and the small town needs to be considered about, but the map up and construction of vacation spots and small towns also have to be planned as a whole in order to build up a complex of small towns for leisure and tourism with Guizhou characteristics.

5.2.5 Training Program for Rural Working Force
Focus on modern citizen’s awareness and working skills and make training programs widely for rural working force using many ways. Based on local profession schools, rural broadcasting schools and training institutes, and insisting on combing constructions of rural training base and labor employment base, a group of training bases aimed at transferring rural working force should be established. Continue to facilitate the combination of agriculture, science and teaching and closely relate promotion of agricultural technology, science and technology development and training to establish training bases that educate pragmatic talents. Improve working admittance and professional qualification certificate regulations, enhance and complete workforce back-up rule, working admittance and professional qualification certificate regulations to enable skilful workers to get higher benefits.
5.2.6 **The planning of ten-year poverty alleviation.**

It should work out well the planning of Guizhou Province Program of Poverty Alleviation and Development during 2011—2020, the Twelfth Five-Year Planning of Poverty Alleviation and Development, the planning of poverty alleviation and development in a large area in the particularly poor areas, and the planning of promoting poverty alleviation and development in a county, town/township and village as a unit. Guizhou provincial government should establish the special transfer payment and policy transfer payment systems. It should innovate in the mechanism of integrating the funds, support at county level to clear, sort and integrate the funds particularly used for agriculture, and use it together without change in the original purposes of funds. It should actively establish rural cooperative banks, village/town (township) banks, micro-finance companies, rural mutual funding cooperatives, and other new financial organizations in the 50 counties. It should encourage and support banks to establish branches at county levels and establish a long-term system to provide loans to small enterprises and micro-loans to rural households.
References

Appendix 1:

Analysis on the fixed assets investment and the increasing rate

According to the current situation, assume that the increasing rate of national GDP maintains 8%, then from 2009 to 2020, the average annual increasing rate of fixed assets investment in Guizhou should be over 35% (from relative approach), so that in 2020, GDP per capita in Guizhou will reach national average level. Therefore, in order to fulfill the purpose of building up a well-off society in an all round way in 2020 in Guizhou, it is a great challenge to the quota of GDP per capita.

The estimated formula based on polynomial fit and extrapolation of Guizhou population:

\[ P_{GZ} = -0.8525 \times T^2 + 57.4505 \times T + 3020.6002 \]  (1)

The estimated formula for national population:

\[ \ln(P') = 0.2306 + 1.6021 \times \ln(P_{GZ}) - 0.6216 \times \ln(P') \]  (2)

And based on the assumption of 8%, annual average increasing rate of national GDP, we can conclude the estimated GDP per capita in the PRC and Guizhou. (Table 1)

<table>
<thead>
<tr>
<th>Year</th>
<th>Population of Guizhou</th>
<th>National Population</th>
<th>National GDP (from relative approach)</th>
<th>National GDP per capita</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>3828.61</td>
<td>133463.1</td>
<td>327081.7</td>
<td>24507.3</td>
</tr>
<tr>
<td>2010</td>
<td>3851.11</td>
<td>134041.2</td>
<td>353248.2</td>
<td>26353.7</td>
</tr>
<tr>
<td>2011</td>
<td>3871.90</td>
<td>134588.7</td>
<td>381508.1</td>
<td>28346.2</td>
</tr>
<tr>
<td>2012</td>
<td>3890.99</td>
<td>135107.1</td>
<td>412028.7</td>
<td>30496.5</td>
</tr>
<tr>
<td>2013</td>
<td>3908.37</td>
<td>135597.8</td>
<td>444991.0</td>
<td>32817.0</td>
</tr>
<tr>
<td>2014</td>
<td>3924.05</td>
<td>136062.1</td>
<td>480590.3</td>
<td>35321.4</td>
</tr>
<tr>
<td>2015</td>
<td>3938.02</td>
<td>136501.5</td>
<td>519037.5</td>
<td>38024.3</td>
</tr>
<tr>
<td>2016</td>
<td>3950.29</td>
<td>136917.1</td>
<td>560560.5</td>
<td>40941.6</td>
</tr>
<tr>
<td>2017</td>
<td>3960.85</td>
<td>137310.3</td>
<td>605405.3</td>
<td>44090.3</td>
</tr>
<tr>
<td>2018</td>
<td>3969.71</td>
<td>137682.0</td>
<td>653837.8</td>
<td>47489.0</td>
</tr>
<tr>
<td>2019</td>
<td>3976.87</td>
<td>138033.6</td>
<td>706144.8</td>
<td>51157.5</td>
</tr>
<tr>
<td>2020</td>
<td>3982.31</td>
<td>138365.9</td>
<td>762636.4</td>
<td>55177.4</td>
</tr>
</tbody>
</table>

Note: All estimated numbers are based on the relative value from 2008, i.e. deducted by the impact of price factor.

From the above table, if the GDP per capita of Guizhou in 2020 needs to reach national average level, then in 2020, GDP (compared to 2008) of Guizhou in 2020 has to be:
In 2008, GDP of Guizhou is 333.34 billion, thus we can estimate the annual increase rate of GDP in Guizhou will be:

\[ \sqrt[3]{\frac{2194.946}{3333.40}} - 1 = 17.01\% \]  

According to the regression relationship of GDP increasing rate of Guizhou and the increasing rate of fixed capital investment (as illustrated in Appendix 3):

\[ GDPR = 0.66096 \times INVR \]  

We can see from this formula that when GDPR is 17.01%, INVR will be 25.7%. In other words, assume that the increasing rate of national GDP maintains 8%, then from 2009 to 2020, the average annual increasing rate of fixed assets investment in Guizhou should be 25.7% (from relative approach), so that in 2020, GDP per capita in Guizhou will reach national average level. Added inflation factor, the average annual increasing rate of fixed assets investment should be around 30%.

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3 GDPR=GDP Increasing Rate; INVR: Fixed Capital Investment Rate.
Appendix 2:

The research on tourism development strategy in Guizhou

Tourism is an industry filled with potential and development impetus, with both economic and social function, characterized with both tradition and modern, production and life and is both labor intensive and knowledge intensive. In the PRC, tourism have begun to transform and develop, and faces with in-depth revolution in its structure, function, form and driving force. Its function transfers from economic-led to the regulation and control of economy, environment, social culture and other functions. Guizhou is rich in tourism resources, but its development lags behind. Besides, it is faced with challenges of worse environmental pollution, recession of ecological environment, intensive competition in tourism market and climate change. The local government shall grasp the opportunity and make full use of its advantage to motivate the transformation of tourism development and the industrial upgrade, making tourism the strategy-driven industry, bringing with it the development of other industries and optimizing industrial structure.

1. Generalization of Tourism Development in Guizhou Province

To treat national average level as the frame for reference, calculate one norm of tourism in Guizhou in a certain period based on the increasing rate of the same norm in national scope and get an assumed increasing volume, the disparity between the actual increment and the assumed increment should be the deviation. The formula will be:

$$D_i = e_{i0} \times \left[ \frac{e_{it}}{e_{i0}} - 1 \right] - \left[ \frac{E_i}{E_{i0}} - 1 \right]$$

In the formula, $D_i$ is the deviation value of the norm $i$ during certain observation period in Guizhou; $E_i$ and $e_i$ are the value of norm $i$ in the PRC and Guizhou respectively; 0 means base year and $t$ means the last year. When $D_i>0$, it means that the increasing rate of this norm in Guizhou is above national level and is relatively faster and vice versa.

To choose 2001 to 2008 as the observation period, and input statistics of four major norms in tourism to the above formula, we will get the actual increment, assumed increment and deviation value of each norm. (Table 1)
Table 1: The Actual Increment and Deviation Value of Relevant Norms in Tourism of Guizhou in 2001-2008

<table>
<thead>
<tr>
<th>Norm</th>
<th>National Increasing Rate</th>
<th>Increasing Rate in Guizhou</th>
<th>The Actual Increment</th>
<th>Assumed Increment</th>
<th>Deviation Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Oversea Visitor Arrivals</td>
<td>46.08</td>
<td>92.41</td>
<td>18.99</td>
<td>9.47</td>
<td>9.52</td>
</tr>
<tr>
<td>(10000)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Home visitor Arrivals</td>
<td>118.37</td>
<td>288.13</td>
<td>6050.69</td>
<td>2485.71</td>
<td>3564.98</td>
</tr>
<tr>
<td>(10000)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income by Oversea Visitors</td>
<td>129.56</td>
<td>70.19</td>
<td>4824.14</td>
<td>8904.84</td>
<td>-4080.70</td>
</tr>
<tr>
<td>(10000 USD)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income by Home Visitors</td>
<td>148.39</td>
<td>749.25</td>
<td>568.01</td>
<td>112.50</td>
<td>455.51</td>
</tr>
<tr>
<td>(10000 RMB)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

During the observation period, the increasing rate of three norms-numbers of overseas visitor arrivals, number of home visitor arrivals and income by home visitors- are above national average level, deviation value positive. Compared to the base year, income by home visitors of the last years has increased by almost 6.5 times, number of home visitor arrivals has increased by 1.88 times, making their positive deviation value bigger. However the income by overseas visitors is lower than national level, with -40.807 million US dollars as the negative deviation value, which means that tourism in Guizhou is largely dependent on home market, with the obvious characteristic of introvert tendency. In 2008, the number of overseas visitors in Guizhou is only 1.54%, 15.80% of that of Guangdong and Yunnan respectively; the income by overseas visitors is 1.27%, 11.61%, 18.95%, and 19.44% of that of Guangdong, Yunnan, Hunan and Guangxi. Generally, the development of tourism is accelerating, having become the strategic and motivating industry of Guizhou, which has the fastest increasing rate and the biggest potential. However it has a far too obvious introvert characteristic and the general development level is still low.

2. SWOT Analysis of Tourism Development in Guizhou

1) Strength
   a. Climate Advantage. Guizhou enjoys a warm and humid climate. It has a warm winter and cool summer, with its temperature maintained to average 15 Celsius degrees in most areas and average 23.10 Celsius degrees in the summer and relative humidity above 70% all year around, which make it the ideal tourist spot and the place to have summer vacation.

   b. Resources Advantage. Guizhou is rich in natural resources in quality and quantity. There is widespread karst landform with complete forms and shapes. The territorial differences are obvious and the bio-diversity here is outstanding. There are waterfalls like Huang Guoshu, Ma Linghe and Shi Zhangdong and etc; Rivers and valleys like Ma Ling river, Wu Yang river, Bei Pan river, Wu river, Hua river, Chi river and Nan river and etc; Karst caves like Zhi Jin cave, Dragon Palace, Nine Heavens Cave, Duo Bin Cave and etc; Lakes like Red Maple lake, Bai Hua lake and etc; Stone forest like Xiu Wen Hui Shui, Zhen Feng Bamboo Castle and etc. The mixture of forest, valleys, mountains and peaks, stone forest, lakes, waterfalls and karst caves displays a wonderful and harmonious picture of mutual mirroring, with unique mountains, beautiful waters, magnificent waterfalls and springs flowing quietly. It is such a diversified and fantastic view of mountains and waters.

   Guizhou is a multi-ethnic province. Diversified ethnic culture has created a deep, mystic, ancient, unique and honest cultural environment. There are 17 ethnics which have lived here for generations in Guizhou,
including Miao, Buyi, Dong, Yi and Gelao...Each ethnic has its own primitive culture. There are other cultural festivals like Tunpu culture, Long March culture, Ancient Wine culture, Yangmning culture, Cave culture and Yelang culture, making it “the land with thousands of culture islet’. Among 518 non-material cultural heritages announced by State Council in 2006, 30 of them are in Guizhou like Ancient Songs of Miao, Dong Choir, Dong Drama, Miao Embroidery, Gu Zang Festival of Miao, Sisters Festival of Miao, Sumar Festival of Dong and etc.

Currently in Guizhou, there is one world natural heritage of ‘Karst In Southern China’, two 5A class national tourism spots, three 4A class national tourism spots, 18 national level major scenery districts, nine national level natural preservation districts, 21 national level forest gardens, eight national level geological gardens, one national mine geological garden, 39 Key Cultural Relic under the State-level Protection, two national historical ancient cultural cities, six famous tourism cities in the PRC, four provincial level natural preservation districts, 53 provincial level major scenery districts, 26 provincial level forest gardens and 3 provincial level geological gardens.

c. Backwardness Advantage. In Guizhou, the development of tourism is far behind and thus the damage brought by inappropriate plan and development is relatively less. Architecture, clothes, diets, wedding tradition, funeral ceremony, festivals, arts and other primitive culture are well preserved. In the scenery districts, manually built architecture and sceneries are fewer, which bring less damage to all districts in general.

2) Weakness

a. Obvious location disadvantage and introvert characteristic. Far way from eastern economic circle, main transportation lines and tourists markets like Beijing, Tianjin, Shanghai, Guangzhou, Hong kong and Macao, its home market is very limited. It is difficult to develop international tourists market and as a result, the international level of its tourism is low and its introvert characteristic is outstanding. Being over dependent on the home market makes it lack awareness internationally.

b. Lagging behind of infrastructure, especially transportation. The terrain of Guizhou is fluctuating and the cost for construction and maintaining transportation is high, thus the roads in the rural area are low in quality and the accessibility of tourism spots is weak. The air network in the province has not yet formed, while there is no road network between scenery districts and spots, weakening the relativity between scenery districts and it is impossible for multiple single scenery districts to combine, which is a major bottle neck in developing tourism. Restaurants, hotels and other affiliated infrastructure out of major cities are less and poor, reducing tourists’ will of staying longer and consuming more. Form 2006-2008, the staying time for oversea visitors in Guizhou has reduced from 2.29 days per person to 1.75days per person.

c. Low industrial development level and lack supporting from affiliated industries. Tourism in Guizhou still focus on the primary stage of scenery viewing and has not developed high quality tourism resources, especially its unique cultural resources. The structure of tourism products is unreasonable, with reception tourism being the majority and lacks system and hierarchy, not being able to answer to market demands of different levels. Tourism products are small and dispersed, lacking highly quality tourism projects. The awareness of Guizhou’s tourism spots are low, like Huang Guoshu and Dragon Palace, they are still small products on a national level. There are no first class resources like Jiu Zhaigou, Yangsu, Yellow Mountain,
The Terracotta Army and the Imperial Palace in scenery tourism and no famous brand like Shangri-la in cultural tourism, so it lacks attraction for visitors abroad and from Hong Kong and Macao, who would break the limit of space for touring. Besides, there is not enough supporting from affiliated industry, especially the third industry.

d. Intensive competition from neighboring provinces and regions. Guangxi is located near sea and the border, with more convenient transportation. It is close to tourists markets of Hong Kong, Macao and Guangdong. With better combination of mountains and watery scenery, the driving force of Guilin is obvious. Yunnan is located on the border and has great geographical advantage, with excellent climate and rich tourism resources. The development of tourism in Yunnan is earlier and it is one of the strongest provinces in tourism in western China. Sichuan owns convenient transportation and has obvious ecological environment, with rich tourism resources and thus the development of its tourism is faster. Jiangxi, as the origin of revolution, has a better ecological environment, led by the famous tourism spot of Lu Mountain. Red tourism spots like Jinggang Mountain in Jiangxi and Shao Mountain in Hunan are developed much earlier and is internationally famous, having already grasped the opportunities of developing red tourism market. Famous tourism spot like Jiu Zhaigou, E Mei Mountain, Guilin, Ancient Phoenix City, Zhangjiajie, Lu Mountain, Dali, Li River and Shangri-la are internationally famous, bringing intensive competition to tourism development in Guizhou.

3) Opportunities
The PRC is bordered with many countries and has the geographical advantages of developing international tourism. Development in international trade has promoted the development of oversea visitors’ tourism. Our compatriots in Hong Kong, Macao and Taiwan are stable tourism markets. A large population, faster economic development and the growing of economic scales provide the development of tourism with great potential and driving force. The expanding of home tourism consumption is already very obvious, which expects a faster development in tourism in the future. Economic globalization and the PRC’s entry into the WTO will provide more opportunities for tourism industry in Guizhou to get international investment and open overseas tourism markets.

The implementation and progression of developing western China strategy provide policy opportunities for the ecological construction, environmental protection, infrastructure construction and the development of tourism and characteristic agriculture. In enlarging home demands and the strategic adjustment of speeding up economic structure by the government, tourism is considered as a new economic growth factor, giving great support to tourism. In 2009, Opinions of the State Council on Accelerating the Development of Tourism Industry raised measures of quickening construction of tourism infrastructure, enriching tourism cultural content, increasing governmental investment, enhancing financial support and improving complimentary services. The local government of Guizhou has also made positive policy and measures for developing tourism. All these conditions will create a facilitating macroscopic environment for the development of tourism in Guizhou.

Green economy and low-carbon development has become the new trend in global development. In 2008, the United Nations Environment Program (UNEP) called for the implementation of ‘Global Green New Deal’, taking green economy as the target, to lower human’s reliance on carbon and slow down the ecological recession, as well as lead the development of economy into the track of clean and stable
development. With the diversification of demands in tourism market, more attention is given to industrial tourism, sports tourism, adventurous tourism, festival tourism and red tourism. The above-mentioned trends has provided with many opportunities for Guizhou in protecting environment and transforming development ways of tourism.

4) Threatens

a. Conflicts between industrial structure and ecological environment: low urbanization, large rural population, high dependence on and extensive development of crop production, these have all lead to high pressure to the environment and contradiction between population and land. The core industries here – thermal power, coal, coal chemical and nonferrous metals, making full use of the local resources like phosphorite, alumyte, manganese ore and coal etc -- have become a major threaten to local tourism. For example, the waste water of Maling Chemical Fertilizer Plant is seriously affecting the water quality and flavor in Maling River Canyon Scenic Area. And coal mine exploration is causing serious pollution of nearly rivers. Besides, mining is affecting the integrity of the landscape, increasing the opportunity of geologic disasters and make the venerable ecological environment much worse. In 2008, Guizhou province, with its 2553 mining areas, mining sectors and well fields, saw 19 cases of landslide, collapse, debris flow and surface collapse etc. due to the mine. The newly added and destroyed area due to mine exploration is 8131.69hm², and only 1195hm² are recovered, a percentage of 14.7%.

b. Serious pollution. First, serious surface water and urban area underground water pollution. In 2009, the total industrial waste water reached 135 million tons, 15.38% higher than the year before, reaching only 70.51% of the set target and is much lower than the national average of 94.24%. According to the data of 2009 Guizhou Environmental Condition Report, the sections of Changjiang and Zhujiang with water quality of V (rated as bad) accounts for 21.6% of the total monitored sections, while that of national sections of Changjiang and Zhujiang with water quality of V only accounts for 3.9% and 3.0% of the total monitored sections. Of the 8 monitored lakes (reservoirs), except Yelang Lake whose water quality reached the II standard, other lakes like Aha, Hongshan, Wanfeng Lake reservoirs, Caihai and Wanhua Lake is only qualified for the IV standard, while that of Wujiang reservoir and Hongfeng reservoir is classified V. Affected by urban domestic waste water and industrial waste water, the areas seriously polluted are often those area running through cities. The underground water of Guiyang, Liupanshui, Zunyi, Anshun and Kaili are all polluted, with total bacteria and coliform group higher than the standard.

Secondly, serious air pollution. According to the monitored air quality data in the 12 cities of Guizhou, 58.3% cities attain the Grade II of national ambient air quality standards, 41.7% attain Grade III and 54.5% cities have had acid rain. On the national level, 78.3% attain the Grade II and that qualified for Grade III is only 16.2%. Thirdly, serious solid waste pollution and low multipurpose utilization rate or low disposal rate. In 2009, the total industrial solid waste is as high as 73.1615 million tons, 25.3% higher than the year before. The total emission is 946.9k tons, 70.3% higher than the year before. The rate of multipurpose utilization of industrial solid waste is 45.6%. The disposal rate of urban residential waste is 39.75%, these are all quite low.

c. Ecological degradation and serious geographical disasters. Due to the wavy terrain, rich rain and frequent rainstorm, with immoderate human activities, water and soil erosion and geographical disasters have become serious. Guizhou province has a total of 1116 sinks, 2316 landslide and 105 karst collapses. The total area of soil erosion is 73539.5km², 41.74% of the total area, of which, 28770.9km² are moderate
erode and 10733.9km² are serious or super serious erode, accounting for 16.33% and 6.09% of the total land area. Stony desertification in the Karst area is serious, and the total stony desertification area of the whole province is 34851.25km², 19.78% of the total area, which accounts for over 30% of the total stony desertification of the southwest Karst area. And of which, 18185.18km² are low degree stony desertification area, 12334.28km² are middle degree, and 4318.37km² are high degree stony desertification, accounting for 10.32%, 7.00% and 2.45% separately. In 2009, there are a total of 380 occurrences of geographical disasters like landslip, collapse, debris flow and surface collapse, with a total loss of 106 million RMB.

d. Climate change is greatly threatening tourism. UN's Intergovernmental Panel on Climate Change (IPCC) has said that global warming is now an undisputable fact and in the future 100 years, the earth will still getting warmer, which is profoundly affecting the natural ecological system and social economic system. The PRC is one of the countries which are profoundly affected by this climate change and we are faced with all the negative influence and challenges brought about by the climate change. Starting from mid 20th century, rains in the middle and lower reaches of the Yangtze river and the west regions of the PRC is greatly increased, and more rainstorms occur during the summer time in the middle and lower reaches of the Yangtze river. In the recent 50 years, geographical disasters caused by drought and heavy rain in the northwest regions occur alternatively. At the same time, the peaks of geographical disasters become higher, period of waves become shorter, frequency become higher and damage much larger. The climate simulation has shown that in the 21st century, temperature will keep increasing. And the warming of the earth will aggravate hydrographic circulation, cause the change of amplitude of the water resources system and the frequency of extreme value, and increase the possibility of extreme weather incidents like drought and flood. In the future, south China will have a dramatic increase in rainy days, with more rainstorms and higher probability of once-in-a-hundred-years drought or flood disasters.

Guizhou province has wavy terrain, with rich rivers, yet the utilization of water resources is difficult and is highly dependent on rainfalls. The area of karst cave exposure of the whole province is 109 thousand km², accounting for 61.88% of the total land area. Because of the karst cave, channeling and funnel etc. in the karst region, rain water would easily seep into the soil. But as the soil is thin and the water conservation capacity is weak, the surface of the earth easily gets dry. As the hydraulic engineering project is lagging behind and the overall deployment is unbalanced, the ecological system is damaged and environment is polluted. As demand for water resources increase with the economic development, the contradiction of demand and supply of water resources begins to show. The complicated geographical and topographic features are liable for geographical disasters, which is further complicated by the climate change, leading to more intense and frequent drought, landslip, collapse and water and soil erosion etc. and sharper contradiction in demand and supply. In 2010, serious drought in the southwest region of the PRC leads to a non-raining period of over 226 days in over 95.45% of the whole province. Most rivers inside the province are dramatically declined in water inflow and over 5 million people are faced with the scarce of drinking water. The rural drinking water supply is in shortage. Besides, Huangguoshu Waterfall loses its majesty due to the dramatic decrease of water from the upper reaches of the river, as is the water drifting scenic area. Natural disaster caused and intensified by climate change are going to bring major impact to tourist resources, tourist safety, water guarantee and infrastructures like transportation, telecommunication, electronic and water supply etc., and will be an important factor that hinders the sustainable development of tourism.
3. Route and suggestions for the sustainable development of Guizhou tourism

Tourism in Guizhou province is in a phrase of accelerating development, with both good opportunities and severe challenges. Guizhou should seize the opportunity while the PRC is shifting the economic development mode and advocating energy saving and emission reduction and is positioning tourism as strategic driving forces for economic development, mode change, industrial structure optimization, employment expansion, opening up acceleration, investment environment perfection and social improvement. We could use the combination of special ethnic culture and Karst ecological sceneries as a supporting point, set the target of building Guizhou as an important tourist destination of the west regions of the PRC and a Greater Tourist province, and focus on ecological conservation and ecological improvement, infrastructure construction, brand project cultivation and industrial quality improvement. The final goal is to enhance cross region cooperation, expand overseas market, improve development environment, and realize leapfrog development of the tourism with a period of 5-10 years, shifting from a Greater Tourist resource province to a Greater Tourist economic province. Based on the above analysis, below are the solutions and suggestion for the sustainable development of Guizhou tourism.

a. Build up a Greater Tourism system. Tourism is an open industry with high relevancy to other industries which requires a mentality of Greater Tourism and Greater industry. Greater Tourism industry use tourism as the pivot industry and extend and interact with multiple other industries to form industry clusters by integrating the demands of transportation, housing, food, travelling, shopping and entertaining etc. It is an organic integrity combining openness, interactivity and overall performance. Economic develop in Guizhou province is slow, and the support for tourism is not enough. Therefore, we need to take tourism as a strategic core industry and work around transportation, housing, food, travelling, shopping and learning to build up a Greater Tourism system by the integration and interaction with other industries and other regions. And by the extension, expansion, interaction and integration of tourism to and with other industries, related industries like tourist agriculture, tourist industry and featured agriculture, transportation, catering, entertainment, business and trading, finance and conference and exhibition will all be promoted. Such, the tourist industry chain could be prolonged, and the industry gets more support, more positions are created, and economic development promoted. At the same time, other industry could be promoted and the whole industrial structure could be optimized. By these, we can stimulate ecological construction, environmental improvement and realize the co-development of economy, society and ecological benefits.

Adapt measures to local conditions and choose representative regions to promote the linkage between tourism and other superior industries. Carry out pilot Greater Tourist industry development projects to form the linkage model of tourist industry with other industries, including the ecological and tourist industry linkage model combining these two industries and with tourism serving as the lead; the agriculture and tourism linkage model combing tourist agriculture and tourism and promoting related first and third industries; the business and tourism linkage model combining business and tourism industry and promoting related first and third industries; the culture and tourism linkage model combining the competitive edge of culture and tourist industry to form a joint force for mutual development; the transportation and tourism linkage model and the industry and tourism linkage model etc.
Tourism in Guizhou province is still in an early stage of development, with imperfect marketing and management system. Greater tourism, with its wide connection with other industry, shall adopt the method of government dominance, enterprise operation and participation of the whole society to form a supporting system to the greater tourism industry. First, establish the greater tourism coordination and leadership team. Second, establish a multiple tourist investment and financing guarantee system. Thirdly, establish the fundamental supporting system including infrastructure, tourist service equipment, tourist product development, tourist marketing and image planning etc. Fourthly, establish a talent guarantee system for the greater tourist system.

b. The integration and linkage of multiple departments (chains). First, the integration of tourist industry related chains, including food, housing, transportation, travelling, shopping and entertainment. The weakness of any of these chains will cause bottleneck effect. Therefore, attention shall be paid to the integration of hotels, restaurants, travel agency, culture and entertainment industry as well as the production and distribution of the tourist merchandize etc. to form an interconnected supporting system. Secondly, the integration of the benefits and obligations of related departments, including the tourist enterprises, Planning Bureau, Construction Bureau, Travel Bureau, Scenic Management Sector, Garden Station, Culture Relic Bureau and Forestry Bureau etc. to form a interconnected system combining tourist public service, tourist safety and quality guarantee system. Thirdly, the reorganization and integration of tourist enterprises. Through horizontal and vertical merger and restructuring, we can establish large and strong tourist enterprises and large tourist enterprise group to improve the benefits and competitiveness of the tourist
industry. Fourthly, the combination of tourist products and scenic spots: by optimize the time and space allocation for tourist products and integrating resources like ethnic culture, sceneries and hot springs, we can cultivate a multiple travel product and form different kinds of tourism like healthy tourism, scientific exploration tourism, expedition tourism, convalescent tourism and revolutionary tourism etc. And by further expand the content of activities, demands from different target travelers can be met. And through the tourist main routes, different scenic areas, spots and Tourist Confluence Center etc would be connected, thus a small product turns into a big product and scatter scenic areas (spots) integrated into a greater tourist area.

c. Driving forces of brand. In view of industrial division of labor, tourism belongs to horizontal rather than vertical division of labor. In market competition, the competition of tourist industry is mainly competition on choice and time, rather than exclusive competition. This means that special feature is the life of tourism and with unique feature, tourism can realize leapfrog development. Guizhou has rich tourism resources, the same as the ethnic culture and natural scenic resources of neighboring provinces like Yunnan, Guangxi, Hunan etc. Yet the key is outstanding features. Due to the lack of branded tourist products, especially top tourist products, even the Huangguoshu Waterfall is still far from top tourist products. Due to the poor economy and limited investment, Guizhou has to pull together all necessary forces, explore exclusive and featured resources to win the market competition and use that as a driving forces for other tourist products. For example, we can make full use of the world natural heritage, also the national 5A tourist spot, the karst region around Libo, as well as the Anshun tourist zone and the Liping-Congjiang-Rongjiang tourist zone, top tourist products will be nurtured, hence promoting the development of other tourist projects.

d. Improve culture significance. Culture is the core and soul of tourist resources and is the driving forces for promoting tourism development. Tourism in the PRC is undergoing a transformation, with the culture significance more and more stressed in tourist consumption. The rich culture tourist resources and the originality and uniqueness of ethnic culture is the special advantage of Guizhou province. Therefore, we need to pay full attention to the exploration, development, planning and promotion of the culture tourist resources and combine that into the related chains of food, housing, transportation, travelling, shopping, entertainment and learning, so that the scenes can be well combined with the unique culture to improve the attractiveness of tourist product and scenes.

e. Optimize tourist environment. First, optimize the ecological environment. Pay special attention to the protection and recovery of plantations; focus on the overall improvement of water and soil erosion and stony desertification, and the ecological recovery of the fragile area; improve the adaptability for climate change. Improve environment pollution improvement; stress the industrial “three wastes” disposal of and along the scenic area. Accelerate the production of urban waste water and garbage disposal facilities; improve the overall regulation of rural environment. Secondly, optimize social environment. Increase investment on transportation, telecommunication, water supply and drainage, tourist reception facilities and improve the infrastructure for tourist resources. Enhance the construction of artery and traffic and feeder airlines connecting the main scenic area and Tourist Confluence Center; improve transportation connectivity; setting up a three dimensional transportation network. Innovate the development mechanism of tourism; accelerate the construction of tourist public service system, related regulations and industry credibility system; regulate the market; improve the quality and service of staff; create a good social condition for the future development of tourism. Promote the overall integration of the PRC management
f. Regional cooperation. First, realize the integration of tourism transportation, market, information and management in the whole province and promote the division of responsibilities as well as cooperation of different regions. Work jointly to create the brand projects and tourist lines, and realize the combined development of regional tourism. Secondly, make full use of the geographical advantage of Guizhou province in connecting the three tourist regions of the southwest, the middle and the Pearl River Delta; improve cooperation with neighboring provinces and regions to co-build a greater tourist region and lines; further expand tourist development space; co-develop the tourist information database to share information; work jointly to build a regional promotion network to expand domestic as well as overseas market. Take Kunming as a knot, the market can be further expanded to Southeast Asia and IndoChina. And centered on Zunyi city, Sichuan, Guizhou and Chongqing would cooperate to build the Southwest tourist Golden Triangle. Work with Hainan province and make full use of the platform of Hainan as an International Tourism Island to improve the awareness of Guizhou province in other countries. Improve bilateral and multilateral cooperation and expand overseas market.

g. Improve the market operation capacity. First, accelerate the diversification reform of tourist enterprises. By the forms of reorganization, alliance, merger and one-time sales, accelerate reform progression, change the operation model into one that is more professional, brand-orientated, more large in scale and regularized. Encourage strong enterprises and renowned enterprises in and out of the country/the province to set sole proprietorship enterprises or joint ventures by way of equity participation, acquisition, franchised operation and joint operation etc.. Develop private tourist enterprises and encourage all economic sectors and social forces to invest in tourist entities, develop tourist project, develop and expand the existing tourist enterprises and improve their competitiveness. Secondly, actively explore marketing operation model of the tourist areas (spots). Give domestic and foreign investors the operation right of tourist resource development and scenic spots to form a tourist development model with multiple investors. The ownership, management right and operation right for tourist resources will be separated. And by way of franchising, transfer, contracting and renting etc., assign the operation right of scenic area project through public bidding, actively explore market operation model of tourist resources development and operation, and speed up tourist areas (spots) development and market operation. Thirdly, establish the Guizhou Tourism Investment Company as a financing platform and an investment subject for tourism construction project. The main responsibility of the company will be leading and promoting the quick development of Guizhou tourist industry. Fourthly, give full play to the connecting role of Tourist Trade Association and intermediary organizations.
Sub-report 1: Study on Strategies of Promoting Industrialization in Guizhou Province

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1. The Status Quo of Industrialization in Guizhou Province

To make accurate judgments on the current stage of industrialization in Guizhou Province based on international and domestic experiences and to make in-depth analysis of the problems and challenges, advantages and opportunities facing the industrialization in Guizhou are the logical premises of promoting the industrialization strategies in Guizhou.

1.1 Diagnosis of the stage of industrialization in Guizhou Province

Zhang Peigang, the development economists believes that the essence of “industrialization” is “the process of a range of essential production functions (or combinations of factors of production) making ground-breaking changes (or transformation) in succession from lower to higher levels”, namely, the process of continuous improvement of the production efficiency. Its main manifestation in reality is that the proportion of industrial sectors with higher production efficiency continues to increase and the proportion of the industrial sectors with lower production efficiency decreases. The indicators of industrialization are mainly in four aspects: 1. the increase of per capita GDP, or labor productivity; 2. the increase of the proportions of industrial and service sectors in GDP; 3. the constant transfer of agricultural labor to non-agricultural areas; 4. the decrease of the proportion of primary products. U.S. economist H • Chenery made rigorous quantitative analysis on the industrialization process of different countries and divide it into three stages: early stage, mid-stage and late stage. Table 1 lists the indicative values of different industrialization stages estimated on the basis of the international experience. We will make a judgment on the stage of industrialization in Guizhou Province according to these indicators.
Table 1: Indicative values for different stages of industrialization

<table>
<thead>
<tr>
<th>Different stages of industrialization</th>
<th>The initial stage of industrialization</th>
<th>Industrialization</th>
<th>Post-industrialization</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Early stage</td>
<td>Mid-stage</td>
<td>Late stage</td>
</tr>
<tr>
<td></td>
<td>Year 1970, USD</td>
<td>Year 2009, USD</td>
<td></td>
</tr>
<tr>
<td>1. Per capita GDP</td>
<td>140—280</td>
<td>280—560</td>
<td>560—1120</td>
</tr>
<tr>
<td>Year 1970, USD</td>
<td>770—1540</td>
<td>1540—308</td>
<td>3080—6160</td>
</tr>
<tr>
<td>Year 2009, USD</td>
<td></td>
<td>0</td>
<td>6160—1155</td>
</tr>
<tr>
<td>2. Output value of three industries</td>
<td>Primary industry has complete dominance. S&lt;20%.</td>
<td>P&gt;20%, S is low but exceeds 20%.</td>
<td>P&lt;20%, S&gt;T and is the highest in GDP.</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Proportion of agricultural employees in the workforce</td>
<td>Above 60%</td>
<td>45—60%</td>
<td>30—45%</td>
</tr>
<tr>
<td>4. Changes in the internal structure of industries</td>
<td>Heavy industry stage centered on raw material industries</td>
<td>Deep processing stage centered on processing and assembly industries</td>
<td>Technology intensive stage</td>
</tr>
</tbody>
</table>

Note: P, S, T here represent the proportions of the primary, secondary and tertiary industries in GDP. According to the World Bank statistics, the CPI of the United States in 2009 and 1970 are respectively 110 and 20 (take 2005 as 100). See http://dps-ext.worldbank.org/ ext / DDPQQ / report.do? method = showReport. The corresponding 2009 GDP per capita to each stage of industrialization in the table is converted based on this index.

Resources: Excerpts from Industrialization and Soft Environment Building in the PRC’ Western Regions, eds. Wei Houkai, Chen Yao, 2003.

1.1.1 Per capita GDP

Chenery and others calculated the per capita GDP of different stages of industrialization using the 1970 U.S. dollar value, and decided that it is the initial stage of industrialization when the per capita GDP is between 140 and 280 U.S. dollars, and the early stage of industrialization when the per capita GDP is between 280 and 560 U.S. dollars. If we convert the figures with a 2009 U.S. dollar value base according to the CPI in the U.S., the two stages will be in the brackets of 770-1540 and 1540-3080 U.S. dollars respectively. In 2009, the per capita GDP of Guizhou Province is 10,258 yuan, 1,502 USD on the exchange rate of the year, still less than the critical value between the initial stage and the early stage of industrialization (1,540 USD), and is at the end of the initial stage. However, in terms of purchasing power parity (PPP), the per capita GDP of Guizhou Province in 2009 is 2,565 USD, into the early stage of industrialization. Considering that the two calculation methods tend to either underestimate or overestimate the GDP to a certain degree, we take the arithmetic
mean of the two numbers, which means the per capita GDP of Guizhou Province in 2009 is about 2,033 USD, not yet at the midpoint (2,310 USD) of the early stage of industrialization. From the above calculations we may conclude that Guizhou Province is now at the first half of the early stages of industrialization, and is still far away from the mid-stage of industrialization.

1.1.2 The output value structure of the three industries
In 2009, the output value structure of the three industries in Guizhou Province is 14.2:37.9:47.9. According to the indicative values listed in Table 1, if we judge from the proportion of the output value of primary industry, which is less than 20% but greater than 10%, it should be a mid-stage industrialization. However, judging from the secondary industry/tertiary industry ratio, the proportion of the output value of tertiary industry has exceeded that of the secondary industry and holds the largest share of GDP, which is the characteristic of post-industrialization. Considering these two aspects, there are no corresponding indicators in Table 1 that match the current industrial structure of Guizhou Province. In fact, taking into account of the PRC’s specific national conditions and the situation in Guizhou Province, the secondary industry/tertiary industry ratio does not accurately reflect the regional stage of industrialization. The reasons are: first, since the PRC adopted the “overtaking” industrialization strategy prior to the reform and opening up, the industrial structure now does not reflect the natural market forces in the industrialization process. Second, on a low economic output background of Guizhou Province, despite that the tertiary industry accounts for more than the secondary industry, the tertiary industry is still at a small scale compared with the national level, and its effect on the regional economy is still not comparable to the primary industry. Table 2 lists Guizhou’s proportion in the national total with different industries in 2009. For the same year, the population of Guizhou Province accounts for 2.85% of the country's total. The proportions of the output value of the three industries in the country's total are much lower than the proportion of the population in the country’s total, indicating that the scale of economy and the size of population in Guizhou Province are very much disproportionate.

The location quotient (LQ), the proportion of industrial output value relative to GDP (1.07%), reflects each industry's relative importance in the regional economy of Guizhou Province, using the national industrial structure as the reference case. If the LQ is higher than 1, it shows that the industry plays a more important role to Guizhou’s economy than in the national economy. In 2009, the LQ of the tertiary industry in Guizhou Province is 1.17, still less than the primary industry (1.46), indicating that the primary industry (agriculture) is a more important support in Guizhou Province than the tertiary industry. The output value of industry in Guizhou accounts for only 0.80% of the country’s total and the LQ is only 0.74, which is a manifestation of the backward industrial development in Guizhou Province. The higher proportion of tertiary industry is no proof for a higher level of industrialization. It is rather a manifestation of the sluggish growth of the secondary industry. In lack of the effective support from the secondary industry, the tertiary industry must rely mainly on outside factors.

In 2009, in the output value of the tertiary industry of Guizhou Province, transportation, storage and postal industry account for 21.20% and the wholesale and retail trade accounts for 15.57%, while on the national level the former accounts for 12.25% and the latter 21.75%, indicating that the development of tertiary industry in Guizhou relies mainly on the growth of transportation and logistical industry caused by the demand for resources from other parts of the country (and the higher proportion of the industry is directly related to the higher cost of transportation and logistics in Guizhou), and the growth of wholesale and retail trade.

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4 Calculations based on China’s Statistical Yearbook 2010.
trade, which is mainly driven by the consumer demand within the region, is very slow. Therefore, to judge the stage of industrialization in Guizhou Province according to the output value structure, the proportion of the output value of the primary industry is more valuable, and we find that the industrial structure of Guizhou Province reflects the characteristics of the mid-stage of industrialization.

Table 2: The relative importance of the output value of different industries using the national industrial structure as the reference case

<table>
<thead>
<tr>
<th>Items</th>
<th>Primary industry</th>
<th>Secondary industry</th>
<th>Industry</th>
<th>Tertiary industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportion in the corresponding national level (%)</td>
<td>1.56</td>
<td>0.82</td>
<td>0.80</td>
<td>1.26</td>
</tr>
<tr>
<td>LQ relative to GDP</td>
<td>1.46</td>
<td>0.77</td>
<td>0.74</td>
<td>1.17</td>
</tr>
</tbody>
</table>

Note: LQ relative to GDP = the proportion of the output value of an industry of Guizhou in the national level / the proportion of GDP of Guizhou in the national level.

Resources: Based on China Statistical Yearbook 2010.

1.1.3 Proportion of agricultural employees

In 2009, the number of employees in the primary industry of Guizhou Province is 16.264 million, accounting for 70.0% of the province’s workforce. According to the indicators listed in Table 1, Guizhou Province should be at the initial stage of industrialization. And this is a huge contrast to the judgment based on per capita GDP and output value structure of three industries. To be prudent, we will check here with other indicators. Since the industrialization process mainly lies in the increase of production efficiency, and when we examine production efficiency from the perspective of the practitioners’ production distribution, labor productivity is one essential indicator, if there is a big gap between industries in labor productivity, it means that a re-allocation of the labor force can improve the production efficiency of the local economy, and, the lower the stage of industrialization, the bigger the gap of labor productivity between industries is, the greater role the re-allocation of labor force among industries plays in the overall increase of production efficiency.

Chart 1 calculates the average labor productivity and the marginal labor productivity of the three industries in Guizhou Province in 2009. Taking into account of the price factor, marginal labor productivity applies the 2008 constant price. The average labor productivity and the marginal productivity of the primary industry are the lowest, 3,406 yuan and 52,764 yuan respectively, 20.3% and 54.8% of the province’s overall average labor productivity and marginal productivity. The secondary industry has the highest production efficiency, with an average labor productivity as high as 64,466 yuan, 3.8 times of the provincial level, 19 times of the primary industry and 61.5% higher than that of the tertiary industry. The marginal labor productivity of the secondary industry is 241,779 yuan, 2.5 times, 4.6 times and 3.7 times that of the whole province, the primary industry and tertiary industry respectively. This shows that there is a huge gap in labor productivity between industries in Guizhou Province, and the transfer of labor force from the primary industry to the secondary and the tertiary industries, especially to the secondary industry, is the prerequisite and immediate

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5 Data from the Statistical Communiqué of Guizhou Province on the 2009 Provincial Economic and Social Development.
6 The calculation formula of “marginal labor productivity” is: marginal labor productivity = growth of output of the industry / growth of the number of employees of the industry. Without control of capital and other variable elements, the calculated value can not be used to reflect the wage rate, but can reflect the potential economic benefits of the re-allocation of labor force in industries.
necessity for improving the industrial production efficiency of Guizhou Province. The disproportionately high number of agricultural employees and the huge gap of labor productivity between industries demonstrate clearly the features of the initial stage of industrialization in Guizhou Province.

Note: The average labor productivity applies the price of 2009; the marginal labor productivity applies the 2008 constant price, calculation based on the statistics of 2008 and 2009.

Resources: Calculation of the average labor productivity is based on the Statistical Communiqué of Guizhou Province on the 2009 Provincial Economic and Social Development. Calculation of the marginal labor productivity is based on China Statistical Yearbook 2008 and China Statistical Yearbook 2009.

1.1.4 Internal structure of industries

After the initial stage of industrialization there are usually the heavy industry stage centered on raw material industries (early stage of industrialization), the deep processing stage centered on processing and assembly industries (mid-stage of industrialization) and the technology intensive stage (late stage of industrialization). Currently the PRC on the whole has entered the mid-stage of industrialization, where processing and assembly industries take up a large proportion in the industrial structure. However, in the industrial structure of Guizhou Province raw material industries still have dominance, which is a typical characteristic of the early stage of industrialization. Chart 2 shows the proportions that mining industry and energy industry take in the total industrial output value of Guizhou Province. In 2008, these two raw material industries account for 14.60% and 22.10% respectively in Guizhou Province, 36.70% altogether, while the two industries account for only 19.12% of the national total. The former is nearly 1-fold higher than the latter. This reflects that the industry of Guizhou Province is highly reliant on raw materials and energy, which is a distinct feature of the early stage of industrialization.
Mining industry includes coal, petroleum, natural gas, ferrous metal, non-ferrous metal, non-metal and other minerals mining and dressing industries.

Note: Mining industry includes coal, petroleum, natural gas, ferrous metal, non-ferrous metal, non-metal and other minerals mining and dressing industries.

Resources: ACMR.

Chart 2 The proportion of raw material industries in Guizhou and in the national total (2008)

1.1.5 Diagnosis of the stage of industrialization on the whole

Chart 3 shows the stage of industrialization in Guizhou Province based on the above four statistical standards. The per capita GDP and the internal structure of industries show characteristics of the early stages of industrialization, the output value of the three industries demonstrates the characteristics of the mid-stage of industrialization, and the proportion of agricultural employees shows the characteristics of the initial stage of industrialization. Therefore, if we give the same weight to the four groups of indicators, we may determine that the industrialization in Guizhou Province is in the middle of the early stage. However, taking into account the key role of population in the regional economic development and as a manifestation of the "people-oriented" concept in the Scientific Outlook on Development, we should place more weight on the proportion of agricultural employees indicators, and therefore we believe that the industrialization in Guizhou Province in general is at the first half of the early stage, basically the same with the judgment made according to the characteristics shown with the per capita GDP standard.
1.2 Major problems and challenges faced by Guizhou’s industrialization

Since the total economic output in Guizhou Province is of a relatively small scale and it is in the first half of the early stage of industrialization, it is hard for the effective accumulation of capital in the regional economy, and a number of economic indicators stay for years at the bottom of the national list. Since 2000, industrialization in the country and the whole western region goes on rapidly, while Guizhou Province has lagged far behind and the share of industry of Guizhou Province in the whole nation and the western region is shrinking. As is shown in Chart 4, the proportion of the industrial output value of Guizhou Province drops from 0.75% in 2000 to 0.65% in 2009 in the country's total, and from 6.44% to 4.90% in the western region total.

Even more serious is that the current industrial investment in Guizhou Province is obviously insufficient, and there is not enough power for further development. According to statistics, the province’s industrial investment in 2009 is only 14.9% more than in 2008, while at the same period the national average growth rate of investment is 25%. The growth rates of investment of neighboring provinces and municipality Sichuan, Hu’nan, Chongqing, Guangxi and Yunnan are respectively 46.4%, 36.8%, 31.7%, 30% and 18.8%, all higher than that of Guizhou province. If the situation remains the gap in the level of industrialization between Guizhou Province and the whole country will be further widened and Guizhou will be further marginalized in the regional development.

There are many contributing factors to the sluggish process of industrialization in Guizhou Province. Besides the objective factors such as the less developed agriculture, the mountainous terrain, land desertification, low urbanization rate and inadequate infrastructure, industry itself has very serious problems. Here we will analyze the problems facing the industry in Guizhou Province in four major aspects as well as the challenges in its process of industrialization. The first two problems generally occur for any area in the early stage of industrialization, and yet are more prominent in Guizhou Province and are illustrative. The other two problems are typically the problem of Guizhou Province and are very difficult to solve. They pose severe challenges to the industrialization of Guizhou Province and need great attention.
1.2.1 High dependence on natural resources & extremely low industrial added-value

Location Quotient (LQ) of various industries, which is calculated by using the ratio between regional industrial output value composition and the national industrial output value composition, can be used to indicate the specialization degree of the industries in a specific region. Its formula is as follows:

\[
LQ_j = \frac{L_{ij} / L_i}{L_j / L}
\]

In this formula, \(L_{ij}\) is the LQ of industry \(j\) in region \(i\) (Guizhou Province), \(L_{ij}\) is the industrial added-value of industry \(j\) in Guizhou Province, and \(L_i\) is the gross industrial output value of Guizhou Province; \(L_j\) is the national industrial added-value of industry \(j\), and \(L\) is the national gross industrial output value. Suppose that region \(i\) (Guizhou Province) has consistent demand structure with the country as a whole. If LQ is larger than 1, it indicates that the output of industry \(j\) is more than enough to meet the market demand of region \(i\), and there are surplus to be sold to national market. In other words, seen from the national perspective, there is certain specialization of industry \(j\) in region \(i\) (Guizhou Province). The larger LQ is, the higher the industrial specialization in the region. In the context of open economy, industries with LQ larger than 1 are usually the leading industries of the region, and they play an important supportive role in regional economic development and industrialization.

In Table 3 lists the industries with a growth rate of 10% or above and a LQ larger than 1.1 in Guizhou Province in 2008. Among these 10 industries, six of them have a LQ larger than 2, including beverage, tobacco, power and heat production and supply, coal minding and dressing, non-ferrous metal smelting and rolling processing, and medical manufacturing industries. The industrial development of Guizhou Province is
largely dependent on these industries, whose industrial added-value took up to 81.8% of the total provincial value. In 2008, the added-value of these 10 industries took up 59.4% of the total provincial industrial added-value. However, most of these industries are highly resource-incentive. For example, power and heat production and supply industry and various mining industries which are highly dependent on the resources took up 36.7% of the total industrial output of the Province. Beverage and tobacco industry ranked the 3rd and 4th in terms of their proportion in industrial output of the Province. Strictly speaking, the above mentioned industries are essentially highly dependent on resources. Only the resources they are dependent on, e.g. water, climate, temperature, etc., are renewable to some extent. Furthermore, these industries are also capital-incentive with high capital-labor ratio and low labor absorption effect, which is also one of the critical factors resulting in the large population of Guizhou Province in agriculture and rural areas over a long period of time.

Seen from the nature and effect of these specialized industries, the industrialization of Guizhou Province has already developed a high dependence on resources. Although dependence on resources and raw material industries is the major characteristic of early stages of industrialization, Guizhou Province’s excessive dependence on resources and severely inadequate development of manufacturing equipment industry (mainly labor-incentive industries) as major industries of the middle stages of industrialization have caused lack of follow-up driving forces for industrialization and difficulty in upgrading industrialization stages.

**Table 3: Industries with a growth rate of 10% or above and LQ larger than 1 in Guizhou Province in 2008**

<table>
<thead>
<tr>
<th>Industry</th>
<th>LQ</th>
<th>Industry</th>
<th>LQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beverage industry</td>
<td>5.37</td>
<td>Rubber products</td>
<td>1.46</td>
</tr>
<tr>
<td>Tobacco industry</td>
<td>4.01</td>
<td>Non-ferrous metal smelting and rolling processing industry</td>
<td>1.38</td>
</tr>
<tr>
<td>Power and heat production and supply industry</td>
<td>3.00</td>
<td>Raw chemical materials and chemical products</td>
<td>1.21</td>
</tr>
<tr>
<td>Coal mining and dressing industry</td>
<td>2.87</td>
<td>ferrous metal smelting and rolling processing industry</td>
<td>1.12</td>
</tr>
<tr>
<td>Non-metal mining industry</td>
<td>2.56</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical manufacturing industry</td>
<td>2.24</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: the calculation is based on the data of 2008.
Source: ACMR

**1.2.2 Weak innovation abilities causing difficulty in meeting the needs of new industrialization**

In general, the innovation of industrial activities is much more frequent than agriculture and traditional service industry, thus larger profits generated from innovation and larger investment in R&D, resulting in a positive feedback loop of scientific & technological innovation and profit promoting each other. However, at early stages of industrialization, due to the small industrial scale, the effect of the feedback loop is often too small, making the role of innovation in economic growth nearly negligible, which is also a common problem in western China. For example, in 2007 in Western China, the number of scientists and engineers per thousand people was 2.52, or 62.1% of the national average; R&D intensity was 0.9%, which was just slightly higher than half of the national average. Guizhou Province is an obvious “depression” region in the western areas, with 1.04 scientists and engineers per thousand people and 0.5% R&D intensity, respectively 41.3% and 50% of the average in Western China. (See Chart 5)
More importantly, the PRC is now at the critical stage of industrial restructuring and speeding up the transformation of development mode. The industrial policies and economic situation are not favorable to the raw material and preliminary processing industry with high pollution, high energy consumption and high carbon emission, while the resource-saving and environment-friendly new technologies and new industries are ever encouraged. Regional economic growth must rely more on innovation and the transformation of industrial and technological structure so as to meet the needs of new industrialization, which has undoubtedly posed severe challenge to the industrialization in Guizhou Province and its weak innovation abilities.

![Chart 5 The gap in scientific and technological strength between Guizhou Province, Western China and the PRC (2007)](chart5.png)

Source: ACMR

1.2.3 High dependence on national investment & serious shortage of private economy

With the reform and opening up, the PRC’s private economy is booming with increasingly improved economic vitality. On the other hand, the proportion of state-owned economy is gradually decreasing in the national industry. One of the major achievements of Go West Campaign is the improvement of private economy in Western China in terms of both scale and quality. Seen from Chart 6, from 2000 to 2009, the proportion of state-owned sector in the gross industrial output value in Western China decreased from 27.6 percentage points from 73.8% to 45.1%, which was higher than the national average of 20.6%. From 2000 to 2003, the decreasing rate of state-owned sector in Guizhou Province was consistent with that of the entire Western China. However, Guizhou Province had fallen behind the development speed of Western China in respect to industrial ownership restructuring since 2003. From 2003 to 2009, the proportion of state-owned industry in Guizhou Province only decreased by 7.2 percentage points, its gap with the Western China average increasing from 5.4 to 15.3 percentage points and with national average increasing from30.8 to 34.4 percentage points. In 2009, the proportion of state-owned industry in Guizhou Province was 61.1%, one of the top 5 in the PRC.

Many industrial problems in Guizhou Province have direct relation with the inadequate development of private sectors, e.g. little promotion of employment, weak industrial supporting capacity, incomplete industrial chain, under-developed processing industry, low added-value, etc. Therefore, the underdevelopment of non-public sectors, especially private sectors, has become a key constraint to improving
the economic vitality of Guizhou Province and to narrowing its gap with the industrialization of the whole country and other regions in Western China.

Chart 6 Difference between Province, Western China and the PRC in terms of the proportion of state-owned economy output

Note: The proportion of state-owned economy output = local industrial output of state-owned and state-controlled enterprises/local gross industrial output. Due to lack of documentation, the data of 2004 has not been included.

Source: calculation is based on the data from China Statistical Yearbook.

1.2.4 Declining advantages in labor cost & decreasing attractiveness to investment

Lower labor costs are usually an important foundation for underdeveloped regions to take part in industrial division and promote regional industrialization. Guizhou Province has a large number of surplus rural labor force and a population increasing rate 1.4 percentage points higher than the national level. Compared with other provinces especially those in Western China, Guizhou Province has long maintained its advantages in labor costs. For example, its average salary in 2000 was 20.2% lower than the national level and 8.9% lower than the average in Western China, thus maintaining its absolute advantage in attracting investment to labor-incentive industries.

However, Guizhou Province’s advantages in lower labor costs have been declining since 2004. According to Chart 7, its average salary in 2004 was 22.4% and 10.7% lower than the national level and Western China average respectively, but in 2008 the gaps were only 15.8% and 3.9%. The declining of advantages in labor costs will make the Province less attractive to investment, which is very unfavorable for the development of labor-incentive industries and causes difficulty to the industrialization of processing and assembly industry, alternative resources and raw material industry. In this case, to maintain and enhance industrial investment attraction, Guizhou Province must make more efforts in improving the soft environments for investment.
1.3 Major Advantages and Opportunities of Industrialization in Guizhou Province

1.3.1 Outstanding advantages in energy and mineral resources in South China
Guizhou Province has outstanding advantages in energy, mineral and bio resources in the south of the PRC, with large development potential. According to statistics, the coal resources in Guizhou Province account for 4.47% of the total national reserve, ranking the 5th in the PRC and even more than the total reserve of 12 provinces in the south of the PRC, among which 75.67% has not been used. Its proved coalbed methane reserve is about 200 billion m3, taking up 22% of the national total and ranking the 2nd in the PRC, which basically has not been tapped and utilized. The exploitable water resources in the Province are 16.83 million kilowatts, ranking the 6th in the PRC, among which small and medium hydropower resources reach 6.74 million kilowatts, ranking No. 4. By the end of 2008, the total installed electric power capacity of the Province had reached 21.35 million kilowatts. In 2007, Guizhou’s power generation accounted for 3.56% of the national total, and its coal output took up 4.3%. In general, the basic conditions for building the energy base in the South of the PRC and further developing energy industry in Guizhou Province are ready.

There are various kinds of mineral resources in Guizhou Province, among which the 47 rank top 10 in national reserve and 34 rank top 5. Over 60% of its coal, phosphate, bauxite, magnesite, iron ore, mercury, vanadium ore, cement limestone, cement clay, cement sand, etc. has not been utilized, thus great potential for exploitation. Its phosphate reserve accounts for 15.85% of the national total, ranking No. 3, with 61.58% not used; its bauxite reserve is 474 million tons, ranking No. 4, with 77.59% not used; its vanadium reserve is 466,300 tons (metal content), with 63.35% not used.

There are 87 species of key state protected animals in Guizhou Province, including 16 Class I and 71 Class II protected animal species. 18 species are listed in Appendix I of International Trade Convention on Endangered Species of Wild Fauna and Flora, and 45 in Appendix II. There are also 45 quality local livestock species. In addition, the number of plant variety of the Province ranks No. 4 in the country, with
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6,735 kinds of vascular plants, and 71 kinds of trees under state protection. It is also one of four largest Chinese herbal medicine bases and important bio gene banks in the PRC. Due to its unique geographical conditions, Guizhou Province is also rich in microbial resources, thus large potential to develop industries like local specialty food, bio medicine, wine, tobacco taking advantage of rich bio resources.

1.3.2 Certain industrial technological basis
Energy construction focusing on West-to-East Power Transmission Project, advantageous raw material construction focusing on coal and coal chemicals, phosphorus and phosphorus chemicals, aluminum and aluminum fabrication, steel, iron alloy, etc. have laid a solid foundation for developing Guizhou into the major energy raw material base in the south of the PRC. Industrial belt construction focusing on three large military industry bases and hi-tech parks has created certain environment for further upgrading the development of equipment manufacturing and hi-tech industries. The development of tobacco, wine, tourism, specialty food, folk medicine industries, etc. has played an active role in promoting the formation of advantageous economy with local characteristics.

The transformation of industrial development mode is in great progress, with a number of circular economy and eco-industrial bases focusing on raw material industries like phosphorus chemicals, coal chemicals, aluminum chemicals, etc. being built, thus leading resource-based industries to change from rough processing to fine and deep processing, which also helps bring into full play the combination advantages of resources, improve their development and comprehensive utilization, and promote resources advantages transforming to economic and market advantages. A lot of large corporate groups with competitive edges have been developed, and the effect of corporate groups promoting industrial clusters and leading enterprises promoting economic growth has begun to display.

It is reported that from 2005 to 2008, 54 circular economic pilot projects in phosphorus chemicals, coal chemicals, non-ferrous metal, power industry, construction, etc. were initiated, including the first national circular economy pilot units – Guizhou Hongfu Industrial Company, Kaiyang Phosphorus Chemical Industry Group Corporation, Chitianhua Paper Company, as well as the state circular economy pilot units of the second batch-Maotai Group, and the planning and construction of circular economy in Guiyang city. In 2002, Guiyang City became the first pilot city for circular economy approved by the State Environmental Protection Administration of the PRC. Guiyang City Circular Economy Eco-City Construction Planning developed in 2003 proposed the objective of “achieving one goal, transforming two modes, building three core systems, promoting the construction of eight circular systems”. In 2004, Guiyang City Circular Economy Eco-City Construction Regulations were developed. All the above practices have laid a good foundation and accumulated much experience for carrying out circular economy strategies in Guizhou Province.

1.3.3 Further national policy support to West China
Next decade will witness the PRC’s efforts in building a moderately prosperous society in an all-round way, while building a relatively well-off society in Western China is the key to achieve this goal and also the most important and most difficult part. According to the two-step economic development strategy, the PRC will further promote the leap-forward economic development in Western China and enhance its support to the region, which will definitely bring more opportunities to the industrial development in Guizhou Province and provide favorable environment to strive for national policy support.
Go West Campaign Working Meeting of the CPC Central Committee made it clear that the overall objectives of in-depth implementation of the strategic Go West Campaign for the next 10 years were to promote the comprehensive economic strength of western region to a much higher level with improved infrastructure and modern industrial systems and develop Western China into major national energy base, deep-processing resource base, equipment manufacturing base and strategic new industrial base. The building of the above four bases is an important opportunity in speeding up Guizhou’s industrial development, as Guizhou is equipped with the resources, industrial technologies and supporting capacity required for the development of the four bases, in particular its equipment manufacturing basis dated back to the three-line construction in 1960s, the energy generation base of West-to East Power Transmission Project in Go West Campaign during the past 10 years, and the bio and agricultural resources deep-processing foundations.

Guizhou should seize the good opportunity of building the four bases in Western China to choose key fields and projects, in particular making efforts in industrial chain extension based on advantageous resources and cultivating strategic new industries taking advantage of economic and technological strength, striving for more favorable development support for Guizhou from the national policy on the construction layout in Western China and trying to make Guizhou the priority, key and even demonstration area for building the four bases in Western China.

In accordance with the national strategy and planning, the future development of Go West Campaign should combine overall advancement and key breakthroughs, with important economic regions as driving engine. Above all, Mid-Guizhou Economic Zone has been listed among the economic zones of special focus during new round of development of western China, which has provided important carrier for the national policy support to the acceleration of industrialization in Guizhou Province. Guizhou should take advantage of this policy support, make careful and scientific planning for the development of Mid-Guizhou Economic Zone and try to make it a national strategy, so as to develop it into a core growth pole that promotes the overall development, industrialization and urbanization of the Province.

1.3.4 Favorable domestic and overseas economic environment for industrialization in Guizhou Province
As the world economy is expected to basically get rid of the influence of financial crisis, major economies are facing a critical adjustment and transformation in economic structure. Therefore, it is possible for them to maintain continuity of existing policies and meanwhile accelerate the introduction of policy and measures that will shorten the process of economic recovery and lead the global economy into a new round of the growth, which means that in the next five years or longer period, the external environment for industrial development of Guizhou will gradually get better and better. The PRC has become the second largest economy in the world and is playing an increasingly important role in international economic affairs. In particular, the PRC’s “going out” strategy and M&A in foreign countries to further develop international market are helpful for the industrial enterprises in Guizhou Province to make full use of domestic and overseas resources and bring in capital from other provinces or other countries.

The international market contraction resulted from international financial crisis has made economic restructuring and the optimization and upgrading of economic structure an urgent issue in Eastern China, especially in developed coastal areas of the PRC. Resources integration should be accelerated for optimal allocation on a larger scale, and part of the manufacturing and processing industry has to be transferred to
areas of rich resources. The PRC’s strategy to expand domestic demand has also promoted the transfer of investment, talent and corporate layout toward inland areas. Guizhou is endowed with rich resources and good industrial basis, which is beneficial for attracting industries to transfer from eastern areas, conducive to the comprehensive implementation of the strategy of “developing the province through industry”, and furthermore creates opportunities and environment for the upgrading of traditional industries, the development of pillar industries and the fostering of new industries.
2. Guidelines and Target for Promoting Industrialization in Guizhou

2.1 Basic idea for promoting Guizhou industrialization

Based on the analysis of the present industrialization situation in Guizhou, the main task for further industrialization in Guizhou is to enlarge industry scale (mainly including the scale of employment, assets and output value) at the same time of transforming the development mode. And the aim of enlarging industrial scale is to promote the industrial upgrading from agricultural and traditional service industry oriented growth to industry and manufacturing service industry oriented growth, and speed up Guizhou economic growth and promote industrialization to a higher level. With the background of the whole country endeavoring to speed up the transforming of development mode, industrialization in Guizhou shall give up the traditional extensive development mode and shift to an intensified resource-conserving and environmentally-friendly mode, and improve industry quality and profits through the expansion of industrial scale.

Based on what is said above, the main idea of industrialization in Guizhou can be concluded as: take the Scientific Outlook on Development as guidance, “prosperous people and strong province” as target, environmental protection and resources conservation as strict limit and human resources development as key; give full play to district competitive edge and strengths as late starters; introduce in investment and appropriate technologies; improve industry scale, benefits and competitiveness; build a new industry model that is ecological, low-carbon, highly efficient and sustainable.

Below is the detailed explanation of principles for Guizhou industrialization:

(1) Insist on economic transition and structure upgrading

On one hand, the ecological system in Guizhou is fragile, with serious stony desertification and water and soil erosion. If the extensive way of growth continues, the eco-environment will further be damaged; the agricultural and service industry of Guizhou will be fatally affected; the social economical benefits of industrialization will be hindered, or there may even be negative growth of benefits. Therefore, industrialization in Guizhou should strictly follow the environmental friendly and sustainable principle, or it will become meaningless. On the other hand, the development trend in and out of the PRC shows that the ecological benefit of economic growth is being paid much more attention to, especially carbon emission, which is becoming an important topic of international economic gaming. Therefore, the industries with high emission of greenhouse gases is going to be strictly controlled -- industrialization in Guizhou will no longer repeat the old capital accumulation model in some districts which depend solely on excessive exploitation of resources. Low-carbon, environmental friendly, energy conservation and low emission is becoming the basic principle for evaluating the feasibility of industrial projects in the new era.

(2) Stress human resources development and training

Based on the four indicators of industrial development stages, the agricultural population proportion in Guizhou is the lowest, and transferring of labors from the low efficient primary industry to the high efficient secondary and tertiary industry is an important driving force for economic development in less developed
regions as well as an important feature of industrialization. Guizhou province will take labor transfer from
different industries as an important task in promoting industrialization, not only because this reallocation of
labor forces is an important measure in giving full play to its competitive edge and making up for the
shortcomings of industrialization in Guizhou, but also, only industrialization and economic development with
adequate employment positions can benefit more people, and hence, narrow the gap between rural and urban
residents and between the rich and the poor. To develop the human resources of Guizhou, we need to focus
on labor quality improvement as well as structural adjustment, and improve the matching degree of industry
and labor forces to meet the demand of industry development on labor quality and talents.

(3) Highlight regional features and unique competitive edge
With the further implementation of the Go West Campaign, industrialization in Western regions have
generally picked up speed, especially Guizhou neighboring provinces, cities and districts with similar
industrial structure with Guizhou, with most of their development strategy upgraded as national level strategy.
This is putting a lot of pressure on industrialization development in Guizhou, with more fierce cross regional
competition. For example, Chongqing has gradually gained leading position in the equipment manufacturing
industry; Yunnan is speeding up its development of phosphorous chemical industry; Guangxi is forming a
larger industrial scale on the aluminum industries; Neimeng and Shanxi are developing with a quicker pace
on the deep processing of coal chemical industry. Faced with these competitions, industrialization in Guizhou
need to further explore its own potential and form an industrial system with Guizhou characteristics and a
unique development structure different from neighboring districts; stress the building of industrial brand,
enterprise brand and regional brand to constantly consolidate and improve the competitiveness of Guizhou.

(4) Expand domestic and foreign open up and cooperation
Industrialization in Guizhou could not get satisfactory development speed, quality and benefit relying on its
own resources, labor forces, capital, technology and market etc., especially as Guizhou province is an inland
province with low industrialization, weak accumulation, limited capacity and blocked thought. Therefore,
industrialization in Guizhou needs to be implemented in an open environment, not only to foreign countries
but also other districts in the PRC. Thus we can make full use of domestic and foreign resources and markets
and combine domestic and foreign capital and technology with the advantages of Guizhou; actively explore
the two markets and strengthen economic and technology cooperation with neighbouring regions, especially
with developed regions in east China; and based on the win-win principle, try to cooperate with developed
regions on resources development, industry chain expansion and industrial zone development etc.

(5) Improving infrastructure and soft investment environment
To speed up industrialization in Guizhou, the improvement of soft investment environment shall be the initial
task. Besides the construction of transportation, telecommunication, power and water conservancy
infrastructure, soft environment improvement is much more important, this is especially true with the large
quantity of small and medium sized enterprises which are in need of a complete, regulated policy and system
soft environment. To speed up industrialization progression propelled by inviting investment and expanding
domestic and foreign opening up, we need to change the government function, improve awareness of service
and administrative efficiency of the government departments, lower comprehensive business cost inside the
province and actively create a regional environment suitable for investment. At the same time, industrialization in Guizhou is in badly need of a bunch of entrepreneurs with pioneering and adventure spirit, and good soft environment is necessary condition for the growth of entrepreneurs. Government of all levels needs to set up detailed system to encourage and support their business start-up and innovation activates.
Besides, more support is needed for the development of military enterprises and central enterprises in Guizhou to try to create a friendlier environment, improve the service capacity and meet reasonable requirements for their development.

2.2 Strategic target for industrialization in Guizhou

The future 10 years is a key strategic phrase for industrialization in Guizhou. Build a well-off society in an all around way and the change of economic environment in and out of the PRC have created an unprecedented opportunity for the better and quicker implementation of industrialization in Guizhou. Guizhou need to seize this opportunity and take this precious 10 years to promote industrialization to a higher level and try to change the backwardness situation.

Therefore, we need to set the target for Guizhou industrialization from two aspects: first, make sure that industrialization will step up to a higher level by 2020 and reach the level of middle stage industrialization. Secondly, shorten the gap with national average level and enter a comparatively reasonable stage. Detailed target could refer to the 4 indicative values of different industrialization stages (see table 1).

2.2.1 Per capita GDP target

Based on international experience, the middle stage of industrialization requires a per capita GDP of $3080 dollars (measured with price in 2009), about 12,320RMB measured in PPP. But as PPP is a high estimation for RMB, and we will mainly set the lower limit for this target. Therefore, we use the exchange rate of 2009 and get 21,043RMB. To realize middle stage industrialization, Guizhou province per capita GDP needs to be higher than 21,043 (measured with price in 2009). But middle stage industrialization target is not enough, we also need to adjust the target by trying to narrow the gap between Guizhou and other provinces in the PRC.

In 2009, per capita GDP of Guizhou is only 40.3% of national average. Apparently, to realize the target of narrowing the gap with other provinces of the PRC in 2020, the ratio of Guizhou per capita GDP to national average level shall be promoted to an appropriate level. As for this appropriate level, different countries and regions have different standards, and the PRC has not formed a unified standard yet. We here take the “recipient regions” standard as a reference, which has been implemented for many years in EU and has been proved effective. European Regional Development Fund (EDFR) standard for “recipient regions” is that the average income for the district shall be lower than 75% of EU average level. That is to say, if the average income of a district is higher than 75% of EU average, the gap will be considered acceptable and no special policy intervention or support is needed. Otherwise, the district will be listed as problem district and support will be provided to erase regional gap and bad effect caused thereof.

Based on the above, we can specify the target of “narrowing the gap between Guizhou per capita GDP with other provinces” as: by 2020, Guizhou per capita GDP shall reach 75% of national average. Based on the prediction for the future 10 years for per capita GDP growth, we estimate that Guizhou per capita GDP target need to reach 40,803RMB in 2020 (by 2009 constant price, similarly hereinafter). And with the realization of this target, industrialization in Guizhou will also reach its middle stage. This target will mean a 2.6 times increase in per capital GDP compared with that of 2010. And taken into consideration of the phenomenon of acceleration during the industrialization procedure, we set the per capita GDP target by the end of the 12th Five-year Plan, ie. 2015 to 55% of national average, ie. 20,963RMB (see Table 4). From the increase rate of per capita GDP, we need to keep an average annual increase of 13.5% in the future 10 years to achieve this
target, with an average annual increase of 12.8% in the 12th Five-year Plan period and 14.2% in the 13th Five-year Plan period.

### Table 4: Guizhou per capita GDP Projection

<table>
<thead>
<tr>
<th>Year</th>
<th>GDP (100 thousand RMB)</th>
<th>National population (10,000)</th>
<th>Per capita GDP (yuan)</th>
<th>Guizhou/National (%)</th>
<th>Projection (Yuan)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>343464.7</td>
<td>133474</td>
<td>25575</td>
<td>40.3</td>
<td>10309</td>
</tr>
<tr>
<td>2010</td>
<td>370941.9</td>
<td>137700</td>
<td>26938</td>
<td>42.6</td>
<td>11462</td>
</tr>
<tr>
<td>2015</td>
<td>545035.3</td>
<td>143000</td>
<td>38114</td>
<td>55.0</td>
<td>20963</td>
</tr>
<tr>
<td>2020</td>
<td>800835.7</td>
<td>147200</td>
<td>54405</td>
<td>75.0</td>
<td>40803</td>
</tr>
</tbody>
</table>

Note: use the 2009 constant price. Data for 2009 is cited from China Statistics Yearbook 2010 and for other years are projections. National GDP is calculated with an 8% annual increase. National population data is 2010-2020 prediction from CPDRC, cited from http://www.cpirc.org.cn. The Guizhou per capita GDP for 2010-2020 compared with national level is projected value.

Resources: China Statistics Yearbook 2010, CPDRC

#### 2.2.2 Structural target for the output value for the three industries

According to the middle stage industrialization target, the industry growth speed in Guizhou must attain quicker development than the tertiary industry. And by 2020, the added value for the secondary industry shall account for over 50% of total GDP. Correspondingly, that of the primary industry shall decrease to less than 10%. Taken into consideration industrialization acceleration, the targeted ratio for the secondary industry by 2015 shall increase to over 42.5%.

Aiming at this target, if the future population data is available, we can get the increasing amount for secondary industry and manufacturing industry. And to get this, we need to predict the permanent population in the future 10 years for Guizhou. Based on the 1987-2009 Guizhou permanent population data, we regressed with index function, linear function, logarithmic function, power function, polynomial function methods, and from the goodness-of-fit perspective, the binomial polynomial function fits the most. Therefore, we make predictions on Guizhou population with the regression equation as shown in Chart 8. According to the regression equation prediction, Guizhou permanent population in the future 10 years will have minor reduction. Taken into consideration of the low urbanization rate, the large income gap between Guizhou and neighboring regions, and the development gap between towns in Guizhou province and the neighboring towns, we think it’s very possible that Guizhou trans-provincial outflow population will be larger than natural population growth in the future, therefore the decreases of population is reasonable.
Based on the population prediction by year in Chart 8 and per capita GDP projection in Table 4, we listed in Table 5 Secondary industry and manufacturing industry added value target for Guizhou province. Measured by 2009 constant price, the added value for the secondary industry by 2015 will reach 324.6 billion and 693.98 by 2020. And for increase rate, the annual target for the 12th Five-year Plan period is 14.5% and that for the 13th Five-year Plan is 16.4%, and average annual increase for the 10 years is 15.4%. Based on the proportion of national manufacturing industry in GDP and the secondary industry and taken into consideration of the factor of acceleration, we set the target of the ratio of industry added value to GDP for 2015 to 37.4%, and that for 2020 to 43%, with corresponding industry added value of 285.65 billion and 596.83 billion RMB separately. As for growth speed, the targeted average annual increase rate for the 12th Five-year Plan is 15.3%, and that for the 13th Five-year Plan is 15.9%, with an average 10 year annual increase of 15.6%.

### Table 5: Secondary industry and manufacturing industry added value target for Guizhou

<table>
<thead>
<tr>
<th>Year</th>
<th>Per capita GDP (RMB)</th>
<th>Population (10,000 people)</th>
<th>GDP (100 million)</th>
<th>Secondary industry proportion (%)</th>
<th>Secondary industry added value (100 million)</th>
<th>manufacturing industry proportion (%)</th>
<th>Industry added value (100 million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>10309</td>
<td>3789</td>
<td>3912.7</td>
<td>37.7</td>
<td>1476.6</td>
<td>32.0</td>
<td>1252.7</td>
</tr>
<tr>
<td>2010</td>
<td>11462</td>
<td>3779</td>
<td>4343.1</td>
<td>38.1</td>
<td>1653.8</td>
<td>33.2</td>
<td>1403.0</td>
</tr>
<tr>
<td>2015</td>
<td>20963</td>
<td>3643</td>
<td>7637.7</td>
<td>42.5</td>
<td>3246.0</td>
<td>37.4</td>
<td>2856.5</td>
</tr>
<tr>
<td>2020</td>
<td>40803</td>
<td>3402</td>
<td>13879.7</td>
<td>50.0</td>
<td>6939.8</td>
<td>43.0</td>
<td>5968.3</td>
</tr>
</tbody>
</table>

Note: use 2009 constant price; statistics for 2009 are from China Statistics Yearbook 2010 and that for other years are all predictions.


### 2.2.3 Agricultural working population proportion target and industry inner structure target

Agricultural working population accounts for a large proportion in Guizhou, which is the most apparent factor for the backwardness of Guizhou in industrialization and per capita income. Lower the scale of
agricultural population is one of the key targets for Guizhou province in the future 10 years in promoting industrialization. To achieve the two targets of both realizing an advanced industrialization and shortening the gap with other districts of the PRC, the proportion of Guizhou agricultural working population shall get down to a proportion of lower than 45% by 2020, and to lower than 60% by 2015.

What we need to stress is, as Guizhou is a province with large population and poor agricultural working conditions, to achieve the target of lower the proportion of agricultural working population, besides industrialization and urbanization, we need to transfer the agricultural population to other industries by making use of the large industrial and urban scale of other provinces. This is beneficial to Guizhou province from the perspective of both enriching the people and protecting environment.

To achieve the target of an advanced industrialization, the industrial inner structure adjustment in the future 10 years shall be accomplished with a two step strategy. The first step is to enlarge industrial scale to get more resources developed and the proportion of manufacture improved base on the existing primary industry during the five years of the 12th Five-year Plan. And the second step is to improve the proportion of processing and assembly industry, especially the proportion of labor intensive industry during the 13th five years. The target is to realize a higher processing and assembly industry proportion than raw material industry and become less dependent on natural resources by 2020.
3. Six Supporting Strategies to promote industrialization in Guizhou

To achieve the target of Guizhou industrialization and at the time shorten the gap with other districts, we suggest six supporting strategies for the 12th Five-year Plan and the future 10 years, they are: Green heavy chemical industry driving strategy, strategy of extending dominant industrial chain, lifted industry transition strategy, circulation economy development strategy, large enterprise driving strategy and aggregation strategy of private small and medium-sized enterprises. These six strategies are based on different regional advantages, realistic restraints and experience of developed regions. They will help promote industrialization of Guizhou province by enlarge the industry scale, improve industrial efficiency and vitality. The six strategies and logic between their main rational and functions are depicted as in Chart 9.
3.1 Green heavy chemical industry driving strategy

Heavy chemical industry is the industry with means of production as main product, including capital and knowledge intensive raw material industry. Less developed region at the beginning stage of industrialization would generally rely on light industry that is closely related with agriculture or heavy chemical industry closely related with natural resources to lay down basis for industry development. Then the processing degree and technology contribution will be gradually improved, promoting the middle and late stage development of industrialization. Therefore, heavy industry is called the “starting up industry”. Traditional heavy industry is generally viewed as high pollution and high emission, while “green heavy industry” combines modern ecological protection technology and stresses the reduction of social cost like ecological and environmental cost at the same time of industrial development. At the beginning stage of industrialization, the green heavy industry driving strategy aims to take the technology and product upgrading of the raw material industry as the focus, develop green heavy industry and drive the development of other related industry to realize the development of industrialization to a higher stage.

Guizhou province has a solid heavy industry basis, with raw material industry like power, coal and metal as the main body of the industry. Improve the competitiveness of these industries and make the heavy chemical industry bigger and stronger are the natural choice of industrialization in Guizhou. The eco-system in Guizhou is fragile, and large scale resources exploration is going to affect the ecological environment. Therefore, at the same time of developing heavy industry, Guizhou need to protect the ecological environment and implement the strategy of development driven by green heavy industry.

First, improve the further exploration of natural resources and try to reduce waste of resources at the same time of developing heavy industry. Second, improve and strictly implement the ecological evaluation criteria for heavy industry projects and strictly forbid the projects that would have major impact or potential impact to the ecological environment. Thirdly, centralize the production capacity of heavy industries to the Park, reduce waste to land resources and improve the benefits of Agglomerative Economy. Fourthly, use modern technology to help improve the traditional raw material industry and improve the energy saving, emission reduction and eco-environment protection capacity.

3.2 Strategy of extending dominant industrial chain

Industrial chain is formed by interrelated industrial departments or chains, which can be explained from the technical and value levels. From the technical level, an industrial chain is formed by departments with relationship of upstream and downstream industries in view of input and output. For example, the relationship between agricultural production and agricultural processing is that of input and output, which form an industrial chain. From the value perspective, an industrial chain is generally formed by multiple value adding links like technical research, product designing, raw material purchasing, processing and manufacturing, transportation and inventory, wholesaling and retailing etc. The more links an enterprise or region possesses or the more complete of a chain, the more economic benefits they will get. Industrialization itself is a process of constantly extending and enriching the industrial chain. Therefore, the strategy of the extending of dominating industrial chain is a process of driving upstream and downstream industries with the dominating industry and promoting the development process of industrialization.

Like many less developed regions, dominating industries of Guizhou province are mostly resources intensive
industries. From the technical level, the products of Guizhou in cross-regional and international trade are resources, raw material and characteristic agriculture products with low processing rate, and small economic and employment scale due to the industrial structure. From the value level, the dominating industries in Guizhou are mostly at the bottom of the smiling curve and trading conditions in Guizhou have been long under the present situation. Therefore, to expand the industrial scale and change the profitability of Guizhou province, the strategy of extending the dominating industrial chain is a must.

Firstly, promote the vertical extension of raw material industries (like power and mining industry) and characteristic agriculture industry chain; develop downstream industry chain such as mineral processing, appliance manufacturing and farm products deep processing; improve the on-spot conversion rate of resources and realize the transfer from “selling resources” to “selling processed products”. Secondly, improve the scale and grade of related industry chains including technical research, product designing, wholesaling and retailing etc. so that the main industrial chain would extend to the two ends of the “smiling curve” and form a compete industrial chain. Thirdly, promote the horizontal extension of dominating industrial chains, improve the coordination rate of different industries, especially production serviced industrial links which are significant to dominating industries like finance, insurance, ads and logistics.

3.3 Lifted industry transition strategy

Cross regional transfer of industries is a continuous process accompanied with the change of cross regional competitive edge, transportation cost and market. With high transportation cost or the restriction of cross regional political and system difference, the transfer of industries between different regions will mainly be realized regional (or international) division of labor and professionalization. And with the reducing of transportation cost and the greatly improvement of regional economic integration, the circulation of resources, capital and labor will accompany product trading; industry transfer will become more direct; cross regional or transnational enterprises will become the main economic body; and industrial transfer are now more of a process of cross regional industrial location adjustment or expansion through direct investment. Industrial location reorganization provide an opportunity for less developed regions to make use of the advanced capital, technology, management experience and sales network etc. Through the implementation of lifted industry transition strategy, we can not only expand the industrial scale of less developed region, but more importantly, we can improve the economic benefits and innovation capacity of local industries by introducing advanced factors of production, make better use of their advantage as late starters and shorten their technical gap with developed regions. Presently, the PRC is under a new round of transferring of labor intensive, resources and capital intensive industry from eastern coastal regions to middle and western regions. Guizhou shall make full use of this opportunity of industrial reorganization, as well as the advantage of natural resources, human resources and certain brand resources to attract more enterprises in the east to Guizhou so as to improve the industrial benefits of Guizhou.

Firstly, improve software and hardware construction of the industrial Park so as to create an appropriate room for the transition of transferred industries. Secondly, optimize the investment environment, improve government service efficiency and shorted the period of industry transfer. Thirdly, make detailed list for encouraged and limited industrial transfer around dominating industries and potential competitive industries; encourage the transfer of industries that are accord with regional advantage but lack in driving forces; strictly control the transfer industries with high pollution, outdated technology and excessive production capacity. Fourthly, improve communication with eastern regions, enhance cooperation with government and
enterprises in the east and form an efficient and fair information and profit sharing mechanism for industry transfer and transition.

3.4 **Circulation economy development strategy**

The core of circulation economy is highly efficient and circulation use of resources; the principle is reduction, reuse and recirculation, and the feature is low investment, low consumption and high efficiency. Circulation economy is an economic development model accord with the sustainable development concept and an economic realization form advocating resources conservation and environment friendly. Circulation economy is an inevitable route to solve the contradiction of requirement of economic development and limited resources and environment capacity.

During the 12th Five-year plan as well as the future 10 years, social and economic development in Guizhou will enter a new stage of fast development. This period is not only a golden era for the fast social and economic development, but also a period with distinct question of how to improve eco-environmental quality. To fully pushing forward the industrialization process in Guizhou, a firm Scientific Outlook of Development shall be set up and implemented, with scientific innovation and system innovation as motility, and resources production rate improvement and waste emission rate reduction as the evaluation standard. At the same time, we need to improve laws and regulations, and policies. With the joint effort of the government, the enterprise and regional society, implement the circulation economy concept in all related chains – production, distribution, consumption and recirculation etc. The circulation economy shall be implemented in all levels: enterprises, industrial parks and regional societies to realize a beneficial interaction between the circulation economy development and the industrialization process, thus to form a circulation economy development model with Guizhou characteristics and develop Guizhou into a resource reserving and environment friendly province with the harmonious development between economy and environment, and human and nature.

The main tasks and measures for Guizhou circulation economy development is developing circulation. Firstly, promote clean production. And paper making, printing and dyeing, dye chemical, building materials and pyroelectricity enterprises will be treated as key facility clean production enterprises. All economic development zones and industrial parks will require ecological structure transforming and the establishment of waste exchange system and closed-circuit circulation system between enterprises to form an ecological chain among enterprises with cross enterprise metabolism and symbiosis. High level sewage concentrated processing rate, recycled water utilization rate, concentrated heating rate, the greenbelt coverage rate are needed to promote the infrastructure construction of the industrial park. Secondly, we should vigorously promote circulation agriculture. Accelerate the research and development of agricultural pollutant reduction and utilization as resources. Produce pollution-free food, vigorously develop green food and promote the production of organic food. Speed up the pace of agricultural production, and the construction of circulation agriculture zone. Summarize and popularize effective circulation agriculture model such as: "straw feed the cow - fermentation with cow dung -- -- residue feed corn", "pig manure - biogas - crops," "pig manure - earthworms - turtle" and "pig manure – grass – lake sheep". Based on the requirement of coordinating the rural and urban development, we need to earnestly implement the “ecological home and prosperous people” plan and vigorously improve rural environment. Thirdly, actively developing circulation services. From the designing and development of service products and facilities to the whole service process, we all need to reduce direct and indirect environmental impact on service main body, service object and service route; bring service object into this resource conservation and environment friendly society through detailed information
and effective ways. Fourthly, the intensive use of water and land resources. Land resources in Guizhou are mainly mountainous and hills, and few flat land. Based on its geographic features, Guizhou shall positively revitalize the existing land, economically utilize land resources, further perfect farmland, especially basic farmland protection responsibility system to improve the level of land intensive use. Fifthly, cultivate industrial wastes recirculation industry. Aiming at improving the industrial "three wastes" comprehensive recycling, we need to resources recycling level of key industries with high waste production, these industries are metallurgy, power, pharmaceutical and building materials. Strengthen wastes recovery network construction, advocate the urban and rural life garbage sorting, and promote recirculation of waste metal, plastic, rubber, paper, and glass etc. Finally, create a circulation society. Actively create a conservation-minded government, and with which, to promote conservation-minded community and conservation-minded campus. Adhere to the people-oriented principle and construct a land, water and energy saving and intelligence ecological residential area. Advocate green consumption and realize material and energy recycling during and after consumption.

3.5 Large Enterprise Driving Strategy Based on Military Industrial Enterprises and Central SOEs

Large enterprises in underdeveloped areas consist mainly of state-owned enterprises with strong scientific and technological innovative capability that played supporting role to local industries during the initial industrialization period. The development experience of eastern and middle China shows that state-owned enterprises especially large scale central SOEs always play a great driving role in local industrialization by means of technological overflow, capital investment etc. Implementation of large enterprise driving strategy lies in utilizing external economic effect of large enterprises with a view to promoting overall local industrial performance.

Despite of its remote location and comparatively bad environment for industrial development, it had formed in Guizhou Province a group of large SOEs with scale performance and science & technology performance prior to the reform and open-up period, especially during the “third-line” construction period. Up to now, SOEs still play a key role in the industrial system in Guizhou Province, especially the military industrial enterprises with strong scientific and technological innovative capability that have laid a foundation for industrialization in Guizhou Province. The main challenge for Guizhou Province to implement the large enterprise driving strategy lies in enhancing coordination and interaction between large SOEs and military industrial enterprises and local medium and small enterprises, for which purpose the following shall be done:

Firstly, to continue to provide good local environment for development of large SOEs and military industrial enterprises, at least avoiding their transfer to other provinces; secondly, to urge large SOEs and military industrial enterprises to absorb local comparative advantages of Guizhou Province and develop and produce new civil products that meet local demand with a view to increasing market exploration capability of Guizhou industries; thirdly, to enhance cooperation between large SOEs and military industrial enterprises and local small and medium enterprises and encourage bidirectional flow of factors like persons with ability, capital, technology, etc. within possible limit between large and small and medium-sized enterprises so as to encourage large enterprises to show a driving role to small and medium-sized enterprises and extend the cooperation network among enterprises.
3.6 Aggregation Strategy of Private Small and Medium-Sized Enterprises

Private small and medium-sized enterprises are elements of industry with the most vitality. Nowadays, private economy has become a main force in industrial development in the PRC. In eastern China, especially in areas with most advanced private economy including Zhejiang Province etc., most private small and medium-sized enterprises have formed, via aggregation, highly efficient special network organizations, achieving the famous “block economy”. The so-called “aggregation” of private small and medium-sized enterprises refers to the phenomenon that large number of small and medium-sized enterprises and their supporting organizations with close industrial relationship from a certain specific industrial zone aggregate spatially and create strong and continuous comparative advantages. By applying the aggregation strategy of private small and medium-sized enterprises, industrial groups of high efficiency shall be formed on the basis of promoting special aggregation of private small and medium-sized enterprises by using for reference domestic and overseas industrial aggregation experience.

Although the development of private small and medium-sized enterprises in Guizhou Province quite lags behind, great similarity exists between Guizhou Province and Zhejiang Province which is the cradleland of “block economy” seen from the perspective of objective motivation of promoting the aggregation of enterprises in severe agriculture conditions, in peasants’ strong desire of engaging in non-agricultural activities, in the mountainous geological conditions that determine the necessity of developing small and medium-sized enterprises within limited space. Therefore, it is quite necessary for Guizhou Province to borrow from Zhejiang Province the experience of developing private small and medium-sized enterprise aggregation. However, Guizhou Province lacks the convenient location that approaching external market and the enterprising sprit, which determines that the local government must play a constructive role in Guizhou Province to apply the private small and medium-sized enterprises aggregation, for which purpose the following shall be done:

Firstly, to encourage entrepreneurs to start more small and medium-sized enterprises; secondly, to assist positively small and medium-sized enterprises to explore domestic market, especially utilize advantages of large SOEs in Guizhou Province and encourage large SOEs to provide subcontracts and procurement orders to small and medium-sized enterprises; thirdly, to direct private small and medium-sized enterprises towards advantageous industrial district to form industrial aggregation.
4. Suggestions on Corresponding Guarantee Measures and Policy

Under the modern economic market frame and the principal of separation of governmental interference from operation of enterprises, governments shall not intervene directly with daily business of enterprises, but can intervene indirectly by means of a series of feasible systems, policies and measures. A complete guarantee system corresponding with the implementation of the six strategies shall be established, which is in six aspects as following:

4.1 Establishing Large Socialized Service System

Industrialization is accompanied by continuous deepening of large socialized production. The development of industry manifests itself in circumbendibus and socialization of industrial production division of work. The development of industry is also inseparable from socialization of related service sectors covering production, science and technology, distribution, investment, financing and so on. At present, the socialized service system corresponding industrial development in Guizhou Province is far from mature. Although a certain degree of local effect has formed within the industrial aggregation zone, the effect of urbanization is far from being brought into full play, which is an important factor of slow industrial growth, small number of small and medium-sized industrial enterprises, weak regional innovation capability and weak city competition power. In order to meet match with the promotion of industrialization strategy, a corresponding large socialized service system must be established in Guizhou Province, for which purpose the following shall be done:

First of all, it is necessary to boost prosperity of production service industry, especially to develop the two major production oriented service industries, namely information industry and logistic industry with a view to promote integration between industry and third industry and increase industrial coordination capability, as well as to vigorously support service industries in great need by, for example, tax reduction and tax exemption; secondly, the scientific and technological service systems shall be enhanced. Under the present practices in the PRC, scientific and technological service has the feature of quasi public resources. Promotion of communication and cooperation between scientific institutes, large SOEs and other enterprises, impelling of research, development and transformation of applicable science and technology is of great importance for growth of small and medium-sized enterprises. Finally, a good legal system for industrial development shall be created by increasing continuously the public service efficiency of government, transferring governmental functions and consummating system construction.

4.2 Strengthening Modern Industrial Infrastructure Construction

Industrial development requires support from complete infrastructure. In Guizhou Province, with the comparatively backward economic development, the low urbanization, the small urban scale, the incomplete infrastructure, the need from industrial development cannot be satisfied. Therefore, strengthening modern industrial infrastructure construction is an important precondition for implementing the six supporting strategies for industrialization of Guizhou Province, for which purpose the following shall be done:

First of all, to strengthen with great efforts infrastructure of various industrial parks, strengthen industrial park planning and layout adjusting, strengthen network infrastructure of industrial parks including transportation, communication, water, power, gas and so on, and promote construction of standard factories,
and increase utilization efficiency of land and capital of the industrial parks;

Secondly, to do a good work in the two weak links namely transportation and water conservancy, increase the overall provincial infrastructure construction level; in transportation aspect, to fulfill the highway network planning of “six horizontal, seven vertical, eight connection and eight lateral ways” and the airport planning of “one main line and ten feeder lines”; in water conservancy aspect, to solving the problem of water shortage due to lack of water conservancy works;

Thirdly, to speed up information network construction, increase prevalence rate of information technology level within the province, promote the “three network” integration namely telecom network, internet and the broadcasting and television network, and provide information service of smooth channel, high efficiency and low cost.

4.3 Establishing and Improving Investment and Financing System Matching Industrialization

Promotion of industrialization requires input of large amount of capital, especially input of external capital. Establishing and improving investment and financing system matching the industrialization is a key aspect that requires strengthening for Guizhou Province to promote industrialization. Firstly, investment and financing channels shall be widened to create diversified capital sources and continuous capital input. While striving to obtain domestic and overseas aid funds and poverty alleviation fund, great efforts shall be made to establish more branches in Guizhou Province of domestic and overseas financial institutes; Governmental and social resources shall be integrated to establish consulting organizations for development of small and medium-sized enterprises to provide initiating and financing proposals for enterprises with great growth potential and to help certain enterprises to raise funds on domestic and overseas stock markets.

Secondly, the industrialization service orientation of investment and financing system shall be guaranteed. While paying attention amounts of investment and financing, related institutes shall also focus on the financing quality, strengthening capital supervision involving enterprises that receive aid funds and politically favorable loans and avoiding over concentration of capital in non-industrial areas like real estate area. Although investing in real estate area results in rapid increase of the local fiscal income, rapid growth in house price in Guizhou Province will bring great obstacle for the local industrialization and urbanization with the heavy urbanization task faced by the province, the low average income level and the big gap between income level of urban and rural areas. Furthermore, the PRC will, in the 10 years to come, settle problems causes by excessive investment in real estate area. Fiscal income growth in underdeveloped areas shall rely more on increase of value of capital invested in industries.

Thirdly, an investment and financing platform that suits industrial development features shall be provided and more efforts shall be made in establishing and perfecting investment and financing systems. Different industries display different demand for capital during their development, and appropriate and specific financing tools and financing organizations shall be available to suit different industries. Only by doing this, can functions of investment and financing systems to support industrialization development be brought to the full. Attention shall be especially paid to investment and financing platform for transportation infrastructure with a view to removing the constraint for economic development by vigorously developing transpiration area and create the most basic conditions for smooth advancing of industrialization in Guizhou Province.
Fourth, the growth of various financial organizations shall be encouraged to promote industrialization by means of development of financing industry.

4.4 Introducing vigorously Outside Human Resources

Industrial development requires not only capital but also technological input, and human resources are a main vehicle of technologies. Therefore, promoting industrialization requires a number of capable personnel to provide intellectual support of industrial development. Guizhou Province is of low number of human resources in scientific and technological area and is of weak technological research and development; therefore, great efforts shall be made to introduce human resources from other provinces. Local governmental authorities at different levels shall strengthen their cooperation with enterprises and other employers; efforts shall also be made to introduce more capable personnel to work in Guizhou Province by means of establishment of cooperation of local governmental authorities, enterprises, science and technology institutes, higher education institutes etc. in other provinces in terms of mechanisms like information sharing, human resources exchange programs, directional trainings and so on. In introducing capable personnel from other provinces, importance shall be attached to both the quantity of human resources and attracting the capable personnel to work in Guizhou Province for a long period of time. For this, efforts can be made from the three aspects namely career prospect, income and work environment to attract more capable personnel to work and live in Guizhou Province.

To be specific, “attracting capable personnel with career prospect” refers to attract capable personnel with the promising career prospect and rewarding. At present Guizhou is in the initial stage of industrialization, allowing a greatly promising career prospect in industry and related sectors, which is ideal for capable personnel from other provinces to start their career. Innovation and fair play shall be encouraged and promoted. “Attracting capable personnel with income” refers to attract capable personnel by increasing incentives by offering better economic treatment. “Attracting capable personnel with good environment” means rewarding and attracting capable personnel with good living conditions. Guizhou Province has the advantages of clean air, good ecological environment and so on. Efforts shall be made to further improve the urban ecological environment, the hygiene situation, the social security, the cultural atmosphere and so on with a view to improving life quality and increasing attraction and living conditions of various cities in Guizhou Province.

In order to better attract and introduce capable personnel for industrialization, it is suggested that human resource introduction teams at provincial level be set up and specific office be established to engage in employment of high level capable personnel and formulate related policies. Meanwhile, specific fund shall be allocated from the provincial budget to provide guarantee and incentive to high end capable personnel as well as financial support for their research on key subjects and tasks.

4.5 Deepening and Innovating Continuously Open-Up Policies

Guizhou Province is located in deep mainland of the PRC and is quite far away from main international markets like Europe, United States and so on. Seen from the domestic perspective, the province is of remote location form eastern China of large market, causing obstacles for the province to open up both domestically and internationally. Therefore, continuous efforts shall be made to deepen and innovate open-up policies. The province is suggested to promote the construction of “dry port” during the 12th Five-year Plan Period of the PRC. “Dry port” is a new business model emerging in recent years, which means logistic center in interior
land providing port services including customs declaration, inspection application, bill of lading issuance and so on, and is thus extension of traditional functions of water port into interior land. This model of business can effectively reduce business cost and logistics cost and increase cooperation between coastal areas and interior land. By now, many non-coastal cities in eastern China and cities in middle and western China including Nanchang, Nanning, Xi’an etc. have been cooperating with cities with ports and established a number of dry ports and have seen tremendous effect.

In construction of “dry port” in Guizhou Province, Guiyang City can be made as the hub. By means of cooperation with cities with ports in southeast China, and on the basis of a transportation system covering airlines, railways and roads etc., land transportation and water transportation can be connected. In this way, the economic distance between Guizhou Province and eastern China as well as overseas market will be reduced and open-up to domestic and overseas market will be enhanced.

Furthermore, application shall be made to establish bond and logistics parks in transportation hubs, to establish export-oriented processing zones, or to establish comprehensive bonded zone in Guizhou Central Economic Zone with a view to accelerate industrialization in the province and boost the provincial economy by construction of open-up platform.

4.6 Soliciting National Favorable Policy Support

Guizhou Province largely lags behind national average level in terms of economic power and industrial development. The province also lacks interior growth incentive. In the next 10 years, it will be necessary for the nation to take into consideration the inferior status of Guizhou Province and support the province with special favorable policies. The significance of doing so not only does good for development of the province, but also helps to narrow the regional development gap and facilitate a coordinated development of regional economic of the nation. It us suggested that the nation pay specific attention to promoting industrial development of Guizhou Province in its support by means of favorable policies. At present, it seems that favorable policies in the following three aspects will play an important role in the course of industrialization of the province:

Firstly, the admittance standards for industrial development in Guizhou Province shall be lowered to an appropriate extent. For example, although industries of high energy consumption like power generation, chemical industry, steel and iron, non-ferrous metals, construction materials, nonmetal etc. are in a status of excessive production all over the country and should be limited in their development, these industries are of the nature of local advantageous factor endowment as well as potential for development on a larger scale in places like Guizhou Province in the initial stage of industrialization. Furthermore, the development of the above industries is determined by laws applicable to the initial stage of industrialization. Therefore, it is reasonable for Guizhou Province to enlarge scale of materials industry. The nation can list Guizhou Province in the category of areas entitled to favorable policies and lower to an appropriate extent the admittance standards of the related industries in terms of product structure, energy saving and emission reduction and so on with a view to enlarging the industrial scale of the province and making the productivity of these industries in other regions to be transferred and concentrated in Guizhou.

Secondly, the overall arrangement of strategic emerging industries of the nation shall be more inclined to Guizhou Province with a view to upgrading the industrial structure of the province, accelerating formation of
modern industrial system as well as increasing the innovative capability and market competitiveness of industries in Guizhou Province. For example, conditions for development of industries like new energies, new materials, high end equipment manufacturing, biological medication etc, are available in Guizhou Province.

Thirdly, it is good to make Guizhou Province the third national partner assistance province after Tibet and Xinjiang. The poverty alleviation pattern by means of assistance from partners in municipal and district levels conducted in Tibet and Xijiang can be followed in Guizhou and the degree of that assistance can be enhanced. The average per capita GDP of Guizhou Province has long since been the lowest among the 31 provinces, municipalities directly under the Central Government and autonomous regions of the nation. The economic level of the province is among the lowest of western regions, with many development indexes being lower than that of Tibet and Xinjiang. In some parts of Guizhou, the existence and development conditions are extremely severe. Besides, Guizhou Province is one of the areas inhabited by ethnic minorities, and its economic development is of immediate relation with the goal of realizing a nationwide relatively well-off society as well as the construction of a harmonious society. Therefore, the economic development in Guizhou Province is worth most attention of the central government.
References

Sub-report 2:

Study on Urbanization Development Strategy for Guizhou Province

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1. Foundation and Major Problems of Urbanization in Guizhou Province

Urbanization level is an important symbol of the level of economic and social development in a region. Since the reform and opening up, there has been a significant development of urbanization in Guizhou province. In 2009, the province's urbanization rate has reached 29.9%, but still 16% lower than the national average. Therefore, accelerating the urbanization process to promote the coordinated development of urban and rural areas is the most important task of Guizhou province in the next five years or even longer. How to promote the process of urbanization in Guizhou province and to take what kind of urbanization path is the key of this research. To answer this question, foundation of urbanization in Guizhou province should be analyzed and confirmed first.

1.1 Characteristics of natural basis

The formation and development of cities are closely related to its natural geographic location and the corresponding conditions. Only by fully understanding and taking full advantage of the natural basis, can long-term urban development be achieved and urbanization level is rapidly increased. Therefore, before analyzing the problem of urbanization in Guizhou, characteristics of its natural basis should be confirmed first.

1.1.1 Vast mountains and scarce farmland, limited available land resources and fragile ecosystems

Located in southwest Plateau China, Guizhou has mountainous landscape with an average altitude of 1100 meters, and 92.5% of its land area is mountains and hills. While the karsts area is 109,084 square kilometers, accounting for 61.9% of the provinces total land area. Representatively developed and extensively distributed karsts topography constitutes a special karsts ecosystem of Guizhou, and suffers a serious threat to desertification.
Guizhou is known as "80% mountains, 10% water and 10% field". It means that the land resources for agricultural production are very limited in Guizhou province. The province's land resources are mainly mountains and hills, but flatland is less, only accounting for 7.5% of the province's total land area. The geographical features made the land resources available for agriculture development limited. Especially in recent years, due to population growth and increasing non-agricultural land, arable land is shrinking. By the end of 2009, the province’s arable land area is actually an area of 1,758,000 ha, and per capita arable land area is less than 0.05 hectares, far below the national average.

1.1.2 Pleasant climate, rich vegetation and a significant advantage of characteristic agriculture

There is humid subtropical monsoon climate in Guizhou province; the annual temperature range is small, cool in winter and warm in summer. The climate is very pleasant. Average temperature of Guiyang, capital city of the province, is usually 14.8°C. Across the whole province, average temperature in the coldest month (January) is usually at 3 °C-6 °C, higher than in other parts of the same latitude, and that of the hottest month (July) is usually 22 °C-25 °C. It is a typical cool summer areas.

Guizhou province has rich vegetation, showing a distinct sub-tropical character, and there is a obviously transitional spatial distribution. A variety of vegetation types overlap and are intricate in geographic distribution. There are many types of combinations and flora complex. The province's forest coverage has reached 30.8%, per capita forest area is 0.14 ha, and total standing tree stock volume is 210 million cubic meters. 70 species of rare plants are included in the list of rare and endangered conservative plants, accounting for 50% of the total number of same species. There are more than 3,800 species of wild plant resources, of which more than 3700 species are medicinal plant resources, accounting for 80% of Chinese herbal medicine varieties; Guizhou is one of the four major producing areas of Chinese herbal medicines.

There are a rich variety of crop plants in Guizhou, food crops, oil crops, fiber plants and other varieties of economic crops are nearly 600 types. Food crops are mainly rice, corn, wheat, root and tuber crops, and tobacco, rapeseed are as the main species of economic crops. Economic forests are tung tree, camellia oleifera, tallow tree, sumac, walnut, etc., the main livestock species kept in the province are more than 30 kinds, and quality forage resources are more than 2,500 species. Due to its specific geographic location and complicated topography, the climate and ecological conditions in Guizhou are complex and diverse, characteristics of stereoscopic agriculture are significant, locality and regionality of agricultural production is strong, it's suitable for an overall comprehensive development of agriculture and the development of characteristic agriculture.

1.1.3 Rich in water and coal resources, and located in upstream of the Yangtze River and Pearl River

Guizhou province is one of major provinces of energy in the PRC, especially hydropower and coal is most prominent. Water system in Guizhou province is along terrain from the western, central part shunting to the north, east and south side. Miaoling Ridge is the watershed of the Yangtze River basin and Pearl River basin. North to Miaoling Ridge belongs to the Yangtze River basin, with drainage area of 115,747 square kilometers, accounting for 65.7% of the total land area of the province; south belongs to the Pearl River basin, with drainage area of 60,420 square kilometers, accounting for 34.3% of the total land area of the province. Reserves of hydropower resources are 18.745 million kilowatts, ranking sixth in the PRC, in which exploitable deposit are 16,833,000 kilowatts, accounting for 4.4% of the national total. In particular, there are many reaches with the concentration of water table drop, and are favorable conditions for development. "Power transmission from Qian to east" is the major force of "power transmission from west to east" in the
China Southern Power Grid. At the same time, it should be noted that Guizhou province is at the upstream cross areas of the Yangtze River and Pearl River system, 69 counties lies in the area of the Yangtze River shelterbelt reserve, and Guizhou is an important ecological barrier of upper reaches of the Yangtze River and Pearl River.

Mineral Resources of Guizhou is rich, of diverse types, widely distributed, of full range of specialties and abundant, meanwhile the geological condition is good. By the end of 2002, over 110 kinds of minerals have been found across the province, of which 76 species had proved reserves. A variety of reserve is ranked in the nation, mercury, barite, fertilizer used sandstone, metallurgical Sandstone, facing diabase, sandstone used for bricks and tiles are on the top. In addition, coal, antimony, gold, pyrite and so on also have certain advantages, being an important stage in the country. Bauxite are of large production and high quality with preserved reserves of 4.24 million tons; phosphate reserves are 2.695 billion tons, accounting for more than 40% of the national total; barite is at the top rank of the PRC and its reserves are one-third of the country; gold reserves are ranking twelfth in the nation, and Guizhou is a China's new gold production base. Up to 49.728 billion tons of coal reserves are ranking fifth in the country, more than the total coal reserves of 12 southern provinces (autonomous regions and municipalities). Not only large reserves of coal, but also the kinds of coals are diverse and coal quality is good. It has laid a solid foundation for the development of thermal power and the implementation of "power transmission from west to east", as well as provides resource conditions for coal chemical industry and the implementation of "transforming coal into oil"," transforming coal into gas" project.

1.1.4 Summary
The natural basis of Guizhou province has two-way effect to the advancement of the province's urbanization process.

On the one hand, the natural conditions will constraint urbanization. Mountain area is vast, land is less, and karsts landforms are widely distributed, made the available land resources limited. And ecological environment are fragile, it is difficult to recover once damaged. Therefore, the urbanization in Guizhou province is urbanization based on the natural conditions of mountain area. It must choice a different urbanization path with the plain areas. Also, as the ecological barrier in upper reaches of the Yangtze River and Pearl River, an inevitable requirement of Guizhou in the development of industry and the introduction of industry, is to consider the environmental carrying capacity.

On the other hand, the rich natural resources and mild climate play a tremendous role in promoting urbanization of Guizhou. Guizhou is a major province of energy, water resources and coal resources are among the best in the southern provinces (autonomous regions and municipalities), and is the strategic focus of resources in south region. Guizhou has a pivotal role in the economic development of South China and even the whole country. Guizhou Can rely on the advantages of resources, introducing deep processing and comprehensive utilization of resources, increase the added value, and attract more labor force. Through the development of industry, Guizhou can actually achieve the urbanization process, including the transition from farmers to citizens and the transformation from rural areas to cities.

1.2 The characteristics and major problems of Guizhou urbanization
Due to the constraints of the natural and cultural conditions, history and adjustment of national development
strategies and other reasons, the level of urbanization development in Guizhou is still in a relatively backward stage after 30 years of construction and development. And there is six outstanding problems as followed.

1.2.1 Low level of economic development, uneven development, and significant polarization
Per capita GDP in 2009 in Guizhou province has exceed 10 thousands, up to 10,309 yuan, but still the lowest in the country (Table 1). At the same time, the province's economic and social development is uneven. Among the cities and states, Guiyang, Liupanshui and Zunyi's per capita GDP exceeded the provincial average, while the Bijie region, Tongren region, and Qiandongnan Prefecture is lower than the provincial average. Urbanization and economic development are very closely linked. Urbanization is the requirements of economic development, and also the impetus of economic development. In general, provinces with higher per capita GDP, urbanization level is higher and urban development is more rapid.

<table>
<thead>
<tr>
<th>Per capita GDP</th>
<th>Provinces, autonomous regions and municipalities</th>
<th>Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>More than 70 thousand</td>
<td>Shanghai, Beijing</td>
<td>2</td>
</tr>
<tr>
<td>60-70 thousand</td>
<td>Tianjin</td>
<td>1</td>
</tr>
<tr>
<td>40-50 thousand</td>
<td>Jiangsu, Zhejiang, Guangdong, Inner Mongolia</td>
<td>4</td>
</tr>
<tr>
<td>30-40 thousand</td>
<td>Shandong, Liaoning, Fujian</td>
<td>3</td>
</tr>
<tr>
<td>20-30 thousand</td>
<td>Jilin, Hebei, Chongqing, Hubei, Heilongjiang, Ningxia, Shannxi, Shanxi, Henan, Hunan</td>
<td>10</td>
</tr>
<tr>
<td>10-20 thousand</td>
<td>Xinjiang, Qinghai, Hainan, Sichuan, Jiangxi, Anhui, Guangxi, Tibet, Yunnan, Gansu, Guizhou</td>
<td>11</td>
</tr>
</tbody>
</table>

There is significant economic polarization in Guizhou province; over 40% of GDP are contributed by the Guiyang and Zunyi. Currently, industry and population in Guizhou is still in the process of concentration to Guiyang. (Figure 1)
1.2.2 Low urbanization level and limited urban development and employment space
Since the reform and opening up, urbanization level in Guizhou province has been increasing in a slow speed. But for economic development is lagging behind, especially in the slow process of industrialization, the gap of urbanization rate between Guizhou and the country are growing, from 12.3% in 2000 expanding to 16.6% in 2009 (Figure 2).

There is a large proportion of the rural population in Guizhou, 71% of population lives in rural areas. The population scattered, urban development has lagged behind, and urban secondary and tertiary industry employment space is limited. The added value of tertiary industry in 2009 is only 188.58 billion yuan, only compare to 10% of Guangdong province, while employees are the 862.3 million, accounting for 36.8% of total employment. The first industry employment is as high as 51.7%. The ability of the tertiary industry to absorb labor force determines the development of city size, and directly affect urbanization level in Guizhou.

![Figure 2 Urbanization Level of Guizhou and compare to The West China and the country level](image)

1.2.3 Support and promotion ability of Industrialization to urbanization is weak
Industrialization is the foundation and basic impetus of the development of urbanization, and urbanization is the inevitable result of industrialization. International experience shows that in a fairly long historical period, urbanization and industrialization in a certain extent are consistent. There is a significant positive correlation between the two. This is a basic law of urbanization development.

However, from the practice of industrial development, Guizhou is still at the first half part in the early stages of industrialization, the regional economy is difficult to form an effective accumulation of capital, and a number of economic indicators are perennially in the country's bottom. Since 2000, the PRC and the whole western region are overall has a rapid process of industrialization, but the pace of industrialization in Guizhou has lagged far behind, leading to Guizhou share a continuously smaller part of the industry in western region and the country. The proportion of gross industrial output value of Guizhou to that of the country dropped from 0.75% in 2000 to 0.65% in 2009, and the proportion to the western region decreased from 6.44% to 4.90%.

Referred to tertiary industrial structure, output value ratio of primary, secondary and tertiary industries in
2009 are 14.2: 37.9: 47.9, the proportion of secondary industry output value is relatively low. Considering the internal structure of industry, industry in Guizhou is still mainly composed of processing of primary product, the proportion of output value of mining and energy industries to gross industrial output value is up to 35% or more in 2009, while the national proportion of these two types of raw materials industries are less than 20%. The industrial system based on mining, minerals and rough machining of agricultural products are characterized by low value-added products, weak promotion ability to service industry, and it is difficult to absorb labor force, so that the development of urbanization is lack of stamina.

1.2.4 Inner-province migration is weak, and it’s lack of motivation to promote urbanization

Since the reform and opening up, the development of urbanization in Guizhou is slow, the proportion of rural-urban labor transfer is very small, and regional migration of population is very limited. Thereby, all these situations prevent large-scale flow of rural population. According to the fifth census data, Guiyang is the only concentration center of population in Guizhou province (Figure 3). The amount of migration from every other cities and states in the province to Guiyang is more than 5,000 people, reflecting its central position as capital city. Besides Guiyang, the capacity of population concentration of the other prefectures is weak, only Liupanshui attracted a small amount of population from Bijie region, Qianxinan prefecture and Zunyi attracted some population from Bijie region. At the same time, Guizhou rural society is still in closed or semi-closed state, the rural population is of poor liquidity.

There are two main reasons. First, Guizhou is lack of urban development, so cities and towns can’t provide a large number of jobs for the rural migrants. The second is that the social security system is still in the phase of reform, education, health care, pension, insurance and other social service industry is seriously lagging behind, thus limiting the regional migration of population.

![Figure 3 Flow and direction of inner-province migration in Guizhou in the fifth census](image)

1.2.5 The number of cities and towns are small, city hierarchical structure is not high, and it is difficult for the cities and towns to play the role of radiation

Although population are usually used as the indicators of urbanization level, the expanding of urban population capacity depends on economic development of cities and towns and the number of cities and towns and the increasing of the city scale. Compared with other provinces, cities in Guizhou are less than normal. Considering the average population size, Guizhou province has a population of about 37,930,000,
while there are only 13 cities. It means 2850 thousand people per city. It is far below the city level of the nearly 100 million people in the PRC’s developed areas, while developed countries are every 50 million people a city.

The exception of four municipalities, currently 650 cities are above the county level, of which there are 283 prefecture-level cities. Every provinces and autonomous regions have an average of 10.6 cities with districts, while Guizhou only has 4, only accounting for 38% of the national average, ranking the fourth-lowest in the country. The proportion of national urban built-up area to the national total land area is 0.33%, only 0.21% in Guizhou. The average square of built-up area in each city is 44.8 square kilometers, while only 28.6 square kilometers in Guizhou, only 63.84% of the national average. Clearly, the overall number of cities in Guizhou is less than normal; Guizhou is in the absence of large cities and a serious shortage of medium and small cities; cities and towns are difficult to play the role of absorbing population in the surrounding areas as well as boosting and radiating the economy.

1.2.6 Immature spatial structure of urban system and lack of support for characteristic cities and towns

Since 2000, urban system in Guizhou province focuses on spatial extension inside the province. It is not seeing the big picture that Guizhou should be located in the large areas and it is lack of the planning for characteristic cities and towns. In Guizhou urban system development strategy, you can see that the planning since 2000 has been following and strengthening the layout pattern of nearly cross loop. The main cities and towns lie along traffic lines for resource transportation. Their economic development are driven by the neighboring provinces, are have weak linkages with the central city, Guiyang in Guizhou. The decentralization and marginalization of urban development in Provincial Border Regions is relatively prominent. Meanwhile, in order to undertake industrial transfer from eastern area and to consider site selection of the state large-scale infrastructure construction projects, for example, driven by high speed railway between Guiyang and Guangzhou and highway construction projects between Xiamen and Chengdu, cities and towns along Qiandongnan prefecture are considered as a major axis of enterprise rent-seeking and industrial development, thus a new industrial-urban zone is formed. But in fact, as land, labor, industrial connection and many other problems, coupled with the financial crisis in 2008, the expectation for transferring and receiving industry has not been implemented.

In addition, in the existing urban system development strategy and planning, every cities and towns are more focusing on urban economic functional orientation, don not pay enough attention to the advantage of unique natural endowments, culture, national characteristics in various cities and towns. Therefore, it is lack of classification guidance in designated function of city and city-size orientation, especially study on small and medium featured town’s development strategy and planning is not enough.

1.2.7 Urban agglomeration has not yet formed and core growth pole is absent

While the global process of urbanization and industrialization is speeding up, urban agglomeration has become a new basic geographic unit for countries to participate in global competition and international labor division.

From urban development trends in the PRC, it can be seen, at this stage the PRC has initially formed a hierarchical structure pattern of urban system consist of 28 urban agglomeration of different sizes, different ranks and different development stages, 50 megalopolis, 81 large cities, 233 medium-sized cities, 297 small
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cities and 18,900 towns. According to the "National Urban System Planning (2006-2020)", except Beijing-Tianjin-Hebei urban agglomeration, Yangtze River Delta urban agglomeration, Pearl River Delta urban agglomeration, urban agglomerations that have established including mid-southern Liaoning urban agglomeration, Shandong Peninsula urban agglomeration, urban agglomeration on the western coast of the Taiwan straits, Wuhan urban agglomeration, Zhongyuan urban agglomeration, eastern Hunan urban agglomeration, mid-Shanxi urban agglomeration, Nanchang-Jiujiang urban agglomeration, Chengdu-Chongqing urban agglomeration, Guanzhong urban agglomeration, the North Bay urban agglomeration, Harbin urban agglomeration, Urumqi urban agglomeration, mid-Yunnan urban agglomeration. Central Guizhou urban agglomeration leading by Guiyang is not included. Based on analysis from the status quo, Guizhou province has not only a small number of cities and towns, not also city hierarchical level are not high, restricting the improvement of city capacity. From Guizhou province Statistical Yearbook 2009, it can be seen; there are only 13 planned cities, including 4 provincially-administrated cities and 9 county-level city. Especially, as the unique large cities and the province's capital city, Guiyang only has the total GDP of 97.19 billion yuan in 2009, less than 100 billion yuan. The total number of cities and economic aggregate is so insufficient that it is in lack of pulling power in the process of urbanization and lack of important growth pole which can drive the province's economic and social development. All these are required in order to completely change the lagged situation of urbanization level in Guizhou.

1.2.8 Summary
Economic development in Guizhou Province is in low level and are undertaking uneven development, contribution to the economy aggregate are mainly from Guiyang and Zunyi; and the number of cities and towns are small, city hierarchical level is not high, urbanization level is low, and secondary and tertiary industries is insufficient, in particular the support and promotion capacity of industrialization to urbanization is weak. All these facts bring limited space for urban development and employment, coupled with the urban social security system is in phase of reform, leading to migration inside the province is weak and lack of motivation to promote urbanization. At the same time, due to the immature structure of the existing urban system, unformed urban agglomeration, lack of core regional growth pole and shortage of support for characteristic cities and towns, it is difficult for cities to have a radiation effect on regional economic and social development.

1.3 Basic judgment to development stage of urbanization
Before pointing out the Guizhou urbanization development strategy, we should first have a basic judgment to development stage of urbanization, and then combined with the general rules of urbanization, Chinese characteristics and practice in Guizhou. Thus, we can establish urbanization development strategy in Guizhou province.

1.3.1 Begun to enter the stage of accelerated development of urbanization
In 1975, American Geographers Ray M. Northam summarized the urbanization process as a slight flattening of the "S" shaped curve by studying the development path of urbanization of different countries in the world (Figure 4). When urbanization levels below 30%, it is started development stage of urbanization, also called the early stages of urbanization, which corresponds to early stages of industrialization; when the urbanization level is between 30-70%, it’s called accelerated development stage of urbanization, also known as the metaphase of urbanization, which corresponds to medium term of industrialization; when urbanization level is more than 70%, it’s mature and stable development stage, also called the late stage of urbanization,
corresponding to the later stages of industrialization.

![Figure 4 The "S" shaped curve of urbanization process](image)

Although there are some disputes about whether Northam’s theory can be applied in the development of provincial urbanization, the experience of domestic and international development shows that, after the urbanization level reached 30%, it often will come into the accelerated phase. The urbanization rate of Guizhou province in 2009 was 29.9%, close to 30%. As a result, it can be determined Guizhou will undertake a transition period from the initial stage of urbanization to accelerated development stage.

1.3.2 Social development is in the transformation period from the poor pattern to subsistence type or from subsistence type to well-off living pattern

The scholars’ classified provinces (autonomous regions and municipalities) and cities into different types, according to urbanization process and its effect to the development level (Table 2). The purpose of this classification is to determine urbanization level, and to provide the basis for urbanization policies and guidelines.

<table>
<thead>
<tr>
<th>Type</th>
<th>Region</th>
<th>Urbanization level classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>type1</td>
<td>Shanghai, Beijing, Tianjin, Guangdong</td>
<td>Urbanization level is above 60%</td>
</tr>
<tr>
<td>type2</td>
<td>Jiangsu, Zhejiang, Liaoning</td>
<td>Urbanization level is between 50%-60%</td>
</tr>
<tr>
<td>type3</td>
<td>most region in mid-and-western area</td>
<td>Urbanization level is between 40%-50%</td>
</tr>
<tr>
<td>type4</td>
<td>areas where urbanization is lagged behind</td>
<td>Urbanization level is below 40%</td>
</tr>
</tbody>
</table>

According to the current urbanization rate, Guizhou province lies in the fourth category, areas where urbanization is lagged behind. Analyzing combined with Table 3, due to the division of development in the province, the current stage of social development in Guizhou belong to 2 different stages of transition. One type is represented by Guiyang, and consists of the four designated cities. Their urbanization level is more than 30%, and their social development is undertaking the stage of transition from a subsistence type to well-off living pattern, also it is in the persistently accelerated mid stage of urbanization. The other type is any other regions and states that urbanization level is less than 30%, and their social development is in the
stage of transition from poor type to subsistence type, also it is in the initially accelerated mid stage of urbanization.

### Table 3: Relation between stage of urbanization and per capita GDP

<table>
<thead>
<tr>
<th>Level of economic development (per capita GDP / Dollar)</th>
<th>Stage of social development</th>
<th>Urbanization level (%)</th>
<th>Stage of urbanization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 300</td>
<td>poor</td>
<td>Below 30</td>
<td>Eagle stage of urbanization</td>
</tr>
<tr>
<td>300—800</td>
<td>subsistence</td>
<td>30—40</td>
<td>Initially accelerated mid stage of urbanization</td>
</tr>
<tr>
<td>800—3000</td>
<td>well-off living</td>
<td>40—50</td>
<td>Persistently accelerated mid stage of urbanization</td>
</tr>
<tr>
<td>3000—7000</td>
<td>comparatively developed</td>
<td>50—70</td>
<td>Steady development mid stage of urbanization</td>
</tr>
<tr>
<td>Above 7000</td>
<td>Level of developed country</td>
<td>Above 70</td>
<td>Highly developed later stage of urbanization</td>
</tr>
</tbody>
</table>

Learned in the field survey, living standards of Guiyang, Liupanshui, Zunyi, Anshun have improved in varying degrees in the last three years. For example, Guiyang has 400 billion real estate investment in 2009, accounting for 30% of social fixed assets investment; annual growth rate of sales is up to 30%, and 65% of that is contributed by local residents to improve the living environment wards, and the replacement of Urban Construction. Liupanshui city's urbanization rate has reached 33%-35% in 2009, and urban real estate development and infrastructure construction are gradually developing. Anshun are functioning tourism development and construction of Huangguoshu Fall, and its noticeable constructions are protection of old city and some characteristics snack bar as well as construction of Pedestrian Street. Zunyi is known as a national model city of red tourism, and it has a strong demonstration effect in Guizhou province on driving development of tertiary industry, agricultural products processing and sales, and creating jobs. Correspondingly, in central city of regions with a higher proportion of minorities, such as Kaili city in Qiandongnan prefecture, living standards are also increasing every year.

### 1.3.3 The stage of urbanization characterized as the concentration of population to be the main driving force

Since "The 11th Five-Year plan", urbanization development strategy driving by large and medium cities has been implemented in Guizhou province, and achieved certain results, especially in improving urbanization rate of the 4 designated cities. The urban landscape are greatly improved, such as Liupanshui and Zunyi, through constructing city appearance, these cities have established the embryonic form of modern cities. As the increase in setting up administrative districts, the internal structure of cities tends to improve, such as administrative adjustments of Guiyang and Liupanshui. And also there are constructions of industrial parks and development zones. All these adjustments and constructions have greatly promoted the concentration of population. The concentration of population mainly showed two different trends:

On the one hand, migration is highly concentrated to large and medium cities. As large and medium cities are relatively developed in education, health, culture, and attract people with a certain level of education and aspiring to urbanism to such urban agglomeration. Cities occupying an important position in red tourism network system in the country, such as Zuiyi, develop tourism and characteristic agriculture; they also have
become high concentration areas. Considering the crowd, the younger generation with a certain level of education and not constrained by the household registration system is major. Therefore, as long as a sound social security system, they are more willing to concentration to large and medium cities and to enjoy the city life.

On the other hand, the population concentrates to the resource-based industrial and mining areas. Considering the crowd, different from the concentration of population to large and medium cities, such groups are often engaged in labor-intensive industries and earn wage income. The development of Xixiu Industrial Park of Huarong Group in Anshun, not only attract a large number of rural surplus labor force and solve the employment problem, but also has a role in promoting the city construction.

Therefore, Guizhou has come into the accelerated mid stage of urbanization, concentration of population is an inevitable result of this phase. The key is how to absorb the influx of urban population, rationally allocate resources, and combine natural advantages (such as urban construction in Liupanshui need to pay attention to the coordination between architectural layout and natural environment). So that can avoid the urban disease and improve the social security system, and lay a solid foundation for urban development in Guizhou.

1.3.4 The stage of needing the country to focus on supporting the accelerated process of urbanization

Based on relevant research, urbanization and industrialization supplement each other. In general, in the early stages of social development, industrialization promotes urbanization. Industrialization provides a large number of urban jobs to absorb rural surplus labor into the city, and provide financial security for their settlement in cities and towns. At the same time, to meet industrial workers and their family members’ living expenses, construction of municipal infrastructure and other amenities continue to accelerate, promoting the accelerated development of urbanization. When entering the medium and later stages of social development, the city is not only a place of production and life, it becomes a factor affecting production and life due to agglomeration effect. At that time, urbanization will drive the development of industrialization, it will exactly promote the upgrading of industrial structure and establish industrialization that adapt to the development of urbanization.

From the history of Guizhou, in the 1950s, Guizhou received construction tasks of "third line". Some of military enterprises taking the aircraft as the main part were placed in Guizhou. In addition, in the planned economy era, Guizhou's industrial system is not well developed, mainly tobacco and alcohol production and mineral resources development. It belongs to resource-based area in the national industrial structure, and industrial structure of industry is at the low level. After the reform and opening up, the Chinese economy are transforming from a planned economy to a market economy. Guizhou, on the one hand, confined by the military-industry, before the development of equipment manufacturing industry has met adequate cognition in the PRC, it is difficult to assume the role of leading industrial upgrading. On the other hand, though Guizhou is a resource-based industry, due to traffic conditions in mountain area, the original economic base is weak; it’s difficult to bring their advantage of natural resources into play in the stage of rapid development in the eastern coastal area. When the government guides the regional coordinated development and introduces western development strategy, Guizhou located in southwest area is in the "shadow zone". Together with the national requirements for environment protection, Guizhou became the pilot area of ecological civilization construction. Guizhou is in a dilemma of protection and development.
Development, approved by the State Council in June 1988, comprehensive rural reform development pilot zone with the theme as "development and poverty alleviation, ecological construction, control of population" founded in Bijie region. After 22 years of construction "Bijie test area" has made significant achievement, especially it got directional poverty alleviation help from United Front Work Department of CPC Central Committee, center of all democratic parties, All-China Federation of Industry and Commerce, and non-party personages. According to incomplete statistics, it brought a total capital of 400 million yuan to Bijie region, contacted more than 80 projects, involving more than 300 billion yuan of funds, constructed and reconstructed 119 different types of schools, and trained 1.8 million cadres and farmers. Surrounding the three main themes of "development and poverty alleviation, ecological construction, control of population", "Bijie mode" was established. It made intellectual support as the main line, set improving people's livelihood as a starting point, and featured demonstration and driving effect as character. This way focuses on both targeted poverty alleviation and projected poverty alleviation of relevant sector ministries, pays attention to both make ideas and do practical things, and takes a path of central and local governments and various departments with their own advantages to form an integration effect of overall advantage of synergies. It works as a model role of the Guizhou province and the western poor areas.

From the fact that Guizhou lies in the bottom of national economic development, considering natural and social foundation, especially national characteristics, as well as historical accumulation and the existing "Bijie mode", provinces with a high proportion of minorities, fragile ecosystem resource-based industries, such as Guizhou, should be given corresponding policy inclination from the national level. The new development path as combination of industrialization and urbanization should be supported.

Guizhou has come into the accelerated development stage of urbanization from 2009. Due to the division of development in the province, the current stage of social development in Guizhou belongs to 2 different stages of transition. One type consists of the four designated cities which urbanization level is more than 30%, and is represented by Guiyang. Their social development is undertaking the stage of transition from a subsistence type to well-off living pattern, also it is in the persistently accelerated mid stage of urbanization. The other type is any other regions and states that urbanization level is less than 30%, and their social development is in the stage of transition from poor type to subsistence type, also it is in the initially accelerated mid stage of urbanization. At the same time, Guizhou is in the stage of urbanization characterized as the concentration of population to be the main driving force, and need state government to support in order to accelerate the process of urbanization. Therefore, in terms of Guizhou, to achieve the transformation of economic and social development and transition of stage of urbanization and to speed up the process of urbanization, must take full advantage of the comparative advantages of Guizhou province, avoid the disadvantages, and find out a path of urbanization with Guizhou characteristics.
2. Opportunities and Challenges of Guizhou Urbanization Development

2.1 Development background and international experience

When all the world and the PRC are involved in the development stage of rapid urbanization, the Chengdu-Chongqing urban agglomeration in southwest China is becoming the fourth pole of economic development. The fact that its strategic position is enhancing will put tremendous pressure on urbanization and economic development in Guizhou.

2.1.1 The background of urbanization development in Guizhou

(1) The world is still in rapid urbanization, and human society has come into the "urban age"

Accelerated development of the world's urbanization began from Industrial Revolution in the mid-18th century, and because the developed countries generally have gone through economic recovery and development after the "World War II", the progress of urbanization is further accelerating. But up to half of the 20th century, rapid urbanization is only the trend of development in advanced industrial countries, have not spread worldwide. During this period, developed countries are the center of world urbanization. From 1800 to 1950, the urban population of the developed countries increased from 2000 million to 449 million, respectively accounting for 40% and 62% of the world's urban population in the same period, and the level of urbanization ascended from 7.3% to 52.5%, especially from 1850 to 1950 the absolute value of its urban population were always more than that of developing countries.

Since 1950s, the greatest feature of world urbanization is the accelerated urbanization of developing countries, and at the world scale, urbanization level increased faster. March 25, 2010, the United Nations published the "World Urbanization Prospects (2009 Revision)." According to the report, the world's urbanization level in 1950 was 29.1%, after 60 years, rose to 50.5% in 2010, showing an increase of 21.4 percentage points. So far, 3.5 billion people worldwide live in cities, population living in the city account for more than half of the world population. Human beings are coming into the "urban age." (Figure 5)

![Figure 5 The variety of world’s urbanization level from 1920 to 2010](image)

Base data is from ZHOU Yixing. “Urban Geography”, p78-81, the Commercial Press, 1995.
The process of world urbanization is uneven. North America, Latin America, the Caribbean, Europe and Oceania are in a high urbanization status, the urbanization level varies from 70% in Oceania to 82% in North America. Meanwhile, the expected urbanization level in these areas will continue to increase. Except Oceania, urbanization level in these areas is expected to be more than 84% in 2050. By contrast, in 2010 it is still largely rural area in Africa and Asia, urbanization level is respectively only 40% and 42%. In 2050, urbanization level in these areas is expected to be much lower than other major regions. Urbanization level will reach 62% and 65% in Africa and Asia.

(2) The PRC’s urbanization as a whole are experiencing rapid development, but it is uneven between different regions
Since 1980s, urbanization level in the PRC continued to increase rapidly. Average annual growth is 0.95% during 25 years. By the end of 2009, the PRC’s urban population has reached 620 million people, urbanization level was 46.6%. In 30 years of the reform and opening up, the PRC has initially formed a multi-level urban system that sets large cities as core, medium and small cities as the backbone and small towns as foundation. The urban agglomerations of Yangtze River Delta, Beijing-Tianjin-Hebei and Pearl River Delta gathered in 14% of national population, created 42% of GDP and attracted 79% of foreign investment with less than 3% of territory. They played an important role in radiating and promoting the development of urban and rural areas.

Throughout nationwide, the development of urbanization is uneven. The PRC's urbanization will be expected to continue an average annual growth rate of 0.8% -1% in the next 10-15 years. To actively and steadily promote urbanization and urban development, optimize the allocation of resources, and adjust the economic structure is an important foundation to sound and rapid growth. Current and future period is the time of strategic opportunities for the PRC's urbanization and urban development, but also urbanization will face severe challenges. These challenges manifested mainly in the following aspects. The first is the increased resources, energy and environmental constraints. Then, urban-rural dual structure is still outstanding. Third, the income gap is expanding. Fourth, regional differences on urbanization and urban development are in large. Fifth, urban municipal utilities are in the lack of support capacity.

(3) Chengdu-Chongqing urban agglomeration is becoming a fourth pole of the PRC, and brings external pressure on urban development in Guizhou province
In recent years, the national strategy for the western region, the Chengdu-Chongqing region's strategic position is increasingly prominent. Chengdu-Chongqing urban agglomeration is relatively developed urban areas in the western area, involving 2 megalopolis of Chengdu and Chongqing, 17 medium-sized cities and 16 small cities, and 142 county-level administrative units. According to statistics, Chongqing and Sichuan in 2009 totaled GDP of 2.06813 trillion yuan, of which economic aggregate within Chengdu-Chongqing urban agglomeration are accounting for more than 90%.Urban density and output per square kilometer in Chengdu-Chongqing urban agglomeration is relatively high. Seeing urban density, Chengdu-Chongqing urban agglomeration has 1.73 cities per square kilometer, while the western area has only 0.24 and the whole country has 0.7. In addition, output per square kilometer in Chengdu-Chongqing urban agglomeration is 3.5 million yuan, higher than the national average of 2.27 million yuan and 3.16 million yuan of the western area.

According to city nature defined by the master planning, Chengdu and Chongqing also clarified their position as growth pole of southwest China. "Chongqing Urban-Rural Master Planning (2007 -2020)" defined Chongqing to be an important central city in the PRC and region's economic center in upper reaches of the
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Yangtze River. "Chengdu City Master Planning (2003-2020)" also defined Chengdu as an important central city in the western area and technology, finance, business center and transportation and communications hub in the southwest China. The city nature of Guiyang has focused primarily on as the provincial capital city.

The Chengdu-Chongqing urban agglomeration is becoming a growth pole in southwest China and the fourth pole of the PRC. The fact that its strategic position is enhancing will put unprecedented pressure on urbanization and economic development in Guizhou.

2.1.2 International experience of accelerating the development of urbanization

Urbanization is an important impetus to promote national development, also is an important symbol in measuring a country's level of economic development. Currently, urbanization level of developed countries has been close to 80%, world average is 50.5%, and the PRC is 46%, while Guizhou is only 29.9%. It is far below the level of developed countries, and there is a certain gap compared with the world average level. Low and lagged Urbanization level caused the slow growth of farmer’s income, difficulty in transferring the rural surplus labor and other problems. So, to sum up and draw on the experience of urbanization in developed countries has important practical significance in development of cities and towns in Guizhou province.

(1) Emphasis on the development of agriculture

The level of agricultural development is one of the keys to determine urbanization pattern. For any large countries, if the efficiency of agricultural production did not significantly increase, and there was no growth in agricultural surplus, industrialization and urbanization would be difficult to continue. Thus, as Smith said: "agricultural surplus should be increased first before we talk about establishing additional cities." Effects of urbanization which are different in developed and developing countries should be first attributed to the differences in the level of agricultural in the process of agriculture.

Western developed countries have had a pre-industrial "agricultural revolution." Specific time is: the United Kingdom 1690-1700; France 1750-1760; in the United States 1760-1770; Switzerland, 1780-1790; Germany and Denmark 1790-1800; Austria, Italy and Sweden, 1820-1830; Spain 1860-1870.

The agricultural revolution greatly increased the efficiency of agricultural production, and made it possible for agricultural labor transferring to the industrial sector and towns. In general terms, the accelerated development of agriculture are generally 30 to 50 years earlier than the accelerated development of cities and towns and industry in Western Europe. For example, Britain, which took the lead to carry on industrialization, began to introduce and absorb the Netherlands advanced agricultural technology before the Industrial Revolution, and constantly innovated in agricultural technology. From 1700, the British once became "Europe's granary." Until 1840 (that is, the industrial revolution began about 80 years later), the British just began to rely on foreign food imports. After the "agricultural revolution", the agricultural productivity had been greatly improved, resulting in a large number of rural surplus labors to the cities and towns, and laid the foundation for the development of urbanization.

Not only that, after Western countries has basically achieved industrialization, through the introduction of machinery and the use of fertilizer, industry began to have a feedback effect to agriculture. There has been called the second agricultural revolution, both agricultural productivity and production got a new leap forward. In particular, the improvement of agricultural labor productivity made by developed countries was
very prominent, and had laid a foundation for urbanization. For example, the use of combine harvesters replaced most of the agricultural labor. In the U.S., one hectare of wheat harvested in 1840 requires 60 hours, only 17 hours to the eve of World War I. According to estimates, 100 years from 1880 to 1980, agricultural labor productivity increased 21 times in the U.S., 13.6 times in France, 14.2 times in Japan, 13.3 times in Denmark, and 6.4 times in the United Kingdom.

Towards modernization in the developed countries, agriculture and urbanization compose a virtuous circle: agricultural surplus result from agricultural development created conditions for population to depart from agriculture sector into urban industrial sector, promoting the industrial growth and urbanization. Formation of manufacturing business center and increase in urban population provide machinery, fertilizer, storage facilities and vehicle to agriculture, and has opened up a vast market for agricultural production, giving a decisive boost to agricultural production. This result of virtuous interaction in the developed countries is that although the status of agriculture relatively declines in the process of industrialization and urbanization, agricultural development has not stalled. For example, during the rapid development of industrialization and urbanization in the United States, the growth rate of each agricultural worker’s production were almost as fast as manufacturing and mining. Heyday of industrialization in the United States from 1870 to 1930, average annual population growth rate is 1.9%, agriculture annual growth rate is 2.5%, per capita agricultural products has been increasing.

(2) Emphasis on transportation construction
Transportation is an importance condition for the realization of rapid development of urbanization. Not convenient, fast transportation, manufacturing will not be able to get rid of constraints by raw materials and consumer market, labor mobility will also be geographical limitations, and the efficiency of optimal allocation of resources will be greatly decreased. Many European and American developed countries have attached great importance to the development of transportation. From the late 1970s to early 1980s, France brought a lot of money into transportation construction, constructed nearly 20 million kilometers of various road, 200 km of canals, about 30,000 km of railways. All the transport facilities have played a very important role in the French industrialization and urbanization. After the war the Japanese government has substantially increased public investment, from 1950 to 2000, the average increase is up to 11.3%, and most of which is mainly used for public investment in railways, highways, ports, industrial sites and other aspects of infrastructure. The completion of these facilities has greatly contributed to the concentration of small and medium enterprises, population growth and commercial prosperity, accelerate the process of urban agglomeration economies, and promote the development of urbanization. In addition, the rapid increase in urbanization level in the United States also benefit from the traffic-ahead policy.

(3) Focus on the development of education
Increase investment in education and intensify personnel training has played an important role in the development of urbanization in many countries. Every level of government in United States attaches great importance to the training of education talent. Especially, the county-level governments invest nearly 50% of revenues in education. American public school education is compulsory from primary to high school, tuition is free, learning environment is very relaxed, and infrastructure are relatively mature. Japan also attaches great importance to education, as early as 1947, the Japanese government promulgated the "Basic Education Law and the School Education Law", requires all school-age population to extend compulsory education from 6 to 9 years. By 1980s, Japan had universal high school education, and 40% of the rural school-age youth got advanced education. Therefore, investment in education by Japanese government gets a significant
increase. According to the statistics, from 1950 to 2000, education funding of Japanese financial expenditure increased from 1.598 billion yen 5.5039 trillion yen, jumped 3443 times. Meanwhile, Japan also popularized the vocational training system in rural areas, encourages businesses and social organizations actively to give pre-job training for farmers, and thus offers a variety of learning opportunities to job seekers in rural areas. The development of education trained a large number of various types of technical and management personnel and skilled workers for regional industrial modernization and urban economy. Meanwhile, the concentration of talent also played an important role in promoting urbanization.

(4) Emphasis on building a sound social security system
In the early stages of urbanization, the differences of national urbanization rates are primarily closely related to market size, but after a certain stage of urban development, the main difference between the speeds of urbanization is closely related to the completion degree of social security system. In other words, Social Security has become the most important the system guarantee to urban development. The earliest establishment of a modern social security system was in Germany. Early in the 19th century, Germany was in a creative manner of social security work. For example, "Social Security Act" promulgated in 1881 marked the establishment of the German social security system. Medical insurance, accident insurance, and disability insurance and old age insurance legislation had been passed a few years later. The community security system has undergone major reforms in 1969, developed a "peasant Pensions Act". Since then, Germany was formally established the social safety net constituted by the social insurance, social relief and social services. Britain is also among the first countries to establish social security system in Western developed countries. In the early 20th century, the British government formulated the "Old Maintenance Act", "National Insurance Act" and a series of other bills. To the mid-20th century, Britain has formed a relatively complete social security system.

(5) Attaching importance to urban planning and management
Strengthen urban management and planning is an important means to promote urbanization in many developed countries. The United States attaches great importance to the planning and construction, requires that each city should have its own detailed development plan. The plan must be demonstrated by experts and considered the public. Once by identified, planning will have legal effect, will be very stable, and will be not free to change. To change, it must be re-examined and approved by the public. Meanwhile, in the United States urban planning, there is also very clear urban functional positioning. Such as Washington's orientation is the country's political, cultural and administrative center, the city basically has no industrial enterprises and shopping malls; San Francisco is positioned as high-tech industrial city, for example Silicon Valley has more than 8,000 high-tech companies, and is the world's electronic technology-intensive areas. In Brazil, in order to speed up urban development, specifically established the National Urban Planning Board, which is responsible for the national urban planning. In 1988, Brazil put urban planning into constitution and defined the guiding principles of urban development policies, stressing the Government’s responsibility for urban planning. Japan has also developed a multi-level, various types of urban development planning. According to statistics, at present, Japan had implemented 14 categories, a total of about 200 of plans relevant to development and urban development projects, and gradually develops and implements urban city construction regulations, in which more than 40 pieces of legislation directly promote the urban development. Such legislations not only adhere to the consistency of policies, and also adhere to the stage of laws, effectively ensuring the sustainable development of cities and towns, such as the American small town Palo Alto.
Pay attention to nurturing leading industries and characteristic industries

Urban development has a direct relationship with industrial development. Well-known economist Myrdal’s theory of circulatory accumulation in urban development indicates that, when the city developed to a certain level, the determinative factor to urban growth is no longer local resource endowments, but agglomeration capacity of capital, labor and production factors in the city itself. This ability depends on whether the city can form a flourishing leading industry. Palo Alto only has 516 million people. In the development process, it relayed on the advantage of nearby Stanford University, developing the high-tech industries set electronic software and biotechnology as leading part. The town became the world's most vibrant small towns. Similarly, Seattle is the headquarters of Microsoft. Iguacu in Brazil which sets electronic information industry as the leading industry is famous for its tourism. In the process of urbanization, the developed countries attach great importance to urban characteristics, such as Detroit as automobile mart and Pittsburgh as steel city in U.S., the French city Bordeaux as wine city, Netherlands city Rotterdam as port city, , the Italian city Milan as clothing city and so on. All these cities survive by unique competitive advantages.

2.2 Opportunities for the development of urbanization in Guizhou

2.2.1 The new regional coordinated development has brought new opportunities for the urban system layout in Guizhou province

In economic and social development strategic plan, the foreign economic cooperation mainly consist of Northeast Asia, Circum-Bohai-Sea, Yangtze River Delta, the Pan-Pearl River Delta, and China-ASEAN Free Trade Area, coupled with new urban forms such as Changsha-Zhuzhou-Xiangtan urban agglomeration, Chengdu-Chongqing urban agglomeration, Guanzhong urban agglomeration, speeds up the pace of adjustment and optimization of urban system in the PRC.

ASEAN Free Trade Area has increasingly shown a strong capacity in the regional cooperation and international economic development, greatly struck the development of Pearl River Delta urban agglomeration, and brought new opportunities to the Guizhou province and Southwest China. The first is that, the world's major powers began to enter the partnership, particularly in the 21st century, the big countries is accelerating the pace of cooperation. Secondly, through international and domestic cooperation, the ASEAN gradually expands the scope of the dialogue, deepens understanding, leads cooperation from a single political union to economic, political, cultural and other aspects, makes diversified development cooperation realm, and cooperation is also more stable. In economic relations, ASEAN has become one of the actively better developing regions in Asia and even the world.

Guizhou is in the ASEAN Free Trade Area, also is an important member of "Pan Pearl River Delta" economic area. It has an important role in the international division of labor in the ASEAN region and the Pan-"Pearl River Delta" region. The further development of regional cooperation will bring important opportunities for the development of provincial urban system.

2.2.2 Implementation of scientific development view broaden thoughts of the historic leap of urbanization of Guizhou

Third Plenary Session of the Sixteenth Central Committee clearly put forward the concept of "scientific development view", and the view of development has made a brilliant statement: " insist on human-oriented principle, establish comprehensive, coordinated and sustainable view of development, and promote all-round
development of economic, social and human beings"; stressed that" in accordance with the principle of balancing the urban and rural development, regional development, economic and social development, the harmonious development of human and nature, as well as the demand of domestic development and opening-up" to promote the reform and development.

Comprehensive, coordinated and sustainable principle is a fundamental requirement of scientific development view, which is widening thoughts of economic and social development in Guizhou province. Working on urban and rural overall development, called for a solution to the problem of increasing urban and rural gap within province, and this must be done by actively promoting industrialization and urbanization. Designing agriculture development through industrialized thinking will continue to promote agricultural product processing industry and other industries. Balancing regional development requires the regions to fully play their respective comparative advantages, rationally allocate the region's dominant industries to optimize the industrial distribution. All these will greatly facilitate the process of economic and social development.

Implementation of scientific development view, building a socialist harmonious society and accelerating the construction of economical society advanced later by the central government, raises new requirements to provincial economic and social development, and expands the new development ideas.

2.2.3 The PRC's development mechanism of urbanization is increasingly sound, and it will bring a huge space for development of urban system

Since 2002, the PRC's economy began to shake off the recession that began in 1997, and re-boarded the steady upward development track. In 2003, the PRC's per capita GDP has surpassed 1,000 U.S. dollars, and passed an important benchmark. As a result, the PRC's economy has entered a "golden period of development." In this period, the provincial economy is facing a huge space.

In the PRC's "golden period of development", upgrading of consumption structure and adjustment of industrial structure will be two Main Line. The performance of consumption structure upgrading will be that residents transfer their focus on the increasing amount of consumption to improvement quality and increase of variety. The adjustment of industrial structure will further accelerate, both the three industrial structures, and the internal structure of industry, corporate organizational structure, product mix, technological structure, regional structure, will be profound change; and international and interregional industrial transfer and technology improvement will accelerate the upgrading process of industrial structure. All these will bring space to the development of urban system in Guizhou province. At the same time, in the "golden period of development", urbanization will speed up. To Guizhou province, space of infrastructure, industrial development and reasonable adjustments of distribution of urban functions will be further expanded.

2.2.4 Western Development of will bring the support of the national policy to Guizhou urbanization

National "11th Five-Year plan" put forward the overall strategy for regional development in the PRC that is: "to insist on the master strategy for regional development consist of implementing western development, reviving old industrial bases like northeast China, promoting the rising of central region, and encouraging the leading development of the eastern region, improve the mechanisms of regional coordination and interaction, and form a rational pattern of regional development."

State support for the western region are including the followings: (1) increasing funding policies--to increase
funds for construction investment, give priority to construction projects, increase financial transfer payments, and increase the financial and credit support; (2) policies to improve the investment environment—to significantly improve the soft investment environment, implement tax incentives, carry out preferential policies for land and mineral resources, and adjust investment environment by using mechanisms of prices and fees; (3) the policy of widening opening up to inside and outside — to further expand realm of foreign investment and channels of using foreign capital, develop foreign economic and trade, and promote regional cooperation and hand-in-hand support; (4) to increase investment in education, and strengthen cultural and public health.

Guizhou province has a vast territory, is rich in mineral resources, tourism resources, and water resources, has huge market demand, and has low labor costs. Guizhou is an important part of the PRC’s overall development, the main source of national energy, and an important guarantee for national ecological security. The western development will bring good development national policy support for Guizhou urbanization.

2.2.5 Formation and development of central Guizhou economic zone will bring strong support of rapid development of urbanization

Irrational urban structure and the shortage of large medium cities is one major outstanding contradiction in the process of urbanization in Guizhou. The central Guizhou economic zone will be an important platform in Guizhou urbanization.

The central Guizhou economic zone consists of all part of Guiyang, and part of Anshun, Zunyi, Qiandongnan prefecture and Qiannan prefecture. It divides into the core circle which is within Guiyang Beltway, the driving circle which is 50 km away from Guiyang Beltway, and the radiation circle which is about 100 km away from Guiyang Beltway.

The region has good transportation and economic base. The central Guizhou economic zone is at the intersection region of the horizontal channel along the Yangtze River and the vertical axis of Baotou-Kunming channel in "three vertical and two horizontal" strategic pattern of urbanization. Many high-speed railways are planned by the nation to go through the area. In addition to the construction of highway, the entire area will gradually form a more complete traffic network. Besides, distribution of mineral resources in the economic zone is relatively concentrated, and basis of industrial enterprises is better. It will occupy an important strategic position in distribution of productive forces in the province.

2.2.6 Vigorous development of urban agglomeration provides a good spatial basis for urbanization

Currently, the global economy is entering an era of group competition, competition between countries and regions gradually transformed into the competition between competitive cities and enterprises. Urban agglomerations become the best geographical unit to participate in international economic competition, and the rapidly integrate with the world economy. Because only such city groups which are organically constituted by large number of cities, have the size, strength and influence needed by global competition. Today's global economic center, trade center and financial center of New York, London, Paris, Frankfurt and Tokyo, all concentrated in the developed urban agglomerations.

Since 1990s, the PRC's urbanization has come into a large-scale development phase spatially based on urban agglomeration. Size, quantity, functions of urban agglomerations are expanding and improving. Urban agglomerations are becoming more and more important in social and economic development in the country.
The development pattern of urbanization promoted by urban agglomerations is the objective requirement of industrialization and service development, and is the inevitable choice for improving land use efficiency and improving urban competitiveness. Structure system of urban agglomerations in the PRC will be the most dynamic and potential core area in the PRC's future economic development pattern, and plays a strategic support role in distribution of productive forces in the country.

The "CPC Central Committee on 'the 12th Five Year Plan 'proposal" clearly states that, according to the principle of overall planning, rational distribution, improving functionality and large cities driving small ones, follow the objective law of urban development, set large cities as basis, focus on small and medium cities, gradually form urban agglomerations with large radiation effects, and promote coordinated development of large, medium and small cities and small towns. Therefore, in the next few years, with the rapid progress of urbanization, urban agglomerations will get fast development. Meanwhile, the rapid development of urban agglomerations will bring spatially support to the development of urbanization.

2.3 Challenges of Guizhou urbanization

2.3.1 Competition between the domestic regions is more and more intense
In recent years, with the PRC's sustained and rapid economic growth and accelerated pace of integration into globalization, domestic regions continue to expand the direct or indirect competition in resources, industrial projects, products trade, policy environment, the regional image, and many other areas, in order to fight for their favorable development conditions and advantage status, enhance the region's economic level. Yangtze River Delta, Pearl River Delta and Circum-Bohai-Sea are the three most competitive and vigorous economic regions. In recent years, economic integration in Yangtze River Delta and Pearl River Delta significantly increased, and the concept of "Pan-Pearl River Delta" proposed expands the effect of Pearl River Delta, the internal differences are more obvious. For a long period, the provinces will face ever increasing pressure of competition. In addition, the pressure of urbanization and economic development thrown by Chengdu-Chongqing urban agglomeration to Guizhou has become more significant.

Competition between regions will have many positive effects, but it can also compress market space of the competitive subjects. At present, particular notion should be given to the negative problems brought by regional competition, such as local protectionism. Local governments intervene in market competition by government behaviors, and will prevent the formation of the regional unified market and market’s fundamental role in the allocation of resources. Another example is the vicious competition in the investment will lead to extensive use of land and the state revenue losses. In the future, Guizhou province in development must actively respond to and resolve these issues.

2.3.2 Highlight of contradictions will resist the enhancement of the region’s international competitiveness
Both from a national perspective and the perspective of Guizhou, as the economy has entered a "period of golden development ", it also entered a "period of prominent contradictions." Although there is rapid economic growth, the overall economic development level is quite low. Urban-rural dual structure has not changed, the trend of widening gap between regions has not reversed, and there are a large number of poor people; the total population continue to grow, the proportion of aging population increase, and there are increasing pressure on employment and social security; contradictions between ecological environment, natural resources and economic and social development have become increasingly conspicuous; the region
still faces the pressure in economic and scientific and technological superiority brought by developed
countries and developed regions; economic system and other aspects of the management system is not perfect,
the state-owned enterprise reform and state-owned assets management system need to deepen. It can be
predicted that, for a long period of time, we will face all kinds of contradictions, and some contradictions and
problems are even becoming more serious. Some conflicts will bring social problems, such as population,
employment and social security pressure; some will bring difficulties to integration and coordination of
regional development, such as institutional barriers, the pursuit of local interests and so on. These will largely
resist the enhancement of the region’s international competitiveness.

2.3.3 Constraints of resources, energy and environmental increase

Guizhou province promotes the accelerated development of urbanization in the context of globalization and
increasing international competition, and is at a critical stage for urbanization going forward to the rapid
development stage. The international and domestic political and economic environment put forward a higher
requirement to sustainable use of resources, environmental protection and international trade exchange and
cooperation and so on. Moreover, Guizhou province has large population, weak economic foundation,
man-land tensity is high, water use is difficult, and ecological environment is fragile. To take the
resource-saving, environment-friendly, intensive and compact urbanization path has become an inevitable
choice.

2.3.4 The major function area in some extent constrains the development of urbanization in Guizhou

In the "11th Five-Year Plan", according to resources and environment carrying capacity, the existing
development density and development potential, and considering the future of the PRC’s population
distribution, economic distribution, land use and urbanization patterns, the land space is divided into four
main functional areas of optimal exploitation, key development, restricted exploitation and banned
development. In accordance with orientation of the major function, adjust and improve regional policy and
evaluation of performance, regulate space development order, and form a rational spatial structure of
development.

In 2007, the research group of Development and Reform Commission's Macroeconomic Research Institute
completed "Study on the PRC’s main function zoning and classification policy." The report presented 5
optimal exploitation areas, 11 key development areas, 24 limited development areas at the national level. In
the list of key development determined by the report, Guizhou as a province suffers an overall loss, and
referred to the list of restricted zone, "karsts rocky desertification prevention and control zones such as
Guangxi, Guizhou and Yunnan" are mentioned. Most of Guizhou province was included in the "limited
development areas" and "banned development areas". It will conducive to ecological protection on the one
hand, but on the other hand it affects the normal industrial growth and upgrading, and brings constraints the
development of urbanization in Guizhou.

2.3.5 Town municipal utilities are lack of ability to support

Based on the data analysis, urbanization level in the PRC increased by 1% is equivalent to about 1,000
million people transferring from rural to urban areas. It will increase the great pressure on urban
infrastructure. In recent years, city public utilities are still difficult to fully meet the urban development needs.
Guizhou province has a total population of nearly 40 million. According to government requirements for
urban development, urbanization level should increase 1.2% to 1.5% every year that is 48 to 60 million
people should be transferred to urban population. Municipal utilities investment used to address the
employment, housing, living services of the urban population, has to reach 240-300 billion yuan. Also, inputs for the improvements of living environment in the old city and production and living environment quality need to continue to increase. Considering the realistic conditions that Guizhou has weak financial capacity and smaller proportion of urban construction investment, it is difficult to meet such a large demand for funds. To achieve leap-forward development of urbanization, and narrow the gap with the western area and the country, there is a lot of pressure.

2.3.6 Challenges of Regional development and urban disaster prevention and urban safety
Guizhou announced to speed up the construction of Guiyang dense urban areas and North of Guizhou dense urban areas, to meet the needs of development and changes of main urban form. Thus, the regional coordination is of great significance. To strengthen the coordination of regional planning, can only through the form of regional planning to eliminate duplicable construction, competition and internal friction within the industry, the revitalization of the old mining area, urbanization of ecologically fragile areas, establishment of regional ecological compensation mechanism and other regional issues.

With the accelerated development of urbanization, geological disasters and urban safety are major issues in healthy development and urban livelihood. Especially earthquakes, floods, landslides and other natural disasters and urban security risks caused by accidental pollution incidents and social contradictions are apparent and have huge impact. To strengthen urban disaster prevention and construction of urban safety facilities, is both required, and a challenge.

2.3.7 Small-scale economy, a lower level industry, urban and rural and regional disparities and other problems highlighted
The first is the small scale of the provincial economy, low level industry, and irrational structure. The province's per capita GDP is less than 50% of national average. It is difficult to achieve regional cooperation and specialization in the PRC -ASEAN Free Trade Area and "Pan-Pearl River Delta" region. At the same time, the industrial level is low, heavy chemical industry has a larger proportion of industry and develops rapidly, low light and high-tech industries have low proportion and the development is slow, the second industries are of small scale and lack of innovative capacity, the core technology with independent property rights is limited, so it is difficult to create more wealth. The tertiary industry is still weak. Cities and towns are lack of competitiveness.

Secondly, there is a big gap between urban and rural areas. The gaps of human resources development in urban and rural areas, education development, and urban and rural infrastructure construction among regions were relatively large. Economically backward areas spread, national poor counties are excessive. Poverty and backwardness in these areas are hard to reverse, and the gap with basic realization of the national well-off is increasing. Such a contrast will adversely affect the ecological construction, resource use, sustainable economic development and social stability.

2.3.8 Summary
There are opportunities and challenges in the process of urbanization in Guizhou province. First of all, competitions between domestic regions are more and more serious; highlight of various contradictions will affect improvement of regions’ international competitiveness. In recent years, economic integration of Yangtze River Delta and Pearl River Delta are significantly enhanced, and the concept of "Pan-Pearl River Delta" proposed expands the effect of Pearl River Delta. For a long period, the internal provinces will face
ever increasing pressure of competition. In addition, the pressure of urbanization and economic development thrown by Chengdu-Chongqing urban agglomeration to Guizhou has become more significant. Meanwhile, though the economy is growing rapidly, the overall economic development level is still quite low, the urban-rural dual structure still exists, and there are a high proportion of poor people; pressures of employment and social security are increasing; contradiction between ecological environment, natural resources and economic and social development are more and more prominent, support ability of municipal utilities is insufficient. All these issues are problems which Guizhou has to actively respond to and resolve in the development.

At the same time, resource and environmental constraints are increasingly confining Guizhou province urbanization, while the main function zoning to some extent enlarged the constraint factor. According to the main function zoning, most of Guizhou province was included in the "limited development areas" and "banned development areas". It will conducive to ecological protection on the one hand, but on the other hand it affects the normal industrial growth and upgrading, and brings constraints the development of urbanization in Guizhou.

Based on this, the development of urbanization in Guizhou need to fully seize the advantaged opportunity, carefully analyze impact of constraint factors, turn negative factors into positive factors, actively develop, and ultimately achieve leaping development in Guizhou province.
3. The General Idea and Development Strategy of Accelerating the Urbanization of Guizhou Province

According to the development stage of urbanization and the opportunities and challenges facing Guizhou, two strategies of Guizhou urbanization are set up. That is the short-term leaping strategy and long-term sustainable strategy. The implementation of the two strategies can achieve the objectives of making the Province strong and the people rich. In the short-term, by 2015, the characteristics of urbanization is acceleration, and the development focuses on the construction of transportation, energy, water and other infrastructures, to support the rapid development of urbanization, and try to make the urbanization level reach 40%. In the long-term, by 2020, the focus is the development of public education, public health, public medic treatment and other public services, especially the solution of livelihood problems during the process of urbanization, and try to make the urbanization level reach 50%.

3.1 General idea

The general idea of Guizhou urbanization should be based on the mountainous situation of the province. Follow the rules of urbanization and adhere to the coordination of industrialization and urbanization, the unity of urbanization speed and quality, the combination of urbanization and new countryside construction. Make great efforts to optimize the distribution of urban space, do a good job in urban construction planning, strengthen the industry support, improve the overall carrying capacity of cities and towns, make innovations in the system and mechanisms, and strengthen the urban management, taking a distinctive, intensive, diversified and green urbanization road of Guizhou mountainous area, and promoting the sound and rapid development of the economy.

3.2 Development strategy

The initial driving force of urbanization is the increased agricultural productivity, providing surplus rural labor force. The absorptive capacity of industrialization and the development of the tertiary industry by providing jobs, together with the concentration profit and the improvement of public services, are the fundamental and propelling force of urbanization.

For Guizhou Province, due to the gap of urbanization stage between Guizhou and the whole country, it’s necessary to adopt a leaping strategy to achieve the transformation from initial stage to fast developing stage. So, industrialization and urbanization are inevitable choices to achieve the fast development the province. But, for Guizhou Province, different regions are at different social development stages. On the one hand, those regions with urbanization level above 30% not only face the job of industry development but also have to follow the idea of low-carbon and energy saving of today’s society. So, they have to take the road of new type industrialization boosting urbanization. While, for those regions with urbanization level under 30% and a lot of rural population, the ecological conditions can’t support the road of industrialization boosting urbanization. So, from the perspective of sustainable development, it’s a must to take the road of featured towns boosting the development of industries and absorbing surplus rural labor. On the other hand, the fact that different regions are at different social development stages demands a step by step implementation of urbanization strategy according to different stages.

To sum up, Guizhou urbanization has to follow a path of organic development, that is the two strategies of
urbanization (Figure6). The relationship of the two strategies is as follows: the sustainable strategy is the basic strategy of Guizhou urbanization development, which is based on the fact that Guizhou is a mountainous area with fragile ecology, with the objectives of urban-rural harmony and enriching people, and is the long-term strategy. The leaping strategy is based on the fact that Guizhou urbanization is at a low level, which relies on Central guizhou Urban agglomeration and new type industrialization to boost the rapid development of urbanization. It’s a leaping strategy and the short-term strategy.

3.2.1 The Leaping strategy——short-term strategy
With a low level of economic development and urbanization, making the province strong through rapid urbanization development boosted by industrialization is the dream of every Guizhou person. According to the urbanization history of different countries in the world, urban agglomeration is an important spatial carrier, but there is no real urban agglomeration in Guizhou. So, Guizhou should make great efforts to cultivate Central Guizhou Urban agglomeration, with Guiyang, Zunyi, Anshun, Kaili, Duyun being the cores and take the leaping urbanization development strategy boosted by industrialization as the second strategy. The core driving force of the leaping strategy is new type industrialization and high modernization.

The main path is, with the construction of Central Guizhou Urban agglomeration and new type industrialization being the main part, large and medium enterprises being dominant, to attract investment in fixed assets, develop export-oriented economy and make full use of the radiation of large and medium sized cities to realize the aim of making the province strong. So, this strategy is the short-term strategy of Guizhou urbanization.

3.2.1 The sustainable strategy——the long-term strategy
According to the basic characteristics of Guizhou urbanization, including mountainous characteristics, an area dominated by agriculture, fragile ecology, etc, Guizhou should take the urbanization road of featured small and medium sized cities and towns being the main part as the sustainable strategy, make full use of natural and humanistic resources, avoid its weaknesses and initiate an urbanization road of Guizhou characteristics. The core driving force of the sustainable strategy is agricultural industrialization and urban-rural coordination.
The main path is, with featured small and medium sized cities and small towns being the main part, small and medium sized enterprises being dominant, the layout of featured industries being the foundation, to construct green, recreational and ecological bases, forming the back yard garden of the south region of the PRC, boosting coordinative urban and rural development and achieving the goal of “enriching people”. So, this strategy is the long-term strategy.

3.3 Strategic orientation
Adhere to the policy of compact urban layout, take the road of green urbanization with resource-saving and environment-friendly characteristics; adhere to the coordinative development of large, medium and small sized cities, pay attention to the special status and role of towns, push forward the division of labor and corporation, construct a scientific urban system of coordinative development of large cities and small towns; highlight the characteristics, decide the development orientation scientifically according to different cities’ conditions, achieve the harmonious combination of national tradition, local features and characteristics of the times, create distinctive urban construction style; adhere to urban-rural harmony, solve the “three rural” issues in the process of urbanization, take the improvement of people’s life quality as the starting point and goal, with all the people of different nationalities across the province having the opportunity to enjoy the fruits of urbanization; through urbanization, make Guizhou become a demonstration area of mountainous urbanization and featured urbanization, and become a leading area of new type urbanization and green urbanization.

3.4 Development goals
3.4.1 Overall goals
Relying on the ecological advantages of Guizhou province, with Central Guizhou Urban agglomeration being the main axis and the supplement of featured towns, construct an urban system of coordinative development of large, medium and small sized cities. Further optimize the spatial pattern of Guizhou urban development, provide spatial support for industry development through classified guidance and improvement of function, and balance urban and rural development and make urbanization level reach 40% by 2015 and 50% by 2020, with an annual rate of more than 2 percentage points.

The economic strength increases markedly, further enhancing the influence in the western region; urban infrastructure and public services become more complete, highlighting the three-dimensional transportation system and the overall carrying capacity increases significantly; urban-rural integration improves obviously, the urban-rural income gap narrows step by step and urban-rural social harmony preliminarily comes into being; urban and rural environment improves significantly with environmental pollution being preliminarily curbed.

3.4.2 Target phases
The goals of Guizhou urbanization development can be divided into two stages, the short-term by 2015, and the long-term by 2020.

The short term is the accelerating period of urbanization, with emphasis on the construction of transportation, energy, water and other infrastructures, providing support and carrier for rapid urbanization; the long-term strategy focuses on the development of public education, public health, public medical treatment and other public services, especially the solution of people’s livelihood problems. The details are:
The province’s urbanization rate increases more than 2 percentage points per year, trying to make urbanization level reach 40% by 2015 and 50% by 2020.

Accelerate the formation of urban system, with large cities being centers, small and medium sized cities being the backbone. The urban system has characteristics of complementary advantages, strong radiation and obvious rank.

Accelerate urban construction, with road area per capita reaching 8 square meters by 2015 and 10 square meters by 2020.

The green coverage rate in built area reaches 30% by 2015 and 35% by 2020.

Urban water coverage rate reaches 95% by 2015 and 100% by 2020; sewage treatment rate in cities above county level reaches 80% by 2015 and 90% by 2020; domestic sewage treatment rate in urban areas reaches 20% by 2015 and 30% by 2020; harmless treatment rate of domestic garbage in cities above county level reaches 80% by 2015 and 90% by 2020.

Public service improves significantly; the urban per capita housing area reaches 28 square meters, preliminarily relieving the housing problems of urban low-income families.

The conditions of education, culture, health, sports and other aspect improve greatly, and the equalization of basic public services basically forms. Urban management strengthens obviously, with a good social order. People work and live in peace and contentment with the society being harmonious and stable.
4. Spatial Strategies of Accelerating Guizhou Urbanization

To achieve the two strategies, a “core-periphery” spatial structure of urban system is to be constructed, making metropolitan area the tool to push forward Guizhou urbanization. The core is Central Guizhou Urban agglomeration based on Central Guizhou Economic Area, which is the important support for the leaping development of Guizhou urbanization and the spatial carrier of the sustainable strategy of Guizhou urbanization; the periphery refers to the 6 urban agglomerations, including Liupanshui, Bijie, Xingyi, Tongren, Congjiang, Wuchuan, which are the foundation of Guizhou urbanization. Main tasks include developing featured industries and constructing featured towns, boosting balanced development of urban and rural areas. This region is the spatial carrier of the leaping strategy of Guizhou urbanization.

Metropolitan areas bear the tasks of boosting socio-economic development of surrounding areas and urban-rural integration and providing development space and conditions for strengthening the function of central cities. To promote the balanced development of urban and rural areas requires the concept and development model of metropolitan area, which, on the one hand, boosts the surrounding rural areas of the 4 cities, and on the other hand, cultivates some featured town concentrated areas like Bi-Shui-Xing Economic Belt, pushing forward the “bottom-up” type urbanization. Together with timely adjustment of administrative divisions and appropriate guidance of urban planning, the development will strengthen the socio-economic ties between central cities and surrounding areas, thus promoting the implementation of the two strategies of Guizhou urbanization.

4.1 Spatial development strategy

The guiding ideology on Guizhou urbanization of Guizhou provincial government is “adhere to the guiding position of Deng Xiaoping Theory and the important thought of ‘Three Represents’, implement the strategy of ‘Western Development’ , closely center on the overall objectives of achieving historical leaping development of society and economy and building well-off society based on the mountainous characteristics of the province, follow the rules of urbanization, adhere to the coordination of industrialization and urbanization, the coordination of urbanization speed and quality, the combination of urbanization and the construction of new socialist countryside, make great efforts to optimize urban spatial layout, do a good job in urban construction planning, strengthen industrial support, enhance urban overall carrying capacity, make innovations in system and mechanism, strengthen urban management, make full use of the radiation and driving function of large and medium sized cities, promote the coordinated development of different sized cities and towns, take a featured, intensive and diversified green road of Guizhou mountainous urbanization, promote sound and fast socio-economic development”. Under these guidelines, according to the natural and socio-economic conditions of Guizhou Province, construct the spatial strategy of leaping development.

4.1.1 Basic principles

(1) The principle of industry driving.

Industrialization and urbanization are complementary. Industrialization is the driving force of urbanization, and urbanization is the spatial result of labor division boosted by industrialization and one of the foundations for the development of industrialization to an advanced stage. So, for the urbanization construction of Guizhou Province, the driving force of industry is the foundation. The industries stressed here don’t limit to the secondary industry, and the second industry doesn’t limit to traditional industry. For Guizhou, “a province
based on industry” is the external driving force to achieve leaping development and the motivation to optimize the spatial layout of urban system. According to “the twelfth five-year” development planning, the adjustment of urban system layout is, on the one hand, to adapt to the requirements of industrial layout adjustment, and on the other hand to reflect the overall orientation of socio-economic development of Guizhou Province.

(2) The principle of ecological priority.
As a province with late-developing advantages, Guizhou should first adhere to the principle of ecological priority and do a good job in the construction of ecological civilization, which needs the unified understanding of various departments at all levels of the province. Urbanization construction not only refers to the improvement of infrastructure and the greening and beautification of the environment during the process of urbanization, but also includes the full reflection of the thought of energy saving, environment protection and recycle, and the wide use of new energy and materials in building designs, and the thought of overall organic environment protection.

(3) The principle of urban-rural harmony.
The fundamental object of speeding up urbanization is to promote urban-rural harmony. For a mountainous province with a large rural population like Guizhou, urban-rural harmony and coordinative development of industrialization, urbanization and agricultural modernization must be considered while the urban spatial development strategy is set up. To develop modern agriculture is one core goal of the strategy of “industry boosting agriculture and urban areas boosting rural areas”, and is the foundation of increasing farmers’ income and urban-rural harmony. Note that urban-rural harmony is not to eliminate the countryside, or to achieve development space of urbanization at the expense of rural land and social and cultural development.

(4) The principle of short, medium and long terms’ integration.
Urbanization should be carried out by stages, with moderate advance, leaving space for future development. This doesn’t mean to expand each city’s built area blindly and build small towns into large cities. It means urbanization should be carried out step by step according to the future socio-economic development and self-development conditions, and those areas and cities with development potentials should be included in development planning.

4.1.2 Guiding ideology
Relying on the ecological advantages of Guizhou Province, with Central Guizhou Economic Zone and Central Guizhou Urban Agglomeration being the main axis, featured towns being supplementary, construct compact and ecological urban system with coordinative development of large, medium and small sized cites. Further optimize the spatial development pattern of Guizhou cities, together with classified guidance and function improvement, providing spatial support for industry development and achieving balanced urban-rural development. Try to make Guizhou urbanization level reach 40% by the end of “the twelfth five year”.

4.1.3 General idea
The general idea of Guizhou urbanization construction is: in the next 10-15years, centering on Central Guizhou Economic Zone, exploit the location advantage of Guizhou being the reception area of east region’s industrial transference, integrate internal and external motivation, push forward the close integration of industrialization and urbanization, and enhance urbanization development vitality; through the adjustment of urban system structure and the construction of Central Guizhou Urban Agglomeration, enhance large cities’
radiation function and driving force; with the construction of ecological environment and towns of featured culture being the principal line, construct compact and ecological urban system, with ecological towns as backbone, ecological communities as network and central cities as main part. Achieve the synchronous development of the comprehensiveness of large cities and the specialization of towns and achieve the transformation of urbanization construction from traditional morphology to ecological morphology, constructing development space for the leaping development of Guizhou Province.

4.2 Overall spatial layout

The spatial layout of urban system is a strategic issue related to future development. Setting up strategy should jump out the province boundary and pursue development in a wider region. Meanwhile, closely centering on the two strategies of accelerating Guizhou urbanization, construct overall spatial layout of the urban system.

4.2.1 Construct an overall “core-periphery” structure of urban system

Core: refers to Central Guizhou Urban Agglomeration (town cluster) based on Central Guizhou Economic Zone. This is the important support of achieving leaping development of Guizhou Province. The core consists of two parts, one being the hare core----Guiyang Metropolitan Area, the other being the inner core, including 4 consolidated metropolitan areas, Zunyi, Anshun, Duyun and Kaili. The core area is the spatial carrier of carrying out the sustainable strategy of Guizhou urbanization.

Periphery: refers to the 6 clusters connecting the province boundary, including Liupanshui, Bijie, Xingyi, Tongren, Congjiang and Wuchuan. This is the foundation of Guizhou urbanization, whose main tasks are developing featured industries, constructing featured towns and driving balanced urban-rural development. (Figure 7)
Under the overall “core-periphery” urban system structure, form provincial regionally urban structure of “megalopolis------large cities------featured towns------towns”.

Megalopolis------Including Guiyang Metropolitan Area and Zunyi consolidated metropolitan areas .The former is the political, economic and cultural center of Guizhou Province, and is the location of the capital city, with a population of more than 5 million, which is the central city of Central Guizhou Urban Agglomeration, and is a representative modern metropolitan area in the Southwest. The later is the sub-center of Guizhou, which have above 2 million population, it is the node city for cooperation between Guizhou and Chengyu economic region.

Large cities refer to the consolidated metropolitan areas, Anshun, Duyun and Kaili, belonging to Central Guizhou Urban Agglomeration. They undertake the task of untwining the population and part economic function of Guiyang, according to their own characteristics developing into urban area with some scale, integrating tourism, national culture, agricultural industrialization and driving regional development. They have a population from1 to 2 million, and are relatively independent.

Featured towns refer to “Bi-Shui-Xing” Economic Belt, which has some foundations, like resource processing and tourism, and some features, like climate, ecology and mineral resources. The advantages of East Guizhou Featured Industrial Belt include tourism in Wuling Mountain, Tongren, mineral in Wuchuan, energy, transportation hub in Congjiang and so on. The population of those cities is from 0.5 to 1 million, forming important parts of accelerating Guizhou urbanization.

Towns refer to those designated towns relying on major towns and dominated by agricultural industrialization, with township enterprises being the main part. They are important spatial carrier of achieving urban-rural harmony and addressing the “three rural” issues.

4.2.2 Take metropolitan areas as tools to push forward Guizhou urbanization

In the process of urbanization, what can be seen and felt directly to reflect the high concentration of urban population and non-agricultural industries exists in the form of urban built-up area. Although urban planning at all levels are involved in the range of urban built-up area, during the actual construction and development process, due to the continuous increase of city scale, the centrifugal spread of urban functions and the expansion of urban land use for industries, the one-day-cycle influential range of urban functions like business, education, employment, recreation and medical treatment has gone beyond the urban built-up area. The more developed urban society is, the more blurred the urban-rural boundary is, which requires the establishment of a functional urban area to replace the concept of urban built-up area, and which is more adaptable to the future demands of urbanization.

Metropolitan area is a common functional urban area drawing on foreign experience. Compared with general urban concept, metropolitan area refers to a large urban area, where the concentration has highly developed, the diffusion has some large scale, and the development stage has transferred from concentration being dominant to diffusion being dominant. Metropolitan area is an important goal and spatial carrier of urbanization in contemporary China, which undertakes the task of boosting socio-economic development in surrounding areas and promoting urban-rural integration, and provides development space and conditions for strengthening central cities’ functions.
According to the PRC’s urban geographer, Professor Zhou Yixing⁸: (1) metropolitan area consists of central city and adjacent counties (cities), with a higher level of non-agricultural industries and closely related to the central city in society and economy. (2) Prefecture level cities with a non-agricultural population of more than 200,000 within the physical urban area can be regarded as central cities and have the qualification to set up a metropolitan area. (3) Counties as the basic unit of the periphery of a metropolitan area, in principle, they need to meet ① non-agricultural GDP accounts for more than 75% in the whole county (or county-level city); ② labor force engaged in non-agricultural economy accounts for more than 60%; ③ adjacent to the central city or the county (city) belonging to the metropolitan area; ④ if the central city is a part of the city or whole-county belong to the city, it also needs to meet the non-agricultural level indicators; ⑤ if a county (city) can simultaneously included in two metropolitan areas, in principle, administrative affiliation determines it. But if the administrative principle is not reasonable, like seeking far and neglect what lies close at hand, the principle of connection intensity should be applied, according to traffic size. Further breaking down, a central city with a population above 1million is a large metropolitan area, and two or more neighboring large cities constitute a consolidated metropolitan area.

The benefits of the usage of metropolitan area concept include: (1) the scope of a metropolitan area is greater than the central city, including discontinuous towns, suburbs and even countryside outside the central city, but the border is consistent with county boundaries. So, statistics of urbanization level about metropolitan area can be done; (2) for balanced urban-rural development, take metropolitan area as the construction unit, policies and utility resources can be shared within a metropolitan area and between metropolitan areas as far as municipal, utility and social security system etc are concerned. For example, for the future development orientations of Guyang and Zunyi, it’s difficult to determine whether Zunyi has the ability to or should replace Guiyang, and there is no need to do it. Because, from the concept of metropolitan area, both the two central cities have the qualification to set up a metropolitan area, and the scope can be decided by the radiation (connection intensity), and in turn deciding the functional orientation according to the scope, promoting the function of polarization of the two cities in Central Guizhou Urban Agglomeration, forming dual-core structure. (3) Advantages to industrial agglomeration and optimization of population distribution. Due to the scope characteristic of metropolitan area, it’s easy to integrate and optimize industrial structure within the area (including between consolidated metropolitan areas), and promote the formation of industrial cluster and the play of scale effects, changing the state of no correlation between industries of different cities and the state of disorderly competition. Meanwhile, the change of land use structure in a metropolitan area is driven by locational direction of industries, agglomeration benefits and capacity of rent competition, and is the result of the flow and combination of various economic factors in the area. For example, modern manufacturing industry gradually migrates outward from the central city, and various industrial parks spring up in suburban towns. Relying on the industry from the central city and the support of policy and space, new industrial parks, modern manufacturing bases and high-tech parks come into being, achieving the modernization of traditional industries, and promoting the penetration of high technology into traditional industries. Meanwhile, people’s migration follows the transfer of their jobs, thus optimizing the spatial distribution of population.

Note that: although the concept of metropolitan area comes from the process of transformation from centripetal concentration to centrifugal spread and it seems that the concept doesn’t apply to a province

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experiencing rapid urbanization like Guizhou, the connotation of the concept should be noted, that is, metropolitan area undertakes the task of boosting socio-economic development of surrounding areas promoting urban-rural integration and providing development space and conditions for strengthening the central city’s functions. Based on the fact of urban-rural integration in Guizhou Province, it is needed to use the concept and development model of metropolitan area to, on the one hand, drive the countryside development around the 4 cities and, on the other hand, cultivate featured town concentrated areas like Bi-Shui-xing Economic Belt, and push forward “bottom-up” type urbanization, combined with timely adjustment of administrative divisions and appropriate urban planning guidance, strengthening the economic connection between the central city and the surrounding areas, and thus promoting the implementation of the two strategies.

4.3 Implementation safeguard

4.3.1 relying on Central Guizhou Economic Area, make great efforts to cultivate and construct Central Guizhou Urban agglomeration

Central Guizhou Economic Zone consists of Guiyang economic circle and 28 cities, counties and districts, with an area of 40,657.1 square kilometers, accounting for 23% of that of the province. This area is located at the joint zone of the Yangtze River lateral axis and the Baotou-Kunming longitudinal axis, both belonging to the national “two horizontal and three vertical” urbanization strategy. Gui-Guang, Cheng-Gui, Yu-Qian high-speed railways and Xia-Rong, Hu-Kun highways run through the area and a perfect land transport network will come into being.

In 2008, Central Guizhou Economic Zone has a resident population of 12.8292 million, accounting for 33.82% of that of the provincial population, the general budget revenue is 14 billion yuan, accounting for 40.6% of the provincial revenue. Guizhou plans to take the development zones in central Guizhou as leaders, making great efforts to cultivate Guiyang, Zunyi, Anshun, Duyun and Kaili. The long-term planning population of Guiyang is 5 million, reaching 4 million by 2020 and 5 million by 2030. The planning population of Anshun is 1 million, Zunyi 2 million, Duyun 0.8 million, Kaili from 0.8 to 1 million, and the whole population in the area is 20 million.

Through constructing Central Guizhou Urban agglomeration and focusing on developing Zunyi-Anshun-Duyun-Kaili Consolidated Metropolitan Area, implement the sustainable strategy of accelerating Guizhou urbanization, the leaping strategy. Guiyang, as the primary city and fastest growing city in Central Guizhou Urban agglomeration, will undertake the task of radiation and diffusion effects in the central city area and surrounding areas after the stage of high concentration. In recent years, the economy in Guiyang has been developed very rapidly, and the urbanization level has reached 65%, with urban population and size having increased by one time in five years. At present, Guiyang has developed the urban strategy of “north extension, south expansion, west connection and east advancement”, with a planning area of 1230 square kilometers, and the main city area being 500 square kilometers, expanding development space in four directions. In the future, urbanization strategy will be further studied and urbanization will be further strengthened, making Guiyang the leader of urbanization in the province.

So, focus on accelerating the development of the central city, Guiyang and Zunyi, provide some policies related to administrative divisions and land use, strengthen the construction of urban infrastructure and public service, strengthen the beautification and greening of the environment and enhance the attractiveness and
competitiveness, thus attracting high-grade industries and new rising industries, and enhancing the popularity of Central Guizhou Urban agglomeration across the PRC.

4.3.2 Optimize the spatial layout of Central Guizhou Urban agglomeration, define labor division and bring about complementary advantages

Further define the internal functional orientation of Central Guizhou Urban agglomeration, forming a spatial pattern of “one major, one minor and three groups”.

“One major”: the central city of Central Guizhou Urban Agglomeration, the location of Guizhou provincial government—Guiyang. The city nature is: the political, economic and cultural center of Guizhou Province, central city of original eco-tourism destination of national culture, demonstration city of national ecological civilization construction, important transportation hub and base of logistics distribution in Southwest China.

“One minor”: the subsidiary center city-Zunyi. The city nature is: the node city of regional cooperation, outstanding national class tourism city, demonstration area of new countryside construction, cultural industry center and demonstration center of Guizhou. Cultural city of red tourism famous at home and abroad, important city on the passage to sea of West China, base of energy, new material, equipment manufacturing and green industry in Southwest China.

“Three groups”: Anshun Group takes the construction of pan Huangguoshu tourism circle as the tool, and civil aviation R&D and production as the goal, forming destination city of international tourism and important base of equipment manufacturing. Duyun Group and Kaili Group develop into eco-leisure city group dominated by featured culture tourism and construction of livable city.

4.3.3 Push forward the construction and development of each metropolitan area, relying on one-hour economic circle

The division of metropolitan areas depends on connection intensity. The central city is closely connected within its scope with surrounding cities and economic hinterland, manifested as the flow of people, materials, capital, technology and information, and in turn leading to spatial interaction, and forming a huge magnetic field attracting various factors in surrounding areas to get concentrated; meanwhile, the central city reacts to surrounding areas by radiation and diffusion, driving the development of the whole region. So, with each central city of Central Guizhou Urban agglomeration being the core, relying on the high-speed railway and highway connecting to surrounding areas, construct one-hour economic circle. On the one hand, straighten out the attraction scope of Guiyang, Zunyi, Anshun, Duyun and Kaili, define the construction objectives of each metropolitan area, on the other hand, further improve connection intensity by transportation planning, gradually expand the radiation scope of the dual-core, Guiyang and Zunyi, thus strengthening the driving force of Central Guizhou Urban agglomeration.

4.4 Development strategy of featured national towns

Guizhou is a multi-ethnic province, with national autonomous areas accounting for 68% of the total area, and the population is more than 15 million, accounting for 39%, ranking No.3 in the PRC. There are 17 ethnic minorities living for generations in Guizhou, including Miao, Buyi, Dong, Tujia, Yi, Gelao, Shui, Hui, Yao, Bai, Zhuang, She, Maonan, Mongolian, Mulam, Man and Qiang. Of which, the population of Miao minority accounts for 49.8% of the whole population in the PRC, Buyi minority accounting for 97.3%, Dong minority 55.7%, Gelao minority 98.2%, Shui minority 93.2%. These minorities usually live in mountains in the form
of village and “bazi”, making the key in the process of accelerating urbanization and promoting urban-rural integration.

4.4.1 Relying on the driving force of industrial industrialization, strengthen small town construction and transform the life style

From the above analysis of the urbanization foundation and problems, it can be seen that Guizhou is an urbanization area dominated by agriculture. Due to the low agricultural productivity and the low adjustment of agricultural structure, there is obvious gap compared with east region in the PRC, and this character is highlighted by minority population. The living area of minority people is small in scale and dispersed, and those national featured areas are mostly in remote and isolated mountains due to historical reasons, each minority group having their own living pattern and style. So many ethnic villages are both advantages and disadvantages.

Low agricultural productivity directly influences the development of towns and rural towns. On the one hand, long-term inadequate attention to rural education, health care, endowment insurance, and limitation caused by lack of talents, capital, technology and equipment resulted in the low quality of rural labor and low productivity. On the other hand, the low productivity is also related to the scattered and backward villages. Due to natural conditions, historical elements and multi-ethnic concentration, the rural living pattern and characteristics came into being and continued.

So, for this kind of area, the second urbanization strategy, with characteristics of leaping development, concentrating on the development of large cities, highly industrialization and modernization should not be applied. The first strategy, the strategy of achieving balanced urban-rural development, is appropriate, that is, making full use of the advantages of national villages, transforming production mode from self-sufficient small-scale agricultural production to agricultural industrialization, taking the form of “company + farmers”, focusing on processing and production of featured agricultural products, increasing the added value of agricultural products and farmers’ income. Meanwhile, strengthen the construction of municipal facilities and public services of featured towns, greatly develop national tourism industry, construct small towns with distinctive ethnic characteristics, relying on the settlement patterns and styles of minority population, guide farmers to transform their life style and transform those qualified into urban residents, thus attracting people transferring to small towns so as to eliminate urban-rural dual structure, accelerate urbanization process and achieve urban-rural integration.

4.4.2 Exploit national culture, enhance national culture taste and construct featured tourism towns

Guizhou has unique national culture, advantage of tourism resources different from those of other provinces. For example, the southeast part of Guizhou is one of the 18 ecological culture protection circles granted by WORLD FOUNDATION for the Safeguard INDIGENOUS CULTURES, and one of the 10 “return to innocence, back to nature” tourism destinations in the world. Such as Qiangdongnan prefecture, that is famous as a prefecture of dance, a prefecture of one hundred festivals and a prefecture of forest. They have primitive ecology, native national culture, original scene of historical remains, forming the core foundation and main resources for the development of tourism. Whole prefecture is a rare “museum of original national culture”. The total revenue of tourism industry was 4.789 billion yuan in 2006, an increase of 436.28% over 2000, and the total number of tourists was 6.3 million, an increase of 372.45% over 2000, of which, the number of foreigners was 237,000. Now, the southeast of Guizhou has completed or started some special development and construction planning of key scenic spots, historical and cultural sites, red tourism, rural tourism, forest
parks and so on. Meanwhile, this prefecture has set up development strategies of tourism masterpiece, and is pushing forward the construction of historical culture in Zhenyuan, landscape tourism in Wuyang, original culture of Miao minority in Leigongshan, nature and ecology tourism destinations, original minority culture of Li, Ping and Dong, tourism destination of original culture of Miao minority in Sanbanxihu. After the adjustment and enhancement of traditional tourism products, and making Wuyanghe, Zhenyuan, Shanmuhe, Xijing, Zhaoixng and other tourism brands stronger, a number of new multiple tourism products have come into being, with rural tourism and landscape tourism as leader, history and culture tourism as characteristics, promoting the transformation of tourism products from single sightseeing to pluralism and diversity.

For this kind of towns, we should focus on long-term development, make full use of eco-compensation mechanism, protect ecological environment, plan and develop tourism activities dominated by ethnic customs, environmental protection, ecological civilization and low carbon energy and construct a number of demonstration tourism towns of low carbon energy and nationalities, so as to attract tourists from large cities, enrich people and promote development of small towns.
5. Guizhou “Three Rural Issues” and Balanced Urban-Rural Development

The main reasons for Guizhou “three rural Issues” mainly lie in contradictions of institution and resources allocation in addition to limits from natural conditions. So, to solve the “three rural” issues in the process of urbanization needs to take a number of measures to achieve balanced urban-rural development, that is, the implementation of “four steps” strategy, including (1) promoting new type industrialization and increasing non-agricultural employment opportunities, (2) constructing a people-oriented migration management mechanism, (3) pushing forward the “three concentrations” strategy, that is industries concentrated in industry development zones, people concentrated in towns and land concentrated in the form of scale management, seeking agglomeration economies, (4) providing equal public services for large countryside areas.

5.1 The “three rural issues” in the process of Guizhou urbanization

Guizhou is a province not adjacent to coast, not adjacent to border and not adjacent to rivers, and influenced by history, nature, politics and culture, the “three rural” issues have accumulated for a long time, prominent in the PRC, forming major obstacles for socio-economic development and the process of modernization of Guizhou.

5.1.1 Issues of farms: slow income growth and a widening gap of urban-rural income

Of the “three rural issues”, the core problem of issues of farmers is the slow income growth, leading to the widening gap between urban and rural residents.

Since the reform and opening up, although Guizhou farmers’ income has increased rapidly, with an increase of 5 times in the past 30 years (in constant price), the growth rate stills lags behind that of urban residents. In 2009, rural per capita net income increased by 7.5%, to 3005 yuan, but the urban-rural income ratio remained at 4.3:1, and the absolute gap was 9857.12 yuan, the biggest gap since the reform and opening up (Figure 8).

Figure 8 Income changes of urban and rural residents (unit: yuan)
In 2009, the urban-rural per capita income ratio in the PRC was 3.3:1, and the absolute gap reached 12 thousand yuan after reaching 10 thousand yuan for the first time. The level of urban-rural income gap has been much higher than that of most countries in the world, and the ratio in the same period in the US, Canada and India was 1.58, 2.30 and 3.26 respectively. In fact, the gap in Guizhou is more serious compared with that of the whole country. Before 1980s, the gap was smaller than that of the whole country, but it has increased gradually after that period (Figure9). Taking into account the welfare and subsidies enjoyed by urban residents, the gap will be much bigger, not only forming the main problem of the “three rural” issues, but also seriously hampering the national economy growth and impacting social harmony and stability.

![Figure 9 The income comparison between Guizhou and the whole country](image)

Not only is there a big urban-rural income gap, the rural per capita net income gap between Guizhou and the whole country, between Guizhou and the east, middle and west regions is still big(Figure 10). Take the data in 2003 for example, the rural per capita net income in the east region increased from 3616.6yuan in 2003 to 7155.5yuan in 2009, with an average annual growth rate of 12.0%; the rural per capita net income in the middle region increased from 2382.0yuan in 2003 to 4792.8yuan in 2009, with an average annual growth rate of 12.4%; the rural per capita net income in the west region increased from 1883.7yuan in 2003 to 3826.5yuan in 2009, with an average annual growth rate of 12.5%. The growth rate of rural per capita net income both in the middle region and in the west region was higher than that in the east region, and the gap between the middle and west region and the east region has narrowed. But Guizhou farmers’ income was much lower compared with the rural per capita net income in the west region, being 20.3%, 21.4%, 22.5%, 25.3%, 22.5%, 25.8%, 27.5% lower respectively from 2003 to 2009(Table 4).

Although there is a period of steady growth for Guizhou farmers’ income, compared with urban per capita disposable income and that of other regions, it still lags behind.
5.1.2 Issues of agriculture: weak foundation and weak development support

Agriculture is an issue related to the national economy and people’s livelihood. For Guizhou, agricultural development is faced with many restrictive factors.

Firstly, Guizhou is the only big agricultural province without support of plain. The geomorphology is dominated by karsts, with mountain system and water system being seriously cut, making land blocks small and soil layers thin. The area of mountain is 108740.83 square kilometers, accounting for 61.73% of the whole area of Guizhou, and hilly area is 54200.76 square kilometers, accounting for 30.76%, flatland (bazi) between mountains has an area of 13225.85 square kilometers, accounting for 7.15%. The number of flatlands with an area over 10 square kilometers is 285, the accumulative area being 5539.41 square kilometers, accounting for 3.14% of the whole Guizhou area.

Secondly, per capita cultivated land is limited, causing a great carrying pressure on cultivated land.
According to the land data of detailed survey, the total area of cultivated land in 2000 was 4770413.11 hectares (71.55 million mu), per capita land being less than 1.5 mu. Meanwhile, the area of cultivated land is being decreasing by an annual rate of over 100,000 mu, due to constructions of water conservancy, hydropower, thermal power, railway, highway and towns. The situation of land resources will become more severe with the increase of population and economic development. Land degradation, serious damage, lack of reserve resources, extensive land use, low efficiency of utilization and production and waste of land are all very serious. By the end of 2007, rural per capita effective irrigated land was only 0.46 mu, much lower than the average national level of 0.86 mu, making cultivated land resources especially valuable. If calculated according to land productivity, Guizhou is overloaded with nearly 10 million people.

Thirdly, the ecology is vulnerable with serious soil erosion. Karsts mountain areas accounts for 73%, with alternative distribution of karsts, sand and shale. Pure karsts area accounts for 61.92% of the whole area, with sand, shale and Quaternary strata accounting for the left 38.08%, and the sand and shale areas have more serious soil erosion.

Fourthly, the development of secondary and tertiary industries in rural areas is still at the initial stage, and the slow pace of small town construction has affected the transfer of rural labor to non-agricultural industries, leaving a large number of population and labor force in the countryside. The agricultural structure is single, and the number of poor population is large. Agricultural population still accounts for more than 80% and the income from agriculture dominates the total income in rural areas. Non-agricultural industries develop not well enough, and rural areas except those few near big cities still remain stuck in agricultural society, with a low rate of agricultural commodities.

Economic development lags behind. In 2009, agricultural output value accounted for 57.3% of the total output value of agriculture, forestry, husbandry, fishery, of which, forestry accounted for 4.2%, husbandry 32.3%, and fishery 1.3%. While, the average national percentage was 50.7%, 3.9%, 32.3%, and 9.3% respectively, with the percentage of agriculture in Guizhou 6.6% higher than that, and fishery 8.1% lower. Grain output in 2009 was 3915 kg/hm2, accounting for 80.4% of that of the whole country. Per capita output value of primary industry in rural areas was 4545.8 yuan, accounting for only 62.5% of average national value, which was 8663.0 yuan.

The acceleration of industrial development and urbanization has brought further problems to agricultural development:

(1) The various problems caused by urbanization restrict the future agricultural development. The steady decline of the total amount of cultivated land, qualitative degradation, decline of water resources and water quality degradation together challenge future food production. The environment is in deterioration on the whole with partial improvement, accompanied by serious disasters. Agricultural science and technology is still insufficient, though having made some progress. Agricultural infrastructure is still weak, though having improved. All these factors together with the low cultural quality of farmers have a bearing on future development of agricultural production.

(2) The outflow of agricultural production factors and resources leads to weakening support. Nobel laureate Theodore Schultz once pointed out that to improve traditional agriculture needs new production factors from
outside, including capital, technology, talents and new institutional elements. While, in the present institution, this process is going in reverse: the acceleration of industrialization and urbanization leads to the flow of cheap production elements from the countryside to urban areas and the second industry, forming the “low cost” advantages supporting industrialization. Three net outflows have appeared in this process, the net outflow of land value, the net outflow of rural capital and the net outflow of high-quality rural labor, greatly discounting the pace and efficiency of transformation of traditional agriculture. A large amount of rural fund flows to cities; a large amount of agricultural capital flows to non-agriculture; especially the outflow of high-quality agricultural labor force has decreased the quality of labor force engaged in agriculture.

5.1.3 Issues of rural area: insufficient public services, restricting the sustainable development potentials of rural area
The main problem concerning issues of rural area is the inequality of social and public services caused by urbanization, leaving a huge urban-rural gap in providing public goods and services. Although the supply of public services has progressed notably since the reform and opening up, each public facility and service is improving steadily, and rural public undertakings have experienced and are in rapid progress, the urban-rural dual structure remains to be there, and the urban-rural development gap is continuing widening.

With the implementation of benefiting-farmers policies and the strategy of balanced urban-rural development, the supply of rural public services will increase greatly, but the equality of urban-rural supply of public services is a long process. Rural social security system is not complete, input concerning compulsory education, health care and agricultural infrastructure is insufficient, and support from existing level of technology is not enough, which can’t be radically changed in recent years, thus, restricting the rural socio-economic development, the improvement of rural life quality and the play of rural sustainable development potentials.

5.2 Implementation paths of urban-rural balanced development
From the above analysis, it can be seen that Guizhou “three rural issues” are mainly caused by contradictions concerning institution, resources allocation etc, in addition to natural conditions’ restrictions. So, to address “three rural” issues in the process of urbanization necessitates a number of measures to achieve balanced urban-rural development.

To address “three rural issues” in the process of Guizhou urbanization and achieve balanced urban-rural development, it is necessary to implement the “four-step” strategy.

5.2.1 Push forward new type industrialization, and enhance non-agricultural employment opportunities
Speed up the adjustment of industrial structure of urban and rural development, make efforts to push forward new type industrialization, try to extend industrial chain through technological progress and develop modern service industry system to increase employment. Focus on the change of extensive development pattern existing in the past and plan industrial development layout of balanced urban-rural development according to the requirements of new type industrialization. Accelerate the adjustment from primary industry to tertiary industry in the countryside, make great efforts to develop tertiary industry in rural areas and enhance the absorbing capacity of rural surplus labor. Form the development concept of “industry driving agriculture, city leading countryside”, give full play to the driving force of industrial development on agriculture and rural areas, make full use of driving force of the secondary industry development on other industries, extend the
industrial chain of the primary and secondary industries, and promote scale operation of agricultural production and deep processing chain.

However, to truly realize the complete transfer of rural surplus labor, it is a must to construct institutional base: a healthy system of population flow management.

5.2.2 Construct a people oriented management system of population flow

“The eleventh five-year plan” put forward explicitly for the first time that the PRC will implement “healthy development of urbanization”. The so called healthy development of urbanization is aimed at the unhealthy problems in the process of urbanization, according to the strategic requirements of constructing a harmonious society. From the perspective of migration management and balanced urban-rural development, leading the process of urbanization to a healthy road requires central cities to undertake the historical task of complete absorption of floating population, making it necessary to construct a household registration management system of “employment + social security + legitimate residence = urban household”.

In addition, in the process of household registration reform, one very important principle is the join-in of social security. Only after providing comprehensive social security for floating population having relatively stable jobs, it is possible to cope with the impact caused by the instability of migration on the society, thus reducing the risk of floating population. Currently, each city has set up social security system for floating population, but with very low execution efficiency. One is the low insurance coverage rate; the other is the small cardinal number. The basic reason is that enterprises are reluctant to pay insurance for employees, while the government gives up or defaults the violation of the interests of farmers to protect the interests of local enterprises and promote economic growth.

5.2.3 Purse agglomeration effectiveness on the base of “three concentrations”

After the construction of orderly population flow, each city at prefecture or county level has to follow the “three concentrations” principle. The “three concentrations” refer to the concentration of industries in industry development zones, the concentration of population in towns and the concentration of land use in the form of scale management. To push forward “three concentrations” is to pursue the agglomeration effectiveness in the process of urbanization. This is an important path to achieve multi-level urban-rural interaction and mutual development, and is also the spatial uniform of the three processes of cities absorbing surplus labor, reducing population pressure and pushing forward modern agriculture development.

(1) The concentration of industries in industry development zones

Guiding industries to get concentrated in industry development zone is the key of the “three concentrations”. Those areas of industrial clusters like Central Guizhou Urban agglomeration having relative good economic foundations with featured industries should promote urban services development in the concentration of featured industries, creating cities with stronger regional radiation; other cities of relative weak industries should focus on the development of the secondary industry and strengthen local economy. Average county towns and key towns should development the secondary industry dominated by labor-intensive manufacturing and agricultural products processing industries while identifying its own orientation, creating job opportunities for the transformation of local farmers to non-agricultural industries.

(2) The concentration of population in towns

The conversion of farmers to urban residents is the key link of urbanization. So, guiding farmers to get concentrated in towns is the core of the “three concentrations”, and is also the key link of achieving balanced
urban-rural development and narrowing urban-rural gap.

Guiding farmers get concentrated in towns is to enable farmers to get involved in the process of urban socio-economic development, to equally enjoy the fruits of urban socio-economic development and to share colorful cultural life, beautiful and comfortable living environment and convenient and considerate community services, achieving the thorough transformation of farmers to urban residents in towns.

Currently, the population density is not consistent with urban density, that is, the population density in Guizhou is high in the west and low in the east, while towns are concentrated in central Guizhou and north Guizhou. The reasons for this are the mechanical growth caused by resource extraction and agglomeration of heavy industries and the natural growth caused by poor natural conditions and over-reproduction of poverty. Meanwhile, the low urbanization level and the state of underdeveloped urban system can’t meet the requirements of production and life of so many people, leaving the situation of quitting agriculture and hometown but lack of capability of settling down in towns. While regions like central Guizhou and north Guizhou are faced with problems of rising costs of urban life, an underdeveloped tertiary, and incomplete security system of social welfare etc, result in the situation that floating people can’t settle down though having the desire.

Therefore, to achieve the concentration of population in towns, the first thing to do is to provide enough jobs and corresponding social welfare and security system, providing necessary production and living conditions for floating population.

Metropolitan area is the main carrier of the concentration of farmers in towns. The spatial distribution of farms’ concentration should be different due to the industrial structure and carrying capacity in different areas. The same principle to follow is adaptation to local conditions and guiding farmers to get concentrated in corresponding towns.

(3) The concentration of land use in the form of scale management
The concentration of land use in the form of scale management is the end result of the “three concentrations”, and is also the only way to achieve the industrialization of agriculture, increase farmers’ income and enhance the core competitiveness of agriculture. It is also the core link of addressing “three rural” issues and constructing socialist new countryside. The key of pushing forward the scale management of land use is to construct the operation mechanism of the concentration of land use in the form of scale management.

5.2.4 Provide equal public services for vast rural areas
To provide equal public services for vast rural areas is the institutional guarantee of achieving balanced urban-rural development, which is not only the necessary measures to enhance the life quality in rural areas but also the basic methods to improve the labor quality of rural residents enabling them to have competitiveness after entering labor market, thus forming necessary measures to promote healthy urbanization.

The ultimate goal of achieving balanced urban-rural development is urban-rural integration. Providing equal public services for the countryside is the fundamental strategy. The construction of infrastructure and employment service system can contribute to higher productivity; social security and services of agricultural information and science and technology can reduce risks of uncertainty; the service of agricultural science
and technology information can facilitate access to information and achieve the accumulation of human capital. The comprehensive and systematic generalization of public services contributes a lot to the improvement of agricultural production and living standards in rural areas, the equality of urban-rural industrial efficiency and the equality of urban-rural life quality, thus achieving urban-rural integration.

Figure 12 The action mechanism of public services pushing forward urban-rural integration
6. Policy Guarantee to Accelerate Guizhou Urbanization Development

To guarantee the implementation of the two strategies, push forward the development of new type industrialization, address “three rural” issues and achieve balanced and harmonious urban-rural development, put forward the following countermeasures concerning system and institution innovation and urbanization.

First, system and institution innovation includes accelerating the reform and innovation of social welfare and social security system related to household registration, pushing forward the innovation of land management system, innovating investment and finance system, pushing forward the adjustment of administrative divisions and accelerating the innovation of urban management system.

Next, specific measures concerning the promotion of urbanization process include trying to take Central Guizhou Economic Area as an important national-level development area in the national “the twelfth five-year” plan and strengthening the cultivation of Central Guizhou Urban agglomeration; promoting harmonious development of the primary, secondary and tertiary industries, strengthening the foundation of urbanization; doing a good job in urban planning and promoting urbanization through scientific planning; taking the strategy of large and medium cities’ driving force as a breakthrough, speeding up urbanization; doing a good job of small town construction, building a distinctive Guizhou urban system; accelerating the pace of green urbanization construction, promoting the construction of Guizhou ecological civilization; taking various measures to meet the need of land for urban construction; gradually lifting the urban-rural dual system, achieving balanced urban-rural development in the process of urbanization.

6.1 Institution and system innovation

Urbanization is the only way for Guizhou to realize modernization, and speeding the process is an inevitable choice to achieve Guizhou economic development. Currently, the process of Guizhou urbanization still lags behind, and the fundamental reason is the obstacles of institution and system having formed in the long period of planned economy. To accelerate urbanization necessitates the innovation of institution and system.

6.1.1 Accelerate the innovation of social welfare and security system related to household registration

The existing household registration system, together with related welfare and security system, like education and employment, greatly restricts farmers’ employment in cities. Not only do these systems raise the threshold of farmers’ transformation into citizens and increase the costs and risks of farmers’ employment in cities, but also they provide policy basis for government’s discrimination against famers’ employment in cities.

By reference to the practice of other provinces, deepen the reform of household registration system, soften the terms of settling down in towns, especially in key towns, simplify the procedures and speed up the population transfer from the countryside to towns.

Currently, the key to guide farmers to get concentrated in towns is not the household registration itself, but the social welfare and security system related to household registration. So, to guarantee the achievement of
urbanization goals, it is a must to reform and innovate the social security system, like replacing household registration system with residence permit system, setting up social security system, implementing measures aimed at residence permit, treating those having got residence permit equally and guiding floating population to settle down in towns. After the transition of farmers into urban residents, it is necessary to reform and innovate audaciously, explore and practice actively, probably handle the policies enjoyed in rural areas and provide equal education opportunities and treatment for their children.

6.1.2 Push forward the reform of land management system
Currently, the transfer of land use right is limited by land ownership, the external environment and other issues. So, the efficiency of land allocation is very low, side-work land management and extensive land use are widespread, and land desertion, diseconomies of scale and decline of agricultural investment are also prominent. So, it is a must to reform the land system and implement the rational transfer of land use right, based on the stabilization of the current household contract responsibility system.

Fully exploit the potential of urban construction land, strengthen the reclaim of idle state-owned construction land, construct energy-and-land-saving residence, and explore paths to transfer mining and industrial waste land into urban construction land. Explore the implementation of the replacement of rural house by affordable house according to some standard and transfer the rural homestead and the saved rural construction land index to urban construction land index to be used by the place of influx. Explore actively methods of rural construction land use right entering market, and activate the collective construction land market in suburbs.

6.1.3 Make innovations in the institution and system of investment and financing
Cities at county level and above can establish by law Urban Construction Investment Company with full capital injection, improve the governance structure and achieve commercial operations. Promote investment diversification through market methods like attracting private investment, improve the finance company’s ownership structure and encourage private investment into the construction of municipal utilities, like water supply, sewage and garbage treatment and so on. The operation of urban land assets and municipal public facilities can be authorized to Urban Construction Investment Company, to achieve orchestrated operations and value increment.

6.1.4 Push forward actively the adjustment of administrative divisions
Try to pursue national support and promote the revocation of prefecture administration and the establishment of city administration of Bijie and Tongren. Accelerate the revocation of county (city) administration and the establishment of district administration and the revocation of county (special zone) administration and the establishment of city administration, focusing on Xiwan County, Kaiyang County, Xifeng County and the city of Qingzhen in Guiyang, Zunyi County in Zunyi, Shuicheng County in Liupanshui, and Pingba County in Anshun. Push forward orderly the revocation of township administration and the establishment town administration and the transition of town into subdistrict in the area of county town, support the construction of newly-built town infrastructure according to plans every year. Implement the Law of Regional National Autonomy, according to the administration authority of district and county straighten the administration system of autonomous prefecture, and authorize autonomous regions more autonomous rights concerning urban planning and construction and land resource management.

6.1.5 Accelerate the innovation of urban management system
The existing urban management system usually defines the urban functions and administration authorities according to administrative level, greatly restricting the process of healthy development of urbanization, thus,
needing straightening the urban administration system. Define the duties and powers of different departments at different levels, give full play to the functions of prefecture city in the overall work, like urban planning and policy making, try to activate the initiative of subdistrict and community in urban management according to the idea of lowering the management center of gravity and getting based on foot layer, forming the management pattern of unified leadership, graded responsibility, integration of departments and regions and regions being dominant. Strengthen community construction, improve the system of community level self-governance, promote social network system and construct town community into social life community with orderly management, perfect services and civilized and peaceful atmosphere.

Meanwhile, strengthen the planning, management and cooperation of urban-rural employment, through organizing and coordinating build labor market, provide employment information, improve employment guidance and training, provide services related to legal aid, work safety and children’s education, create excellent environment for farmers to work in towns and guide orderly flow of labor force from the countryside to towns. Predict the volume, rate and direction of cross-region flow of rural surplus labor and improve the organization of the transfer of rural surplus labor using methods of wages, taxes, economy and administration.

6.2 Specific policy suggestions

6.2.1 Try to get Central Guizhou Economic Zone included in the national “the twelfth five-year” plan, and construct Central Guizhou Urban Agglomeration

From the national level, to try to include Central Guizhou Economic Zone into the regional development strategy in “the twelfth five-year” plan and make it an economic area of key supporting in the following 5 years have great meaning for Guizhou to push forward urbanization, industrial development and construct important growth pole, certainly providing strong support for rapid urbanization of Guizhou. From the local level, in the following 5 years, the focus is to construct Central Guizhou Urban Agglomeration centered on Guiyang has great meaning not only for Guizhou but also for the whole country. Currently, Central Guizhou Urban Agglomeration has not really formed yet, but has taken shape and prepared enough development conditions. In the following 5 years, the provincial government should strive to get national policy support to push forward the construction and development of Central Guizhou Economic Zone and Central Guizhou Urban Agglomeration. Cultivating and planning Central Guizhou Urban Agglomeration is to strengthen central cities boosting regional development as a whole, accelerate the development of Guiyang metropolitan area, cultivate consolidated metropolitan area and construct Central Guizhou Urban Agglomeration. This is both the spatial carrier of Guizhou urbanization and a strategic objective of regional development as a whole.

6.2.2 Strengthen government’s dominant role and propel healthy urbanization development

The key to accelerate urbanization construction is the government, especially the full play of its dominant role. So, the government should continue to emancipate the mind and focus on institutional innovation to accelerate urbanization construction. To be specific, the first is to make innovations in urban planning, break the rigid and backward planning system and concepts. Planning should be prospective, systematic and sustainable, both detailed and operational, including both long-term and short-term plans, and plans should have legal effectiveness and can’t be changed unless through legal procedure; second, make innovations in urban construction, reform urban construction & management system and investment & financing system,
establish concepts and brands of modern cities, improve urban elements and functions, integrate urban resources, strengthen urban economic strength, and enhance urban competitiveness, influence and popularity; third, make innovations in urban management, including good management of urban land development and utilization to ensure the preservation and increase of land through market operation on the one hand, and good management of urban public services, developing diversified public utility through market channels to better meet the public demand on the other hand; fourth, make innovations in urban management, establish concept of modern urban management, absorb and draw upon experience and approaches of developed cities both at home and abroad, adhere to people oriented concept, solicit urban management talents and be initiative to deal with various socio-economic problems of modern cities, like traffic congestion, housing stress, employment difficulties, environmental and deterioration of law and order. The innovations in these four aspects are related to, influence and restrict one another, with urban planning being prerequisite, urban construction being support, urban management being driving force and urban administration being the key. These four aspects are focusing points of strengthening the government’s dominant role in urbanization development, and also important tools of accelerating healthy development of Guizhou urbanization.

6.2.3 Push forward the coordinated development of primary, secondary and tertiary industries, and strengthen urbanization foundation

The foundation of urbanization is industrial development and the driving force is in the increasing volume and share of non-agriculture. The key to the increase of urban power and status and the strengthening of attraction and radiation is industry, and the focusing point is also industry. Practice shows that the relationship between urbanization and industrialization is mutual development and mutual promotion. Industrialization creates supply and urbanization creates demand; industrialization is the motor of urbanization and urbanization is the accelerator. Currently, the aggregate economic volume is small with low industrial added value. Small primary industry, weak secondary industry and feeble tertiary industry result in Guizhou being the only province with urbanization level under 30%. Faced with the basic provincial situation of being “underdeveloped and underexploited”, Guizhou has to combine industrialization and urbanization and promote integrated development of urbanization, agricultural modernization, new type industrialization and modern service industry. The urgent task is to take unswervingly industrialization as the core, make great efforts to the upgrading of industrial structure, thus boosting the increase of non-agricultural added value and employment share; develop corresponding industries according to regional comparative advantages and push forward the construction of key projects with strong driving force and related to the overall situation of local development, promote industrial agglomeration, cultivate leading industry; support the accelerating development of tertiary industry, especially producer services, increase employment, stimulate domestic demand and promote development.

6.2.4 Focus on urban planning, and promote urbanization through scientific planning

Guizhou is a province with more mountains than plains, high population density and poor economic base. So, urban construction can’t stand doing much ado about nothing of repeated building and tearing down against scientific planning. Scientific urban development firstly depends on scientific planning. First, pay attention to the foresight of planning. Try to make planning be long-term, future-oriented with high standard and high starting point and effectively address the problems that planning can’t keep pace with development and that planning lags behind construction. Second, pay attention to the scientificalness of planning. Adhere to scientific layout and coordinated development of towns, both avoiding being unrealistic and over advanced, and achieve coordinated development of different sized cities and towns and urban-rural integration; construct a new Guizhou urban pattern with rational structure, functional complementation and moderate
advancement. Third, pay attention to the guidance of planning. Adhere to the integration of urban planning, transportation and industrial development, reasonably define urban nature, scale, development direction and land use distribution and give full play to the comparativeness of different sized cities and towns, forming the situation of clear functional orientation, collaboration and division of responsibilities, complementary advantages and win-win cooperation.

6.2.5 Take large and medium scale cities’ driving strategy as breakthrough, and accelerate urbanization

After analyzing Guizhou Province and the development objectives, implementing large and medium scale cities’ driving strategy, enhancing large and medium scale cities’ strength, thus through radiation boosting the accelerating development of featured towns and small towns are in line with the requirements of Guizhou urbanization development.

Based on the two strategies of Guizhou urbanization, to promote Guizhou urbanization process necessitates the full play of complementary advantages between cities, including both the driving force of large cities and the complementary function of small cities and towns, thus giving large cities wider development space and more solid foundation, forming urban agglomeration with reasonable layout, industrial support, intensive development and strong radiation, pushing forward coordinated development of the urban system in the whole province. On the one hand, highlight Guiyang as the political, economic, cultural and transportation center in the province, improve development conditions by a higher standard, promote environment quality, propel the upgrading of industrial structure and enhance the functions of comprehensive service and radiation in the whole province, forming Guiyang Metropolitan Area; construct Central Guizhou Urban agglomeration, focusing on the consolidated metropolitan area of Zunyi, Anshun, Duyun and Kaili. On the other hand, relying on the exploitation of featured and advantageous resources, promote the development of “Bi-Shui-Xing” Economic Belt and the development of featured industrial belt in east Guizhou, forming regional interaction effect, and promote the layout, forming new regional economic growth pole; help each prefecture central city to improve overall strength and become the lead in developing into large and medium sized cities with strong functional concentration of population and fast increasing overall carrying capacity; support the development of county level city and county town to develop into small and medium sized cities with stronger economic strength, more complete functions, more distinctive features and more beautiful environment.

6.2.6 Do a good job in small town construction, and form distinctive Guizhou urban system

Guizhou is the only province without support of plain, with uneven spatial and temporal distribution of precipitation, without large scale rivers and lakes, and the result is urban development is greatly limited by resources of land, water and so on. To push forward urbanization, Guizhou has to “do two types of work at the same time” and “walk on two legs” that is attaching equal importance to the development of different sized cities and the development of small towns. It means while implementing large and medium sized cities’ driving strategy, promote overall strength of small towns without stop, forming distinctive Guizhou urban system. First, highlight advantages and construct towns of strong strength relying on development of primary, secondary and tertiary industries. Urbanization and industrialization can’t be separated from one another, but it doesn’t mean that each small town must develop the secondary industry, especially industry full of all sectors. Small towns should adapt to local advantages to develop industry with comparativeness, down-to-earth and increasing step by step. Second, highlight the features and construct cultural towns relying on ethnic customs. The nationalities in Guizhou are scattered in the whole province with small scale
concentrations in different areas (da za ju, xiao ju ju), forming diverse but unique cultural symbiosis. So, it is necessary to properly handle the relationship between urbanization and the preservation & carrying forward of fine traditional culture and fully highlight the featured national culture and cultural taste small towns. Third, highlight the excellent tourism and climate resources and construct tourism towns relying on industries related to leisure and holidays. Guizhou is rich in tourism resources with pleasant climate. Giving full play to the unique tourism and climate resources and constructing tourism towns relying on industries related to leisure and holidays are the main direction of Guizhou small town construction and rural tourism. Developing small towns not only needs to consider the integration of scenic area and small towns, but also needs to combine leisure & tourism destinations and planning & construction of small towns, creating distinctive leisure & tourism urban agglomerations with Guizhou features.

6.2.7 Accelerate the pace of green urbanization, and enhance urban overall carrying capacity

Urban overall carrying capacity is the organic combination of urban carrying capacity of natural resources and environment, carrying capacity of infrastructure, carrying capacity of industrial employment, carrying capacity of public services and carrying capacity of society. Urban overall carrying capacity decides the scale and quality of a city. According to the requirements of scientific development concept, it should be figured out clearly the amount of forest, the amount of water supply, the amount of pollutant total emissions, the air quality of a place and how many people this place can bear.

The urban population density in Guizhou is much higher than that of the whole country on average, resulting in a lower index of urban per capita water and road area etc. Thus, the urban overall carrying capacity is in urgent need to be enhanced.

Therefore, Guizhou urbanization should adhere to the principle of sustainable development, and accelerate the pace of green urbanization without pressure from urbanization on environment. Address the main problems restricting sustainable development of cities: the first is land resource. Always give first priority to scale effect and land saving in the process of urban development. According to land grade, define the layout of different kinds of land use and strictly control land development according to urban planning. The second is water resource. Research water resource conditions within the region and arrange rationally the exploitation and utilization of different water resources. Address the problems of water saving and pollution preventing from the perspective of institution and legal system, guaranteeing clean drinking water. The third is the natural environment. Natural environment in cities include natural resources and environmental conditions of a region. While, urban human activities have a great impact on and even change the environmental conditions. So, there is a proper scale for each city. The fourth is ecological environment. It is necessary to do a good job in the planning of garden greening, analyze and appraisal the scale, structure, characteristics of the existing green land system, protect carefully the original forest land and green plants and set up short and long term objectives of green land system planning. In addition, to fully understand the environment conditions and trend in surrounding areas is also very important.

Moreover, do a good job in the construction of infrastructure in the process of accelerating urbanization, and indeed enhance urban overall carrying capacity, focusing on the construction of transportation network. Complete and good infrastructure is the basic prerequisite of achieving beautiful urban environment. So, it is a must to strengthen the construction of infrastructure in the process of urban construction, especially the overall consideration, based on a good road network planning, of those urban infrastructures, including water,
electricity, gas, communication, greening, sewage treatment plants and landfill, enhancing urban overall carrying capacity through the completion of infrastructure.

6.2.8 Take various measures to guarantee the need of urban construction land

Guizhou is included in limited development areas according to national division of major function area, and the shortage of land resources makes the biggest bottleneck in urbanization development. So, on the one hand, try to seek policies that the central government can adopt different land policies in underdeveloped regions. On the other hand, it is a need to construct long-term working mechanism to link city (town) general planning to city (town) land use general planning, guaranteeing the coordination of the two plannings concerning the direction, layout and scale of urban construction land use.

In addition to trying to seek index of urban construction land use and index of rural land transition into construction land, according to the spirit of “the increase of urban construction land being linked to the decrease of rural construction land” issued in “the Decision of the State Council on Deepening Reform and Tightening Land Management” (national issue [2004] No.26), for those qualified in settling down in towns, replace their rural houses with urban affordable housing according to some standard and their homestead in rural areas should be transferred into cultivated land or properly dealt with by the local government. So, the saved rural construction land index can be transferred to urban construction land index of the immigration area. Reform the existing management system of collective construction land, allowing use right of rural construction land to enter market. Some preferential policies can be adopted to encourage rural collective organizations to build affordable housing and low-rent housing according to general planning and in the form of constructing joint-stock companies, so that the collective construction land market in suburbs can be activated.

Fully exploit the potentials of urban construction land stock. The first is to strictly control private housing construction in cities at county level and above; the second is to strengthen the reclaim of idle urban construction land; the third is to construct energy-and-land-saving housing according to local conditions and moderately increase urban land-use intensity; the fourth is to deepen the feasibility study of transferring the waste land of brick kiln and industry or mine near towns into urban construction land.

6.2.9 Gradually eliminate the urban-rural dual system, and achieve urban-rural integration in the process of urbanization

The urban-rural dual system is the constitutional root of the “three rural” issues in Guizhou, including dual household registration system, dual development strategies, dual social structure, dual financial and taxation system, dual mode of production and so on, of which, dual household registration system and dual financial and taxation system form the most important ones. So, in order to effectively address “three rural” issues, the dual system should be rescinded step by step, so that, on the one hand, rural labor force can get free in circulation, and on the other hand rural residents can enjoy various urban welfares. The unequal rights caused by existing dual system have become key elements restricting farmers’ development. So, to address issues concerning farmers first needs giving them equal rights through constitutional construction. The first is to endow them equal status right. Rural residents are born with the status of a farmer, the status of a farmer of a citizen is supposed to be an employment status, and it doesn’t equal to inferiority. Each citizen’s status should be equal. The second is to endow farmers with equal rights of receiving education. For a long time, the strategies biased in favor of cities and the graded education system has resulted in inequality in the opportunities and conditions of rural education. It is necessary to create development system of rural human
resources, giving them equal right to education.

Meanwhile, push forward rural infrastructure construction, improve rural environment and speed up information flow. Take rural road construction as the focus of rural infrastructure construction, seize the opportunity of construct new socialist countryside, integrate planning of rural roads construction and planning of new countryside, give full play to the comprehensive effects of rural roads; seize the opportunity of constructing socialist harmonious society, fully mobilize the enthusiasm and initiative of peasants in rural roads construction and promote rural society’s harmony and stability; seize the opportunity of comprehensive reform in rural areas, straighten rural roads management system, and enhance the government’s financial support; seize the opportunity of further opening up, speed up the construction of passages connecting the outside of the province, promote the flow of population, materials, money and information, and continuously improve the level of opening up. At the same time, support rural infrastructure construction, like small-scale water conservancy facilities, small-scale hydropower, bridges, power grids, gas, and telecommunications etc, to increase the speed of communication with the outside and receiving information in rural areas.
Reference

1. Characteristics of Status quo of Agricultural Development of Guizhou Province

Since the mid-90s of last century, two very important changes have occurred in cause of agricultural development in the PRC: Firstly, the problem of shortage of supply of agricultural products has been basically solved. Therefore, the objective of growth has been shifted from increase of agricultural production to increase of farmers’ income. Secondly, due to becoming a member of WTO, the PRC’s agricultural resources allocation has been changed from the single domestic resource and market into both the domestic and international resources and markets. With the changes in the background of growth, the agriculture of Guizhou Province, as that of the whole country, has entered the new open stage of restructure.

1.1 Steady development of planting and breed aquatics industries

In 2009, area of major food crops in Guizhou Province increased steadily, reaching to 2,984,700 hectares, with total grain output reached to 11.6827 million tons, an increase of 0.9% compared to in 2008. At the same time, rapeseed, tea, vegetables and other cash crops yields were considerably increased, while fluecured tobacco production has slightly declined due to the planned production reduction.

Crops structure was further optimized. 513,100 hectares of oil crops were cultivated, increasing by 12.7%; vegetable growing area reaching to 599,600 hectares, up 7.4%. At the end of 2009, the area for orchard came to 140,800 hectares, an increase of 5.7%; an area of 132,200 hectares for tea garden, up 25.7%.

In 2009, numbers of pig, cattle, sheep for sale was 15.96 million, 920,000, 1.9 million respectively, increasing by 2.2%, 9.4%, 6.5% compared with 2008; meat production was 1.7 million tons, poultry eggs 10,000 tons, milk 45000 tons, aquatic products 80,000 tons, increased by 5.0%, 13.0%, 4.4%, 2.9% compared with that in 2008.
1.2 Stability as feature of agricultural growth

Elasticity of demand for agricultural products is very small, especially it can not maintain and has no need to maintain rapid growth when the problem of short supply of agricultural products is basically solved. Hence, economists usually take 3% of steady agricultural growth or 1% higher than population growth rate as experience indicators of measuring the stability of agricultural growth. Table 1 shows that between 1991 and 2009, average annual growth rate of agricultural output in Guizhou Province was 4.3%. Among them, the average annual growth rates of the planting, forestry, animal husbandry, fishery output were 3.6%, 1.7%, 6.3% and 10.5% respectively, with forestry the only one less than 3%. so the agricultural development in Guizhou Province, as a whole, is higher than the above experience indicators, indicating that there is no worrying problem in agriculture development.

Table 1: Growth rate of agriculture, forestry, animal husbandry, fishery output of Guizhou Province

<table>
<thead>
<tr>
<th>Previous year</th>
<th>Agriculture output</th>
<th>Planting</th>
<th>Forestry</th>
<th>Animal husbandry</th>
<th>fishery</th>
</tr>
</thead>
<tbody>
<tr>
<td>1991-2009</td>
<td>113.1</td>
<td>116.5</td>
<td>109.2</td>
<td>106.3</td>
<td>109.9</td>
</tr>
<tr>
<td>1991</td>
<td>100.8</td>
<td>98.4</td>
<td>114.0</td>
<td>103.6</td>
<td>102.4</td>
</tr>
<tr>
<td>1992</td>
<td>104.2</td>
<td>105.9</td>
<td>101.7</td>
<td>103.9</td>
<td>120.2</td>
</tr>
<tr>
<td>1993</td>
<td>103.7</td>
<td>104.0</td>
<td>100.7</td>
<td>103.6</td>
<td>109.7</td>
</tr>
<tr>
<td>1994</td>
<td>103.0</td>
<td>100.8</td>
<td>100.3</td>
<td>108.9</td>
<td>116.6</td>
</tr>
<tr>
<td>1995</td>
<td>104.5</td>
<td>105.6</td>
<td>94.5</td>
<td>103.9</td>
<td>107.2</td>
</tr>
<tr>
<td>1996</td>
<td>104.9</td>
<td>105.0</td>
<td>101.4</td>
<td>104.8</td>
<td>120.2</td>
</tr>
<tr>
<td>1997</td>
<td>100.3</td>
<td>97.3</td>
<td>102.2</td>
<td>107.1</td>
<td>119.2</td>
</tr>
<tr>
<td>1998</td>
<td>103.6</td>
<td>103.6</td>
<td>99.5</td>
<td>104.0</td>
<td>109.6</td>
</tr>
<tr>
<td>1999</td>
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<td>103.1</td>
<td>111.0</td>
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</tr>
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<td>2000</td>
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<td>99.9</td>
<td>84.1</td>
<td>106.9</td>
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<tr>
<td>2001</td>
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<td>98.6</td>
<td>116.7</td>
<td>108.5</td>
<td>108.1</td>
</tr>
<tr>
<td>2002</td>
<td>105.4</td>
<td>104.9</td>
<td>101.0</td>
<td>108.8</td>
<td>106.4</td>
</tr>
<tr>
<td>2003</td>
<td>105.5</td>
<td>105.4</td>
<td>85.6</td>
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<td>108.7</td>
</tr>
<tr>
<td>2004</td>
<td>105.9</td>
<td>104.3</td>
<td>99.9</td>
<td>109.8</td>
<td>106.7</td>
</tr>
<tr>
<td>2005</td>
<td>104.8</td>
<td>102.4</td>
<td>104.4</td>
<td>108.2</td>
<td>119.8</td>
</tr>
<tr>
<td>2006</td>
<td>103.3</td>
<td>103.4</td>
<td>102.3</td>
<td>102.1</td>
<td>106.5</td>
</tr>
<tr>
<td>2007</td>
<td>106.8</td>
<td>106.1</td>
<td>115.5</td>
<td>107.1</td>
<td>101.5</td>
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<tr>
<td>2008</td>
<td>104.6</td>
<td>102.8</td>
<td>100.7</td>
<td>108.5</td>
<td>102.6</td>
</tr>
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<td>1991-2009</td>
<td>4.3</td>
<td>3.6</td>
<td>1.7</td>
<td>6.3</td>
<td>10.5</td>
</tr>
</tbody>
</table>

Source: "Statistical Yearbook of Guizhou in 2010."

In 2009, the added value of agriculture, forestry, animal husbandry, fisheries of Guizhou Province were 33.05 billion yuan, 2.511 billion yuan, 16.779 billion yuan, 7.21 billion yuan respectively, growing 2.4%, 0.7%, 7.9%, 2.6% compared with 2008.
1.3 The widening gap in the agricultural output between Guizhou and other provinces

From a static comparison, between 2007 and 2009, the average agricultural output value (price in 2006) is 278.809 billion yuan in Sichuan Province, 137.099 billion yuan in Yunnan Province, while only 67.036 billion yuan in Guizhou Province.

![Figure 1 Comparison of agricultural output of southwestern provinces](image)

From the dynamic point of view, Sichuan Province witnessed an increase of 7.32% in agricultural gross output value compared with 2007, Yunnan Province 13.70%, while Guizhou Province increasing by 11.42%. That meant that Guizhou Province was faster than Sichuan but slower than Yunnan province.

Even so, the gap of agricultural development between Guizhou Province and the two provinces, Sichuan and Yunnan, is still widening. It can be seen from Figure 2 that in 2007 agricultural output in Guizhou Province was 206.2 billion yuan and 646 billion less than Sichuan Province and Yunnan Province respectively. By 2008, this gap had expanded to 210.3 billion yuan and 704 billion; by 2009, even widened to 218.8 billion yuan and 753 billion.
1.4 The resource base of agricultural production is even more severe

1.4.1 Cultivated land resource will not be allowed to be optimized

In 2009, Guizhou Province has 1.75782 million hectares of arable land in common use, only 0.64 mu (1 hectare = 15mu) arable land per capita, 0.77 mu arable land per capita for the agricultural population. Per capita arable land area decreased by 0.04 mu, 5.88% lesser than 2005, and per capita arable land for agricultural population decreased by 0.03 mu, 3.70% lesser than 2005 (see Table 2).

Table 2 Land resources of Guizhou Province

<table>
<thead>
<tr>
<th>Item</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arable land in common use at the end of the year</td>
<td>1753.50</td>
<td>1753.36</td>
<td>1751.86</td>
<td>1754.05</td>
<td>1757.82</td>
</tr>
<tr>
<td>Total population at the end Of the year</td>
<td>3867.73</td>
<td>3921.91</td>
<td>3985.04</td>
<td>4036.75</td>
<td>4090.78</td>
</tr>
<tr>
<td>Population for agriculture</td>
<td>3258.04</td>
<td>3295.08</td>
<td>3346.09</td>
<td>3385.66</td>
<td>3429.35</td>
</tr>
<tr>
<td>Per capita arable land</td>
<td>0.68</td>
<td>0.67</td>
<td>0.66</td>
<td>0.65</td>
<td>0.64</td>
</tr>
<tr>
<td>Per capital arable land for agricultural population</td>
<td>0.81</td>
<td>0.80</td>
<td>0.79</td>
<td>0.78</td>
<td>0.77</td>
</tr>
</tbody>
</table>

Source: “Statistical Year Book of Guizhou Province in 2010”.

The data in “The National Survey of land use change in 2008” showed that in 2008 the cultivated land in Guizhou Province reduced by 7,630 hectares, of which 3,590 hectares of farmland was used for various construction, 770 hectares for agricultural restructuring, 30 hectares for ecological restoration, 2,480 hectares being damaged by disasters, 760 hectares reduced for other causes, accounting for 47.08%, 10.08%, 0.41%, 32.46% and 9.97% of the total reduced of arable land of the whole province.

1.4.2. Agricultural water use is a heavy responsibility

In 2009, the province's total water consumption was 10.04 billion cubic meters, 50.8 billion cubic meters for agriculture, 50.6% of the total water consumption; 3.41 billion cubic meters for industry, 34.0% of the total; 1.49 billion cubic meters for domestic water consumption, 14.8% of the total. This shows that the proportion of agricultural water in Guizhou Province is far below the national agricultural water use ratio of 62.4%.

In terms of the change trend of structure of water use in Guizhou Province, thanks to improvement of agricultural production conditions, the proportion of agricultural water, compared with in 2005, declined by 9.05%. In 2009, effective irrigation area in the whole province was 1.0874 million hectares, an increase of 10.1%; new water-saving irrigation area was 6,200 hectares, an increase of 1.4 times.
2. SWOT Analysis on the Development of Ecological Agriculture in Guizhou Province

Guizhou Province has both advantages and disadvantages in ecological development, facing both development opportunities and certain challenges. This section focuses on analysis on the strengths, weaknesses, opportunities and challenges in development of ecological agriculture, aiming to provide a basis for the targeted strategy.

2.1 Analysis on the advantages of developing ecological agriculture

2.1.1 Ecological environmental advantages

Guizhou Province has an apparent three-dimensional agricultural climate and enjoy unique climate condition, which is described as "a mountain has four seasons, different weather can be found within 10 li (1km=2 li)". This climate makes crop growth period relatively longer, conducive to the accumulation of plant nutrients. In particular, the rich biological resources, a wide range of special wildlife resources are most advantageous for development of green food industry.

Meanwhile, due to the low level of industrialization and relatively backward economy, the destruction of resources and pollution of atmosphere, soil and water pollution are relatively light, so that it has less impact on the rural ecological environment. Ecological environment in rural areas is relatively good, which is advantageous for the ecological agriculture development.

The pollution caused by agriculture is relatively light. In 2009, Guizhou Province used 865,400 tons of chemical fertilizers, 181.0 kg per ha, far lower than the 340.7 kg / ha of the national average, also lower than Sichuan (261.7 kg/ha) Yunnan (270.2 kg/ha), laying a foundation for development of ecological agriculture.

The rich forest resources provides a green barrier for the development of ecological agriculture. In 2008, Guizhou Province had 7.0339 million hectares of forest, and the forest coverage rate is 39.93%, reflecting distinct ecological advantage.

2.1.2 Advantages of variety resources

Guizhou Province has diverse varieties of agricultural products. In addition to rice, corn, soybeans and other bulk agricultural products, Guizhou has a rich variety of local agricultural products such as tea, hemp, sugar beet, potato, tobacco, pepper, Chinese medicine and so on. Some data shows that there are 6 series of pepper varieties (pod pepper series, flat pepper (Huaxi capsicum) series, line pepper series, wrinkled pepper series, "baiyi pepper" series, "Rod pepper" series. As one of regions in the PRC teeming with Chinese medicine, Guizhou has been determined as " Guizhou Base of State modern Chinese Medicine Industry." There are 4,290 kinds of traditional Chinese medicine resources, 3,924 kinds of medicinal plants, 289 kinds animal medicines, and 77 kinds of mineral medicines, ranking the fourth in the country. Among the 363 major varieties of Chinese medicines selected by the national survey, 326 species are in Guizhou, accounting for 89.8% of the total. Guizhou has not only the rare and expensive wild herbs and home planted ones, such as asterodia elata, eucommia, pearl ginseng, cork, magnolia officinalis, but also raw materials herbs with important value, such as gallnut, camptotheca acuminate and ginkgo.
The rich variety of resources has provided a broad space for Guizhou to develop ecological agriculture and take the road of special local agricultural products.

2.1.3 Comprehensive and comparative advantages in agricultural production

The related analysis shows that the efficiency advantage index of rice production in Guizhou Province is 2.83, beans production 2.31, showing significant efficiency advantage. Rice and beans, however, have no scale advantages because of the constrains of arable land. Comprehensive advantage index of rice production in Guizhou Province, is 1.56, while 1.48 for the soy production index, showing a comparative advantage.

Meanwhile, the scale advantage index of animal husbandry in Guizhou Province is 1.09, showing a scale advantage; comprehensive advantage index is 1.01, with a comparative advantage in the development of animal husbandry.

In addition, efficiency advantage indexes of oil, tobacco and tea production in Guizhou Province are 2.90, 3.91, 1.88 respectively, showing that Guizhou Province has efficiency advantage in the 3 areas. Comprehensive advantage indexes of oil, tobacco production are 1.74 and 1.25, having comparative advantage.

2.1.4. Industry advantages

Since 1980s Guizhou Province has made experiments of ecological agriculture in Longli, Duyun, Daozhen, Meitan and achieved initial success. Paradigms of ecological agriculture development have emerged, which took growing high quality and special crops as a starting point, combining cultivation, breeding, biogas together. Each region has created its own development mode adapting its ecological resources and regional characteristics and obtained experience for the further development of ecological agriculture.

Since 2007, Guizhou Province has improved the certification of quality and safety of agricultural products and pollution-free agricultural products. Through supervision of quality and safety of the green food and organic produce, the Province actively promotes the standardized production of agricultural products and agricultural quality and safety has improved steadily. Thereby credibility of pollution-free agricultural products has been increased. As of the end of 2009, Guizhou Province had identified a total of 901 pollution-free agricultural production areas. Among them, 568 were origin planting areas, covering 226,000 hectares of area; 319 animal origin areas, with production scale reaching to 65.1089 million; 14 Fisheries origin areas, with 7549.79 hectares of breeding water. 873 pollution-free agricultural products had passed the certification, of which 721 were crop products, with annual output of 3.1933 million tons; 146 livestock products, with annual output topping 220,300 tons; 6 fishery products, with annual output of 73 tons.

2.1.5. Advantages of leading enterprises

Guizhou Province abounds in a number of leading enterprises of green food, such as Maotai Group; Guiyang Laoganna Flavor Food Co., Ltd.; Guizhou Niulaixiang Industrial Co., Ltd.; Guiyang Sanlian Dairy Co., Ltd.; Guizhou Dongpo Tea Plantation; which have developed a number of famous brands of green food with good economic returns, strong market competitiveness and local characteristics, such as Maitai series, Laoganna Flavor Food, Niulaixiang Dried Beef, Shanhua Milk series products, Yunwu Tea, Guibao Chinese Goosebeery Juice, Meitanmaogong Rice.

Guizhou Province has certain material and technical foundation for the development of ecological agriculture.
Green food industry has formed a certain scale and capacity of development, and a group of leading enterprises of green food have played an increasingly prominent role in driving the others. In 2009, with the support of 99 leading enterprises above the provincial level, planting raw material bases of 410 million mu was established, and 2.86 million households in livestock breeding base were involved. The carrying capacity of the leading enterprises has further increased.

2.2 The disadvantages in development of ecological agriculture

2.2.1 Lack of production-scale land condition
With a large population and less land, Guizhou Province is facing a problem of shortage of arable land resources and water. In 2009 the per capita arable land was only 0.64 mu, per capita effective irrigation farmland only 0.40 mu, far below the national average. With the special karst geological conditions, Guizhou is fragile in ecological environment. Due to the high mountains and steep slopes, soil erosion is serious, causing a large proportion of farmland with low or medium yields. In addition, since fragmentation of land distribution limits the development of ecological agriculture to some extent, it is difficult to reach the production scale for modern agriculture.

2.2.2 Overall level of agricultural production is on the low side
As a "less developed" mountainous province, rock desertification is the most serious ecological problem in Guizhou Province. It is facing a series of problems in agricultural production, such as ecological fragileness, weak foundation, high mountains with less water, frequent natural disasters. The comprehensive agricultural production capacity in Guizhou Province is somewhat low. In 2009, the grain production efficiency in Guizhou Province, 3914.2 kg / ha, was far lower than 4870.6 kg / ha of the national average and 4976.5 kg / ha of Sichuan Province.

2.2.3 Weak awareness of local agricultural products brands management
Guizhou Province has put initially in place a specialty industrial system with focus on tea, pepper, medicine, oil, potato, meat, fruit, grain, vegetable, and has greatly promoted the development of agro-industries. However, affected by the concepts of traditional agricultural production and management, agricultural products are still at the core of agricultural production and management in Guizhou, rather than brands, lacking brand awareness.

In creation of brand, although a number of high profile with brands in “Guizhou” have been fostered and named as provincial famous brands, there are few national brands having a certain influence in the country and occupying a certain market share. This will certainly affect the development of special pollution-free, green and organic agricultural products.

2.3 Analysis on opportunities to develop ecological agriculture

2.3.1 International macro background of the external environment for the development of ecological agriculture
Since 1992 when the General Assembly on Environment and Development held in Rio de Janeiro, sustainable development strategy, as a new concept and model of development, has drawn the global attention. At the same time, concept for consumption has shifted to improving quality of life, even including the requirements of ecological environment quality. For this reason, to protect their own interests the developed countries have built up green barriers one after another to exert influence on international trade with reason of environment. there is a direct and close relationship among agricultural production, use,
consumption and the environment, so the green barrier will have a great impact on production of agricultural products.

On ground of presence of the green trade barriers, we should vigorously develop pollution-free food, green food and organic food products in the cause of development of ecological agriculture to improve the quality of agricultural products.

2.3.2 The national policy ensuring eco-agriculture development
Since Agricultural Environmental Protection Association formally presented to the competent department the proposal to develop ecological agriculture in 1982, the central government has issued a series of policies for promotion of eco-agricultural development, which have provided Guizhou with policy support for the development of ecological agriculture.

At the third Plenary Session of sixteenth Congress CPC made it clear that the PRC will adhere to the people-oriented, comprehensive, coordinated and sustainable development outlook. Building of ecological civilization is the proper meaning of the concept of scientific development outlook. Building of Eco-agriculture is an important part of ecological civilization. The scientific thought for development and basic method for addressing the issues of development, which are contained in the scientific development outlook, have become the guidance of methodology for eco-agriculture and broadened the idea of ecological agriculture.

2.3.3 Industrialization and urbanization development strategies have provided space of integration of elements for ecological agriculture development
Guizhou provincial government has proposed a development strategy of "sound and fast, better and faster" and put forward a clear direction for agriculture. According to the strategy, Guizhou should highlight the ecological features of the mountainous regions; make much account of the diversity of climate, biodiversity, resources diversity to develop ecological agriculture; optimize agricultural structure by actively developing and fostering such industries as forestry, tea, fruits, medicines and vegetables according to the advantages and characteristics of different regions. It can be seen from the above, ecological agriculture, in the field of agriculture, is an effective carrier to achieve better and faster development of agriculture. This strategy has added the flourishing of ecological agriculture and provided the impetus to the development of modern agriculture.

To achieve economies of scale ecological agriculture needs to integrate resources elements with a focus on arable land resources. The industrialization and urbanization strategies can provide a space for elements integrating for the development of ecological agriculture, exactly achieving the effective integration of the three. Industrialization can provide some employment opportunities, so as to guide the rural residents to leave rural areas and promote the development of urbanization. At the same time, after raising the level of urbanization, urban residents will further increase the demand for the quality of agricultural products, in turn, it can promote the development of ecological agriculture.

2.3.4 Consumer groups’ consumption trend has oriented the objective of ecological agriculture development
With social and economic development and living standards improvement, consumers spending on agricultural products and food have become increasingly demanding. As a result, it is bound to put forward higher requirements for high quality and safety of agricultural products. The survey data shows that 92% of
consumers are very concerned about information about the quality and safety of agricultural produce. Green food, organic food are in good graces with customers, becoming cosset of the market. Market demand directly stimulate and promote production, and also show the orientation of ecological agricultural development, in turn, more quality products are produced.

Ecological agriculture building can effectively protect and improve the ecological environment, cultivate agricultural natural resources and promote sustainable development of agriculture. And at the same, eco-agricultural technologies can effectively reduce environmental pollution, provide a good environment conditions for producing quality agricultural products (pollution-free products, green food and organic food) to meet consumers’ increasing demand for such agricultural products.

2.3.5 The improving traffic has created the conditions for external market for the development of ecological agriculture

Since 2007, the Guizhou provincial government proposed a new ideas ,"traffic leading the economy", and formulated a strategy of giving priority to transportation development. According to the strategy, by 2030, about 6,851 km of freeway will have been built up, which will form a freeway network, “6 from east to west, 7 from north to south, with 8 linking the all). At that time, a modern highway transportation system will have been completed, forming a provincial highway network and linking surrounding provinces vertically and horizontally, further highlighting the position of the principal part of Guizhou Province as the transportation hub in southwest China.

Improvement of traffic conditions is significant for the Province. First, it makes the people in rural areas easier to access cities, and transportation capacity in rural areas is enhanced. The traditional organization of agricultural production systems (a family as the basic operating unit) will be affected to a certain extent, making the long-closed agricultural production toward the opening step by step. Second, thanks to the convenient transportation, the agricultural production elements such as social capital, talent, technology can be gradually attracted to agriculture. Farmers’ thinking, lifestyle and behavior begin to change. It also promotes the development of agricultural resources, helping agricultural products change into commodity. Third, improvement of traffic conditions creates provides external market conditions for ecological products.

2.4 Analysis on the challenges for developing ecological agriculture

2.4.1 Constrained resource conditions

In terms of Quantity, the cultivated fields are small and fragmented, difficult to form the land scale needed by eco-agricultural development; With social and economic development, more land resources are bound to be used for industries and urban areas. The space for agriculture will be getting smaller due to increasingly reduction of the land used for agriculture. In addition, shortage of water, owing to project water use, is very serious; efficiency of water use is low; proportion of agricultural irrigation is low. Meanwhile, with speeding of industrialization and urbanization, more and more water resources will be allocated for industrial and urban use.

Qualitatively speaking, with large proportion of mountains and hills and thin soil layer, it is prone to cause rock desertification in case of even slightly inappropriate agricultural practices. Industrialization and urbanization may have some impact on water quality.
Additionally, as the arable land managed by farmers is sporadic and scattered, the cost of modern science and technology application is high and the benefit is low. The low level of production specialization and lack of demand for services result in low efficiency, thus preventing such production factors as capital, technology, human resources being allocated to agriculture. Lack of adequate driving force for changing agricultural production and growth pattern constrains the development of ecological agriculture.

2.4.2. Constraints of the quality of labor in agriculture
As the young labor force in rural areas moves to the urban, greater proportion of labor engaged in agricultural production are the elderly. Due to aging and low cultural quality, they have weak capacity of accepting the new technologies, new knowledge and new skills for agricultural production and it is difficult for them to access market information, which poses a severe challenge to promotion and application of eco-agricultural technologies.

2.4.3 Constraints of the backward marketing for special agricultural products
Guizhou Province enjoys rich agricultural climate resources, which helps develop three-dimensional agriculture with diversified crop species, and highlights the regional characteristics and advantages. Through the development of ecological agriculture, the province can develop the high-quality agricultural products with local characteristics to create local quality products, so as to promote the process of industrialization of agriculture and increase farmers’ incomes. To achieve this goal, the key is how to nurture the local agricultural products market and convert the resources advantages to the economic advantages.

However, modern marketing techniques, brand registration, labeling and promotion for pollution-free food, green food and organic food need to be improved, as a result, the prices of quality agricultural products have been long low. Therefore, the local agricultural products market development is not enough to boost the development of local agricultural products, thus affecting the development of ecological agriculture.

2.4.4 The constraints of insufficient capacity responding to natural disasters
Natural disasters on agricultural production are inevitable, but the losses caused by natural disasters can be reduced to some extent by capacity-building of the system for resisting the natural disasters. The water conservancy facilities are the main system for resisting the natural disasters in Guizhou Province. Owing lack of Investors and inadequate investments for irrigation and water conservancy facilities, it results in insufficient capacity responding to natural disasters due to the aging, disrepair and lack of functionality of the system. In 2009, the area hit by agricultural disaster in Guizhou Province came to 780 thousand hectares, with disastrous area reaching to 402 thousand hectares, disaster rate as high as 51.5%, higher than the national average rate of 45.0%. And the drought disaster rate was 66.6%, higher than the average national disaster rate of 45.1%.

Development of ecological agriculture has been affected to a certain extent because of the insufficient capacity of the agriculture responding to the natural calamities, coupled with lag of establishment of the agricultural insurance policy mechanism.
3. The Strategic Orientation and Objectives of Ecological Agriculture

According to the SWOT analysis on development of ecological agriculture in Guizhou Province, Guizhou Province could be developed into the pioneering and demonstration areas for ecological agricultural development, and the demonstration area of the PRC’s ecological agriculture sightseeing coordinately developed with other tourism resources, forming complete industrial system, the ecological security system and monitoring service system after 10-15 years of development.

3.1 The strategic orientation of ecological agricultural development

3.1.1 The Southwest China's pioneering area and demonstration area of eco-agriculture

In order to develop ecological agriculture, Guizhou Province, based on giving full play to its resources advantages, will take pollution-free food, green food and organic food as the starting point and ecological agriculture base as a carrier, rely on science and technology, adopt the means of industrial management, apply modern industrial philosophy and concept of the modern market to lead agricultural development. Focusing on development of local quality agricultural products for the purpose of enhancing the market competitiveness of agricultural products and increasing farmers’ income, the Province will form a product mix to adapt to market demand and Guizhou circumstances; establish a better ecological agricultural industrial system and a smooth modern agricultural marketing system; gradually achieve realization of multi-function agriculture, high efficient structure, new and high technology and standardized production; and finally become the Southwest China's pioneering area and demonstration area for eco-agriculture, which will be the major base supplying ecological agricultural products for the Pearl River Delta.

3.1.2 China demonstration area for eco-agriculture sightseeing coordinately developed with other tourism resources

Guizhou Province has a beautiful natural landscape and colorful ethnic cultures. Therefore, Guizhou Province could take folk culture of ethnic minorities as a link to make full use of the resources of cultural to promote the development of natural resources and use natural resources to enrich the meaning of the natural resources at the same time. All tourist areas can be coordinately developed, which include the red tourism areas with site of the Zunyi Conference as their representative, the natural landscape tourist areas represented by Huangguoshu Falls, folk custom tourism areas represented by Xijiang Miao folk culture, and the ecological agriculture tourism areas. The top-quality tourist products line that puts all the tourist areas mentioned above together can be complementarily developed. It will not only embody the long culture history, but also reflect the magical natural splendor. In this way, Guizhou, a China demonstration area for eco-agriculture sightseeing coordinately developed with other tourism resource will be built up step by step.

3.2 The strategic objectives of the development of ecological agriculture

The overall strategic objectives of Guizhou Province's ecological agriculture development is to gradually establish three systems in the coming 10-15 years: industrial system of ecological agriculture focusing on circulating economy, agricultural ecological security system characterized by beautiful environment and ecological agriculture monitoring service system based on standardization. Main objectives are as follows:
- Forming a improved ecological agricultural system with optimized product structure and space layout, resource-saving and friendly environment

- Building up a number of ecological agricultural products base, in which the products are safe and reliable; production process is standard; waste can be circulated and reused; product quality and safety can be traced back; and obvious scale benefits can be achieved. In the base 90 % or more of processing raw materials of the key and leading enterprises should be supplied by the bases in the province. At the same time, efforts will be made to improve the application for pollution-free food, green food and organic food to make higher proportion of agricultural products certificated.

- Focusing on supporting a number of large scale leading enterprises which have greater growth potential and can play role of driving others in wide areas; building a number of eco-agro-processing park, striving to set up 120 key leading enterprise in the province and bringing along about 60% of total farmers in the whole province.

- Establishing a ecological agricultural tourism system with rational plan, prominent features and perfect services; focusing on creating a number of ecological agricultural tourist demonstration sits for rural leisure and agricultural sightseeing; creating 3-5 national brands of ecological agricultural tour.
4. The strategic priority of ecological agriculture development

In order to achieve the goal of ecological agricultural development, the following aspects should be considered in Guizhou Province’s strategic priority: improving infrastructure construction and improving grain production capacity; developing ecological animal husbandry and agriculture, agricultural products processing, resource-saving and environment-friendly agriculture; and strengthening the circulation of agricultural products.

4.1 Improving infrastructure for ecological agricultural development

Strengthening the agricultural infrastructure focusing on water conservancy construction. The following methods will be adopted in addressing major problem of water shortage: large, medium, small and micro-sized water conservancy facilities should be given the proper consideration at the same time, with the small and medium-sized facilities as the priority; storage, channel, pumping, drainage and water-saving should be considered at the same time, with storage as the priority. Water conservancy projects in central Guizhou will kick off and other key water conservancy projects including "Zi Qian" will be speeded up. As "benefiting-people project" for effectively use of rainwater which focus on “Three smalls --- small pond, small pool and small cellar” will continue to be implemented, more than 1 million of “three smalls” projects will be built up. Efforts will be made to build 2.5 million mu of high standard basic farmland, increase 3 million mu of effective irrigation area and complete water conveyancy system for 6 millions mu cropland.

4.2 Protecting and enhancing the grain production capacity

Efforts will be made to strictly protect and improve arable land. Arable land for non-agricultural use will be controlled, while arable land resources are fully used. The land will be further improved and explored. Improvement of land with medium and low yields will be carried out. The project for fertilizing fields will be implemented to increase the soil and fertility, so that the cultivated land quality will be promoted.

It should adhere to the path of self-growth for development of grain production. "Seed Project" with construction of original seed base and improved seed center as the priority will continue to be implemented. As a result of the project, Improved Seed Engineering Center and Seed Testing Center will be built up to promote breeding of improved seeds, speed up the process of popularization, and establish a improved seed system which will be motivated by both the government’s support and market’s driving force. High-yield agriculture demonstration project as a carrier to enhance the promotion of better methods will be carried out to raise the popularization rate of good varieties with high quality, high yields, strong resistance and practical technologies. Major crop pests and diseases control will be strengthened. More efforts should also be made to increase grain yields and improve construction of high-quality grain production bases for the farmers’ benefits from growing grain.

4.3 Accelerating the development of ecological animal husbandry and diversified agriculture

Due to the comparative advantages in development of animal husbandry, taking making Guizhou to be the large province for ecological animal husbandry as the objective, Guizhou Province will foster the animal husbandry to be the pillar industry. It will adhere to the way of development of ecological animal husbandry by relying on science and technology; speeding up construction of a market system which should have strong
service functions, including livestock and poultry breeding for the vast rural areas, disease control, forage production, quality and safety, etc. It will do a good job breed aquatics in small areas, increasing the field quality by mixing grass with soil and improving the grassland. It will accelerate pig raising while highlighting the development of beef cattle, sheep and cows; It will actively develop their unique culture, and vigorously support animal husbandry process industry, and do a good job construction of pollution-free high-quality livestock products bases. It will strive to obtain the state’s support to implement modern grass and livestock action plan in karst areas.

As for the overall regional arrangements quality beef cattle production base will be built up in northern Guizhou, Southern Panjiang River and Northern Panjiang River Basins; quality sheep production base will be built mainly in northwestern Guizhou, northern Guizhou and southern Guizhou; quality pig production will be built mainly in central Guizhou and northern Guizhou; milk production base will be built mainly in the suburbs in middle and large sized cities and along the highways; and quality poultry breeding base will be built mainly in southern Guizhou and southern Guizhou and along the highways; beef and mutton processing centers will be built in the regions where the transportation is convenient and basic conditions are better, such as central Guizhou.

Bringing regional comparative advantages into play to vigorously develop specialized agriculture. By making full use the diversification of geography, climat and biological resources, Guizhou Province will tap the development potential of agriculture with local characteristics, optimize regional arrangement for the agricultural products, vigorously develop quality agricultural products and expand the advantage industries. According to the market demand, such agricultural products with local characteristics and market prospect will be selected as pivot of development while consolidating the advantages of traditional special agricultural products such as flue-cured tobacco and rape, etc. Efforts will be made to develop the special agricultural products with local characteristics such as potato, tobacco, rapeseed, pepper, vegetables, fruits, herbs, tea and flowers to create a number of famous brands with local characteristics and large production scale, so as to form a competitive industrial system for special agriculture.

As for the regional arrangement, the following key development regions will be built up: quality chilli development region in northern Guizhou, southern Guizhou, northwest Guizhou and central Guizhou; high-quality potato development region in northwest Guizhou, central Guizhou, eastern Guizhou and southern Guizhou; “double Low” rapeseeds development region in northern Guizhou, northeastern Guizhou and central Guizhou; off-season vegetables development region in Dalou mountain, Wumeng Mountain, Miaoling Mountain and Wuling Mountain; Standard Chinese herbal medicines development region for growing 14 kinds of staple Chinese medicines including gastrodia elata and eucommia ulmoides; square-bamboo development region in northern Guizhou; quality tea development region in northern Guizhou, southeastern Guizhou, central Guizhou, southeastern Guizhou and southern Guizhou; fruit development region in central Guizhou, southwestern Guizhou, eastern Guizhou and northwestern Guizhou, and quality orange development region in valleys of Duliu River, Qingshui River, South and North Panjiang River; and cold-water fish development region in northeastern Guizhou, Central Guizhou and southwestern Guizhou.
4.4 Accelerating the development of fine deep processing of ecological agricultural products

Vigorously developing the processing of local agricultural products to actively promote eco-agriculture industrialization. According to "Opinion on Speeding up the Industrialization of Agriculture" published by the Guizhou provincial government, Guizhou Province will: develop a variety of special local products with local flavor by developing local agricultural products deep processing to enhance the competitiveness of local agricultural products and increase market share; introduce and support agricultural industrialization and enhance the competitiveness of leading enterprises and their driving force; strive to introduce a number of strong agricultural products processing enterprises to make them participate in management of agricultural industrialization, which will be regarded as the priority in attracting investment from oversees; further establish and improve the mechanism liking interests of leading enterprises and farmers, guide them to establish a community of interests, so as to let farmers share the benefits from processing and circulation and bring along the development of bases and farmers.

4.5 Building a resource-saving and environment-friendly agriculture

Ecological construction, with forestry as the priority, will be carried out through implementation of such projects as project of restoration of forest by using cropland, project of natural forest protection, project of Pearl River shelter belt, project of rock desertification control and nature reservation zones, etc.

Intensified efforts will be made to develop rural biogas. Relying on rural biogas construction, mode of "a pool for three purposes" will be adopted. Methane pool construction should be integrated with rebuilding of kitchen, lavatory and pigsty, so as to comprehensively improve village appearance and environment and promote aquaculture and agriculture.

Circulating economy of agriculture will be vigorously developed. The following measures need to be taken: steadily increasing the level of intensive use of farmland and strengthening arable land quality management to improve the land quality; reforming the traditional farming methods and encouraging protection cultivation; developing water-saving agriculture; comprehensively carrying out the action plan of soil testing for rational use of fertilizer and pesticide; scientifically and rationally using improved seeds. In this way, utilization efficiency of agricultural inputs can be raised practically.

4.6. Strengthening ecological agricultural products circulation market

Focusing on increasing the income of farmers, Guizhou Province has established bases of special local products such as cordate houttuynia, garlic and ginger, and other special products such as off-season vegetables in summer and autumn, toxin-free potato, high quality rice, strengthening the agricultural restructuring. However, in terms of agricultural market system, there exist some problems hindering the circulation of agricultural products and development of rural economy. For example, size of transactions is small and wholesale markets in the producing areas are underdeveloped.

Guizhou Province will speed up development of the agricultural market information system. Special attention will be paid to agricultural information collection and transmission, storage development and distribution services to establish provincial data centers and the prefecture –and-county-level data services platforms. In order to provide trading platform for the production and speed up the circulation of agricultural products, new methods of distribution of agricultural products will be developed and service platform for marketing of
agricultural products will be improved.

Guizhou Province will speed up upgrading of agricultural products wholesale market in establishment of agricultural markets, focusing on building of agricultural quarantine inspection center, information center, environment- friendly waste water treatment center, settlement center and security monitoring center as well as infrastructure such as warehousing, transportation and trading venues. At the same time, it will foster professional companies and specialized cooperatives for circulation of agricultural produce distribution, and develop industries for standardized classification, grading and packaging of agricultural products and logistics and distribution center of agricultural products.

Efforts will be made to build large scale wholesale markets in the main agricultural product consuming regions, and integrate with the regional origin wholesale markets. Investigation shows that Guizhou has only small-scale agricultural production and it is difficult to form large sales market. In order to play a role in market-oriented agricultural products, it is proposed that agricultural product wholesale market should be concentrated in the main consumption areas or in transportation and logistics centers. Through specialized distribution company and cooperatives of agricultural circulation the two markets can be integrated.

Guizhou Province should actively promote applying the mode of integrating farmers with super-markets, building refrigeration chain system and fast detection system between producing areas and the supermarkets. It should guide the large supermarket chains to direct integrate with farmer cooperatives in fresh agricultural producing areas, establish new type of agricultural products distribution channels to promote integration between the chain of industry and of agricultural supply. Guizhou will develop a number of direct procurement bases of agricultural products and establish agricultural production and marketing alliance to promote the industrial management of agriculture and expansion of sales of agricultural products.

Local agricultural products in Guizhou Province, based on the provincial market, should face the national market and target the international market. Therefore, ecological agriculture will be developed as a bright spot for Guizhou participating in the international market. It will adopt an export-oriented strategy, adhere to attract foreign capital, introduce foreign technology explore international markets and use foreign resources. The entire process including production, processing and marketing will be practiced according to the international market demand and standards.
5. Strategical Measures, Action Plan and Policy Recommendations for Ecological Agriculture Development

According to the strategic focus of Guizhou Province's ecological agriculture development, it needs to take the four strategic measures: adhering concept innovation to transform agricultural development mode, improving the system of ecological agricultural industrialization, establishing an effective mechanism of policy incentives and of policy monitoring, and strengthening financial support system.

5.1 Strategic measures

5.1.1 Adhering innovation concept to change the agricultural development mode

Since the concept innovation is a prerequisite for development of ecological agriculture, the past concept of singularity in development of agriculture must be changed. We should consider the issue of agriculture out of agriculture, of Guizhou out of Guizhou. Through such ways as expert lectures and study tours, we should enhance understanding of ecological agricultural development strategy, so as to achieve concept innovation, and gradually build the development concept of "The eco is productivity, the competitive edge and the potential." To this end, we should adopt a strategy to change the development mode.

Changing development mode means that the modern development concepts of ecology, recycling and low-carbon should be applied to accelerate agriculture development, to enhance agricultural functions of production, ecology and life, so that agriculture can develop in a scientific track in the economic use of natural resources and production factors, and in the transition from traditional ecological agriculture to the modern ecological agriculture.

Changing agricultural development mode should achieve the "four changes":

First, it needs the thinking of large-scale agriculture, instead of the thinking only limited within the agriculture when developing agriculture. Horizontally, the so-called large-scale agriculture concept includes not only all the aspects of agriculture, forestry, animal husbandry and fishery, and the relationship among them, but also relationship within each industry. Vertically it should be regarded as a whole, including the whole process such as processing, transportation and sale. It should change the practice that the processing industry always follows aquaculture and agriculture, processing whatever the latter produce. A new path should be explored to guide the processing industry to follow the leading enterprises, forming a new thinking of ecological agriculture. It means that leading enterprises are brought about by market and aquaculture and agriculture by the leading enterprises.

Second, it needs to change the concept of government-run agriculture, improve the organizational innovation, and bring full into play professional associations and farmers’ cooperatives and economic organizations. To this end, it will strengthen the functions of agricultural services from government. Government should support cooperative economic organizations to carry out standardized production and to develop ecological agriculture, and give them subsidies for infrastructure construction, equipment procurement and market development.
Third, it needs to change the operating mechanism and establish a "win-win" interest mechanism between enterprises and households. Reasonably stable interest relationship ensures that eco-industrial management of agriculture can be guaranteed. The mechanism of interest distribution will establish a relationship of the main body of ecological agriculture in industrial management and property and ensure them to obtain profit. We should actively explore methods for farmers who intend to hold shares by land use rights, products, technologies, capital, and encourage them set up a community, sharing both the risk and interest in form of joint-stock system or stock cooperative system, putting interest mechanisms under the system track.

Fourth, it needs to change the land management mechanism and establish a land transfer mechanism. Guizhou Province is confronted with serious constraints of land fragmentation in its cause of development of ecological agriculture. Therefore, in order to achieve scale of operation, it must set up innovative mechanism for land transfer and input mechanism. To this end, in accordance with a principle of "observing law, free will, compensation with payment, observing criterion" it will explore new forms of land transfer and encourage and promote the transfer of land contract and management rights to meet the needs of the land scale for developing eco-agriculture. In addition, it still needs innovation in investment mechanism and compensation mechanism.

5.1.2 Improving the ecological agricultural industrialization system
From long run, besides management system of ecological agricultural industrialization it needs to set up science and technology innovation and promotion system for development of ecological agriculture, social service system and ecological agricultural product circulation system.

First, it should establish a science and technology supporting system for ecological agriculture development. Ecological agriculture development must be supported by modern science and technology, closely being integrated with science and technology (for example, the bio-engineering technology). Relying on Guizhou Academy of Agricultural Sciences, Guizhou University and other research institutes, the Province should introduce successful technologies from home and abroad and integrate and develop them according to the actual situation of Guizhou Province in order to provide better services for ecological agriculture development.

Accelerating the technical standards for ecological agriculture development Focusing on the leading industries of ecological agriculture in Guizhou Province, it will, based on national standard and industrial standard of ecological agriculture, work out agricultural technical standard system including agricultural technical rules and agricultural products standard, which will guarantee that major agricultural products have technical rule for production and technical standard for quality and safety, with more than 80% of agricultural products and livestock products being produced according to the corresponding standards of production and meeting meet national standards or industry standards.

Strengthening supervision and inspection of agricultural products quality and safety. It will improve the Agricultural Products Quality Inspection Center; establish rapid measuring points mainly including farm produce wholesale market, farmers market, leading agricultural enterprises, cooperatives and major agricultural production bases; and provide with equipment and personnel of rapid measurement.

Second, implementing the service system for ecological agriculture development. The sectors including
Government, financing, insurance and other departments need to change their functions, improve and optimize the service system and enhance the capability against natural and market risks. At the same time, it will establish a variety of ecological agricultural service systems, keep the stability of ecological agriculture service teams and improve social services of ecological agriculture.

Third, invigorating eco-agricultural market. Guizhou Province, according to the overall concept of eco-agricultural development, will work out a plan of eco-agricultural product circulation system to accelerate the development of eco-agricultural product wholesale market, origin wholesale, logistics and distribution center. It will encourage leading enterprises and farmer cooperatives to establish cooperative relationship with big consumers such as supermarkets, hotels, hospitals, universities and other groups. It will speed up logistics industry; improve logistics system for agricultural product; accelerate training of large agricultural products sellers and brokers, with a focus on the introducing and cultivating of agricultural products distributors. It will improve "green channel" system of ecological agricultural products, establish information platform for the development of ecological agriculture and develop eco-agricultural product e-commerce.

5.1.3 Establishing effective mechanism of incentive and monitoring of policy
Developing of ecological agriculture needs to be given incentives at the policy level. First of all, it should pay attention to development, demonstration and promotion of key technologies of ecological agriculture. Second, it needs to increase financial subsidies for farmers’ building of biogas pools, purchasing machinery for returning straw to fields, soil testing and rational fertilizer applying. Third, it should guide rural financial institutions to provide loans to farmers and leading enterprises who are engaged in ecological agriculture development.

Effective monitoring mechanism is the effective means to develop ecological agriculture and improve the quality of agricultural products. So, the Province must strengthen team building of supervision and management of ecological and environmental protection in rural areas. It will actively carry out environmental supervision, strengthen the rural ecological environment monitoring capacity building, and strive to improve the level of unified supervision and management. It should plan to carry out personnel training, constantly improve the quality of supervision and management team for rural ecological environment.

5.1.4 Strengthening the financial support system
The Province will increase financial input to ensure that all levels of financial investment growth rate for agriculture are higher than the growth rate of recurrent revenue. Overall agriculture-related funds will tilt to the eco-agricultural projects, focusing on infrastructure, such as small-scale irrigation, water-saving irrigation facilities, application of biogas and power generation, rural string village (households) tractor road, sewage treatment and utilization of rural life, ecological agriculture base (the parks), etc. and other projects such as ecological agriculture technological innovation, agricultural waste recycling, agricultural non-point source pollution control projects. And it will do a good job reservation and application of agricultural development projects to actively strive to obtain state’s financial support. At the same time, it will explore the diverse investment and financing mechanisms for ecological agriculture.

Exploring the agro-ecological compensation mechanism. The Province will give compensation for the enterprises and farmers who are involved in activities for development of ecological agriculture, mainly
including production of pollution-free products, green products, organic agricultural products, building of ecological agriculture base (Park) and agro-ecological restoration, and developing of ecological agriculture in the concentrated drinking water resources protection areas such as the "two lakes and a reservoir ".

5.2 Action Plan

To implement the strategy of the development of ecological agriculture, it is necessary to carry out infrastructure construction project, new farmer training project, special local agriculture products brand-building project and agricultural science and technology park project.

5.2.1 The ecological agriculture infrastructure project
- Farmland ecological engineering. According to ecological agriculture planning, combined with the new rural building, the villages with good conditions will be selected to build modern ecological agriculture demonstration park, where the land will be improved, fields will be square and linked each other; channels are linked; roads are jointed each other; trees are lined. This project will improve the county’s agricultural infrastructure and help increase social economic and ecological benefits.

- Fertility fertilization project. It will focus on promotion of the technologies for returning straw to the fields and applying balanced fertilization. By increasing the proportion of organic fertilizer, it improves soil structure, while enhancing the comprehensive utilization efficiency of straw; reduce chemical fertilizer, and increase soil organic matter content.

- Pollution-free project. It will apply the pollution-free production technology, “from fields to the table”, to build the bases of pollution-free food, green food, and organic food, ensuring quality and safety of agricultural products.

- Ecological project for rural environmental pollution control. It includes six works: implementing a project of creating green families by applying the method of “one pool with three rebuild”; doing a good job building drinking water source protection areas; demonstration for sewage treatment in rural areas; implementing the "Ecological Forest Project"; implementing soil and water conservation projects and improving agricultural infrastructure; and prohibiting the entry of polluting industries.

- Farmland water conservancy facility project. The Province will actively seek policy support such as the policies for the central water conservancy construction, ecological construction and rock desertification control; and effectively increase the infrastructure of ecological agriculture, especially irrigation and water conservancy facilities; and address the problem of water shortage encountered by the Province in the cause of development of ecological agriculture.

5.2.2 The new farmers training project
It is the key in sustainable development of ecological agriculture to carry out farmers training with a focus on the technologies needed for development of ecological agriculture.

- Good job should be done for basic education, including full implementation of the nine-year compulsory education and vocational education according to social needs.

- Do a good job adult education and training business, focusing on vocational skills, so that each worker has
one or more of the professional skills related to ecological agriculture.

The implementation of the projects, such as young farmers training project, green certificate training project, home training program of science and technology and “sunshine project”, which adapt to the needs of ecological agriculture development, will provide farmers with ability accessing to the advanced technologies

- Establishing long-term and short-term ecological agricultural production skills training system. The specific actions are: opening farmers skills training markets; promoting competition in quality between training institutions; issuing training vouchers farmers to enable farmers to choose training programs and training institutions; and boosting the training institutions to promote training programs to better meet the demand for competition.

5.2.3 Local agricultural products brand building project
- Expanding the main brands of local quality agricultural products. It includes: implementing supporting policies for local quality agricultural products; striving to foster and support the leading enterprises that have strong capacity of processing and market development; developing and expanding specialized farmer cooperative economic organizations; guiding enterprises, cooperatives and farmers establish more stable production-sale contracts and service contracts; strengthening quality control measures to regulate farmers’ production behavior and to achieve an effective integration of small-scale production and large-scale markets.

- Improving the quality certification of local quality agricultural products. It includes: taking certification for pollution-free food, green food, organic food and products with geographical indications as an important element and basic conditions of promotion of agricultural products with high quality; adhering to the principle of "strict standards, restrict procedures, strong regulation" and of “paying same attention to quantity and quality, and certification and supervision”; strictly implementing the work management system; speeding up bases construction. These will help achieve breakthrough in quality certification of local quality agricultural products.

- Encouraging and supporting integration of trademark and brand of local quality agricultural products. It includes: strengthening awareness of the main sectors of production and management including the business enterprises for producing and processing of famous quality agricultural products, specialized farmer cooperative economic organizations, rural agents, and other large households of aquaculture production; encouraging agricultural trade mark registration. It also includes learning some good practices at home and abroad, and integrating the brand resources of agricultural products by enterprises and special cooperative organizations who are engaged in production and processing of the same kind of and similar quality of local quality agricultural products.

5.2.4 Ecological agriculture science and technology park project
- Guizhou Qiannan green and organic food science and technology industrial park. It includes industrial park of processing of green organic beef and mutton and industrial park of processing of special agricultural products.

Industrial park of processing of green organic beef and mutton, with a capacity of processing and slaughtering 10 million cattle, 50 million sheep and goats annually, covers an area of 150 mu, with floor area of 30000 sq. m. The project includes the main production projects (slaughtering plant, cutting-meat workshop,
meat products workshop, processing workshop, side-food-product processing plant, and animal pharmaceutical extraction and packaging plant), auxiliary engineering public works, life works and transport facilities.

Industrial park of processing of special agricultural products project. This park has a capacity of processing 20,000 tons of agricultural products (pepper, tea and other products) and covers an area of 150 mu and building area of 20,000 square meters. It includes main production building (primary cleaning workshop, preservation and packaging workshop, fast drying packing workshop, etc.), auxiliary engineering, and facilities for public works, life works and transport.

Comprehensive agricultural trade logistics center of local green and organic agricultural products. This center can process 30 million tons of green and organic agricultural byproducts annually, covering an area of 200 mu, with main building area of 30,000 square meters. The construction includes the main engineering for transactions, storage and transport (storage and preservation workshop, primary cleaning workshop, preservation and packaging workshop and the trading floor), auxiliary engineering, public works, life works and transport facilities.

Guizhou Tongren green and organic food science and technology industrial park. It includes green and organic ducks and geese processing industrial park and the local green and organic agricultural products comprehensive trade logistics center.

- The green and organic ducks and geese processing industrial park can slaughter 6 million ducks and geese annually and process meat, down and by-products, covering an area of 150 mu and 30,000 square meters of the main building. The construction includes the main production projects (slaughtering plant, cutting-meat workshop, meat-products workshop, feather processing plant, by-products and packaging plant), auxiliary engineering, public works, life works and transport facilities.

30 million tons of green and organic agricultural byproducts comprehensive trade and logistics center covers an area of 200 mu and a main building area of 25,000 square meters. The construction includes the main storage and transport engineering transactions buildings (storage and preservation workshop, primary cleaning workshop, preservation, and packaging plant, the trading floor), auxiliary engineering, public works, life works and transport facilities.

5.3 The policy recommendations

5.3.1 The recommendations for the central government
Considering the strategy of national ecological safety, the project of ecological agriculture in the rock desertification areas in Guizhou Province may be included in national major ecological program. Through the ecological agriculture development of rock desertification areas this project could improve the ecological and production conditions in the rock desertification areas, which will become a main battlefield achieving “win-win” result, the ecological environment improvement and poverty alleviation of farmers.

The central government may increase investment in Guizhou Province, in particular the infrastructure investment for ecological agriculture development. Since Guizhou Province is weak in economic foundation, backward in infrastructure for ecological agriculture development, particularly short of project water, it is
difficult for the province itself to guarantee the construction funding needs. Therefore, it is hoped that central government could increase the investment in the "Twelfth Five-Year" period for the water conservancy facilities construction to improve conditions of ecological agriculture development in Guizhou Province.

It is hoped that the central government would improve innovation and popularization of technologies and mode of modern ecological agricultural production. Modern ecological agriculture needs to change the traditional agriculture methods and technological and development modes. Through the implementation of national key scientific and technological projects, innovation and popularization of ecological technologies could be carried out.

5.3.2 Recommendations for Guizhou Province
With strong support from the central government, Guizhou Province, according to conditions of ecological resources and relative advantages for development of the ecological agriculture and the strategical targets, should effectively change the agricultural development methods, and actively promote eco-agriculture. In the process of development of ecological agriculture, Guizhou should carry out a coordinated development of all kinds of resources. Through introducing elements of modern ecological agriculture Guizhou should take the mode of "resources - products - consumption - renewable resources" to promote the development of new industries, and at the same time, explore the tourism pattern of coordinated development of eco-agriculture tourism, red tourism, eco-tourism, and ethnic customs tourism.

Exploring eco-agriculture model. Guizhou Province should make full use of artificial forage grass to develop ecological animal husbandry. The pressure of livestock on feed grain can be reduced on the one hand, it can fully mobilize the farmers to participate in eco-agriculture on the other. At the same time, the "four major projects” could be actively promoted.

5.3.3 Recommendation for Asian Development Bank (ADB)
It is suggested that ADB provide Guizhou Province with opportunity to exchange international experience in development of ecological agriculture, making Guizhou strengthen cooperation and exchange in ecological agriculture development with international organizations and the countries which have developed ecological agriculture well.

ADB provides Guizhou Province with technical assistance and financial assistance for development of ecological agriculture in the rock desertification areas to explore new model for achieving “win-win” result of modern ecological agriculture development and poverty alleviation of farmers.
References

Sub-report 4:

Study on Strategies of Stony Desertification Control in Guizhou Province

Xiong Kangning, Dean of Institute of South China Karst, Guizhou Normal University

Li Kun, Vice director of Research Institute of Resources Insects, Chinese Academy of Forestry

1. Current Situation, Genesis and Evolution Trend of Rock Desertification

Proportion of the area of karst rock desertification land of Guizhou Province ranks first among all provinces in the PRC. The area of karst outcrops of the whole province is 109084.58 km$^2$, accounting for 61.92% of the province’s total land. In the karst regions, the area of rock desertification land is 37597.36 km$^2$, accounting for 21.34% of the province’s total land (Xiong Kangning, Yuan Jiayu et al, 2007). Where serious rock desertification is is poverty. In the process of rehabilitation for rock desertification, building walls for lands looked like ladders, planting trees and grasses, converting croplands to forest, new energy construction, water conservancy construction in the rural areas, ecological migration, and other measures have played important roles in rehabilitation for rock desertification in Guizhou Province. However, due to the complex and diverse eco-environment in the rock desertification areas, regional socioeconomic characteristics in different regions and different developing stages, temporal and spatial differences of environmental background, problems existing in the process of the rehabilitation are that: a) rehabilitating model is single, b) rehabilitation and rebuilding in those areas with intense rock desertification are difficult, c) restoration and conservation in those areas with potential and slight rock desertification are slow, d) problems as water and soil loss from slope surface, serious waterlogging in depressions, water and soil loss in sink holes and subterranean rivers are not paid enough attention, e) independent rules and insufficient negotiation and regulation among different departments of different industries result in difficult implementation of rehabilitation for rock desertification, f) effective approaches for rehabilitation for rock desertification, development of local economy and increasing residents’ income to make rich are still short.
1.1 Characteristics of Rock Desertification Distribution

1.1.1 Acquisition of Survey Data of Rock Desertification of Guizhou Province

In karst areas of Guizhou Province, using 3S (Remote Sensing, Global Positioning System and Geographic Information System), taking counties as units to interpret remote sensing images, figures of current distribution of karst rock desertification and GIS database were formed. Then the data were statistically analyzed and the distribution area of lands with different grades of rock desertification was obtained (Xiao Dan, Xiong Kangning et al, 2009). Finally, combining the large number of the on-spot investigation materials in the field, geographic information database of Guizhou rock desertification is built.

1.1.2 Characteristics of Rock Desertification Distribution of Guizhou Province

Proportion of the area of karst distribution and of rock desertification land in Guizhou Province both rank first among all provinces in the PRC. It is found by survey that the area of karst outcrops of the whole province is 109084.58 km$^2$, accounting for 61.92% of the province’s total land. In karst regions, area of the lands with no rock desertification is 37460.64 km$^2$, accounting for 21.26% of the province’s total land and 34.34% of the karst land; that with potential rock desertification, 34026.58 km$^2$, 19.31% and 31.19%; that with rock desertification, 37597.36 km$^2$, 21.34% and 34.47%. In the distribution area of rock desertification, area of lands with slight rock desertification is 22155.76 km$^2$, accounting for 12.58% of the province’s total land and 20.31% of the karst land; that with moderate rock desertification, 10868.95 km$^2$, 6.17% and 9.96%; that with intense rock desertification, 3715.41 km$^2$, 2.11% and 3.41%; and that with highly intense rock desertification, 857.24 km2, 0.49% and 0.79% (Xiong Kangning, Yuan Jiayu et al, 2007).

(1) **Rock desertification is widely distributed with a large area.** Karst is widely distributed in Guizhou Province, so does the rock desertification. Except the areas with continuous non-karst distribution, different degrees of rock desertification have occurred in other karst areas. Especially in the middle, west and south of Guizhou Province where pure limestone and dolomites are distributed, there is continuous distribution of rock desertification.

(2) **Types of Rock desertification are diverse with strong representativeness.** Compared with other southwestern provinces with rock desertification distribution, Guizhou Province covers all grades of rock desertification, that is to say, all grades from no rock desertification to highly intense rock desertification are distributed in Guizhou. It has a typical area with karst gorge-plateau rock desertification and an area with limestone and dolomites rock desertification, which shows that rock desertification in Guizhou has complex types, diverse causes and strong representativeness.
(3) Spatial distribution of rock desertification is uneven, with a macroscopical layout of more distribution in the western and southern, less in eastern and northern Guizhou. Under the karst setting, influenced by driven factors, intense and highly intense rock desertification mainly distribute in the west and south of Guizhou Province, such as Shuicheng County, Liuzhi District, Guanling County, Zhenfeng County, Ziyun County, Changshun County, etc. While in eastern and northern areas, large scales of intense and highly intense rock desertification is less distributed, mainly distributing the slight and moderate rock desertification, such as Sandu, Danzhai, Majiang, Huangping, Zhenyuan, Tongzi, Suiyang, Zheng’an, Xishui and other areas. Intense and highly intense rock desertification just occur in some local regions.

<table>
<thead>
<tr>
<th>Types of Rock Desertification</th>
<th>In 2000</th>
<th>In 2005</th>
<th>Changing Area from 2000 to 2005</th>
<th>Changing Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>No rock desertification</td>
<td>33413</td>
<td>37460</td>
<td>4047</td>
<td>2.42%</td>
</tr>
<tr>
<td>Potential rock desertification</td>
<td>40261</td>
<td>34027</td>
<td>-6234</td>
<td>-3.10%</td>
</tr>
<tr>
<td>Slight rock desertification</td>
<td>21070</td>
<td>22156</td>
<td>1086</td>
<td>1.03%</td>
</tr>
<tr>
<td>Moderate rock desertification</td>
<td>10425</td>
<td>10869</td>
<td>444</td>
<td>0.85%</td>
</tr>
<tr>
<td>Intense rock desertification</td>
<td>3914</td>
<td>4572</td>
<td>658</td>
<td>3.36%</td>
</tr>
<tr>
<td>Non-karst</td>
<td>67083</td>
<td>67083</td>
<td>0</td>
<td>0.00%</td>
</tr>
<tr>
<td>In total</td>
<td>176167</td>
<td>176167</td>
<td>0</td>
<td>0.00%</td>
</tr>
</tbody>
</table>
Table 2: Analysis of Conversion of Rock Desertification Types in Guizhou Province from 2000 to 2005

<table>
<thead>
<tr>
<th></th>
<th>In 2000</th>
<th>No Rock Desertification</th>
<th>Potential Rock Desertification</th>
<th>Slight Rock Desertification</th>
<th>Moderate Rock Desertification</th>
<th>Intense Rock Desertification</th>
<th>Non-karst</th>
<th>In total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No rock desertification</td>
<td>32278</td>
<td>904</td>
<td>231</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>33413</td>
<td></td>
</tr>
<tr>
<td>Potential rock desertification</td>
<td>5073</td>
<td>31127</td>
<td>3350</td>
<td>518</td>
<td>194</td>
<td>0</td>
<td>40262</td>
<td></td>
</tr>
<tr>
<td>Slight rock desertification</td>
<td>85</td>
<td>1600</td>
<td>18471</td>
<td>608</td>
<td>307</td>
<td>0</td>
<td>21071</td>
<td></td>
</tr>
<tr>
<td>Moderate rock desertification</td>
<td>16</td>
<td>396</td>
<td>104</td>
<td>9688</td>
<td>221</td>
<td>0</td>
<td>10425</td>
<td></td>
</tr>
<tr>
<td>Intense rock desertification</td>
<td>8</td>
<td>0</td>
<td>0</td>
<td>56</td>
<td>3851</td>
<td>0</td>
<td>3915</td>
<td></td>
</tr>
<tr>
<td>Non-karst</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>67083</td>
<td>67083</td>
<td></td>
</tr>
<tr>
<td>In total</td>
<td>37460</td>
<td>34027</td>
<td>22156</td>
<td>10870</td>
<td>4573</td>
<td>67083</td>
<td>176169</td>
<td></td>
</tr>
</tbody>
</table>

(4) The degree of rock desertification is serious and it is quite possible to further occur. More than 1/3 of the karst areas have occurred different degree of rock desertification with an area of 15441.60 km² moderate rock desertification land, as a result, the rehabilitation and restoration is difficult. The area of potential rock desertification is 34026.58 km², accounting for 19.31% of the province’s total land. These lands may convert into rock desertification lands if rehabilitating measures are not enhanced and human beings destroy the lands.

1.2 Genesis and Revolution of Rock Desertification

Genesis of karst rock desertification in Guizhou Province includes natural factors and human factor. The natural factors are precondition of the occurrence and development of rock desertification. With development of society and economy and increasing impact of environment by human activities, the human factor has become a dominant factor of rock desertification occurrence (Xiong Kangning, Li Ping et al, 2002).

1.2.1 Karst Environment

The natural factors of karst rock desertification occurrence include geology, geomorphology, soil, vegetation, hydrology, etc.. All the factors which interact and link with each other constitute the natural background of rock desertification occurrence.

Basis of petrology: the thickness of stratum of Guizhou is nearly 40,000 m with complete development of stratum, continuous succession of marine strata, abundant paleontological fossils and various rock assemblage, such as sedimentary rock, igneous rock, metamorphic rock and so on. The total thickness of sedimentary carbonate rocks in the whole strata of Guizhou is 8,500 m (Han Zhijun and Jing Zhansheng, 1996), with an outcrop area proportion of 61.92% of Guizhou’s total land (Guizhou Regional Geographic Information project Leading Group, 1996), which is a best developed sedimentary rock in Guizhou. Numerous researches show that the carbonate rocks are the basement of rock desertification occurrence and there is an obvious difference among rock desertification types occurred on different lithology basement.
Proportion of moderate and intense rock desertification in continuous limestone and dolomites is much more than that in other rocks, especially of intense rock desertification. Rock desertification mainly distributes in continuous limestone and dolomites strata and those strata mixed with limestone and clastic rocks. About 70% of slight rock desertification, nearly 75% of moderate rock desertification and 85% of intense rock desertification are distributed in these three rock strata. Therefore, the lithology determines the general layout of occurrence and development of rock desertification.

Geologic structure: Guizhou experienced 21 times of crustal movements with different properties and scales primarily from the Wuling tectonic epoch in the Proterozoic era to the Himalayas tectonic epoch in the Cenozoic era, most of which are lifting and dropping movements with obvious folding movements. In the Tertiary, the whole Yun-Gui Plateau began to uplift intensively and Guizhou continental crust began to uplift slowly forming the terrain with uplift from west to east and incline to the east (Lin Shuji and Liu Aiming, 1985). The western karst mountainous areas uplifted by 2,000 m; the middle by more than 1,000m; the east, by hundreds of meters, which constitute the general layout of Guizhou’s terrain and topography (Yang Mingde, 1988). Strong differences of lifting and dropping movements and folding movements result in the stagger of karst and non-karst. As a result, the spatial distribution of rock desertification is determined obviously by geologic structure. For example, rock desertification distribution in the northern and northeastern Guizhou Province obviously has a north-east trend and a north-north-east trend, while that in the northwestern Guizhou and Liu Panshui District has a north-west trend.

Process of karst: karst process is a process of exchanging and balancing matter and energy in a complex three-dimensional space consisted by a dual structure, namely karst above and beneath the ground. Guizhou is located in the subtropical monsoon climate region featured by plentiful precipitation with little annual variation. Annual precipitation in most areas of Guizhou ranges from 1000 to 1300 mm which provides karst corrosion and erosion with sufficient external force. The dominant erosion in carbonate rocks is chemical corrosion and the secondary is physical erosion. Soil particles in surface layer are in a negative growth state. Though physical erosion force is not strong, it can lead the region’s soil layer to be in a negative growth state. The upper hillside of carbonate rocks is a serious eroded area because in the upper coverage soil, the caking property of soil particles is bad so that it is easy to be scoured by flowing water (Hu Shunguang et al, 2010). Furthermore, in the soil with bared surface and sparse vegetation, the density of root system of vegetation is too small to resist the impact. All these conditions make the physical erosion occur with high possibility and lead to the bareness of the rock mass on the surface (Bai Xiaoyong et al, 2009). Eventually, rock desertification occurs.

Geomorphologic type: Guizhou is located in the watershed area of the Yangtze River and the Pearl River. After lengthy geomorphic shaping in Daloushan Period, Moutain and Basin Period and Wujiang Period, terrain in the western Guizhou is higher than the middle and the eastern, and in the east of Sichuan basin separately to northern Hunan low hills and southern Guangxi basin gradually transition, which looks like three-level steps from the southern to the eastern and like two slopes from the middle to the north and the south. The average elevation is 1,100 m and the maximum height difference is 2753 m. As a result, Guizhou is a subtropical karst mountainous area deep cut by rivers with high terrain and large internal differences. The area of mountainous area in Guizhou is 108,740 m, accounting for 61.7% of the province's total land; the hill, 54,197 m, 30.8%; the dam land, 13,230 m, 7.5%. Therefore, Guizhou’s terrain is very remarkable and it is belonged to one of provinces without plain (Yang Mingde, 1989). The ground with the boundary is cracked.
because of cutting by rivers and the mountain ups and downs with large height difference. The average cutting height of the whole province’s areas is 500 m. Mountains, valleys, hills and basins inlay with each other and constitute the inlay geomorphologic landscape. According to the tectonic features, karst geomorphologic types and features of karst development, Guizhou karst is divided into 6 zones, namely Qiandongbei karst area with low mountain and hill, Qianbei karst area with hill, Qianzhong karst area with mountain and plateau, Qianxi karst area with plateau, Qianxinan karst area with peak forest and valley and Qiannan karst area with peak cluster and valley. The degree of rock desertification occurrence differs sharply in different karst zones.

![Figure 2 Proportion of different landforms in Guizhou Province](image)

**Karst forms**: Guizhou widely distributes carbonate rocks with an obvious karst plateau-gorge structure. The plateau is consisted of denudation-planation surface as core area with high terrain and fluctuant geomorphology, and without river headward erosion. Under the background of relatively ground, a large area of cone peak forest, together with wide basins, valleys and depressions constitute the karst peak forest-plain, peak forest-basin, peak forest-valley, peak forest-depression and other peak forest geomorphologic landscape combinations with a character of shallow overburden karst. Valley areas are overlay zones of karst development in Guizhou with deep cutting valleys as main body which are mainly distributed in each great river or in the gorges of plateau edge of main tributaries that are eroded strongly. Under the background of low terrain but big fluctuation and the cracked ground, large areas of cone peak forests, together with deep cutting valleys and depressions constitute many typical bare geomorphologic landscape combinations of peak cluster, such as peak cluster-valley, peak cluster-depression. Rock desertification differs sharply in different areas with different geomorphology. Usually rock desertification in valleys is more serious than that in plateaus (Li Bo, Zhou Zhongfa et al, 2010). Intense rock desertification in Guizhou is mainly in Shuicheng, Anshun, Huishui and Pingtang and its southern areas where valleys are widely distributed, namely, rock desertification is mainly distributed in the eroded fossil karst plains, the upper reaches of rivers, typical mountainous areas with peak cluster in valleys and deep cutting valleys, and secondly in those areas with strong movements, such as the dissolved karst hills. According to its developing microtopography types, rock desertification can be divided into 3 combinations, namely, peak forest-plain rock desertification combination model, peak cluster-depression and peak forest-valley rock desertification model and peak cluster-valley rock desertification model.
**Soil-forming process and soil character:** In karst areas, it is difficult to form soil and conserve it (Wan Guojiang, 1995). The soil forming process is slow and the soil layer is thin. In the process of weathering and transportation, more than 90% of carbonate parent rocks are dissolved into water and blown away and the content of soil acid insoluble matters is low existed by weathering and leaching. The average rate of weathering of carbonate rocks is 61.88 mm per millennium and the average rate of soil formation ranges from 3.1 cm to 24.7 cm per millennium. Consequently, soils in karst environment mainly are those lithologic types with low soil maturity, namely, lime soil and red or yellow soil with great viscosity. The distribution of soil strips is discontinuous and not thick, and differs greatly. Soil ecological physical property is bad. There is an obvious soft and hard interface between soil and rock and their viscosity is bad. As a result, it is likely to lose water and soil and to slide a large numbers of blocks. Finally, rock desertification occurs. Rock desertification is a process of land degradation relevant with the fragile ecological geologic background and human activities, mainly reflected by the change of geomorphology, declining quality of soil and degradation of vegetation. Especially, the declining quality of soil is an important character of rock desertification reflected by the loss of soil matter, degradation of physical, chemical, and biotic properties of soil and the change of soil layer. In those soil configurations with usual development, the profile soil configuration should be A-B-C. However, it is great change because of rock desertification which develops inconspicuously. In those areas with rock desertification, desertification phenomenon happens in the surface soil and the content of sand increases dramatically. The soil with serious rock desertification, like crude soil, is short of soil mineral colloid and the soil particles are bulky and tight, which hinders the formation of soil aggregate structure. As the grade of rock desertification increases, soil’s fertility reduces dramatically.

**Coverage vegetation:** The zonal vegetation in Guizhou Province is subtropical evergreen broad-leaved forest. But in the southern areas, the zonal vegetation was destroyed and various secondary vegetations developed including subtropical warm coniferous forest, mixed broad-leaved and coniferous forest, deciduous broas leaved forest, shrubs, mixed shrub and grass, etc.. The species composition and complex degree of each kind of vegetation is different so that their effects of improving and protecting environment are also different. According to their ecological effects from maximum to minimum, the order is evergreen broad-leaved forest (evergreen monsoon forest and valley monsoon forest)-deciduous broad, leaved forest, coniferous forest, mixed coniferous and broad-leaved forest, coniferous forest, shrubs and mixed shrubs and grasses. Although the ecological effect differs from different kind if vegetation, all vegetations have strong ability of improving and protecting environment. Various karst shrubs and mixed shrubs and grasses widely distributed in karst areas have played an important role in preventing or restraining the rock desertification. Forest in Guizhou features with inhomogeneous distribution, showing that the coverage rate of forest in karst regions is low and that it is relatively high in non-karst regions. The inhomogeneous distribution of forest has great impact on water conservation. Due to karst environment featured by aridity, being rich in calcium and rocks but being short of soil, plants in these areas grow slowly and the vegetation structure is bad with low coverage rate. As a result, the environment would be deteriorative and the vegetation may further degrade once the vegetation suffers destruction. Because of the loss of vegetation and the increase of soil loss, the area of rock desertification land becomes larger and larger.

**1.2.2 Human Environment**

Under the natural background of fragile karst environment, with the addition of the destruction human activities, rock desertification multiplies (Lan Anjun et al, 2001). To some extent, unreasonable human activities are the main genesis of rock desertification.
**Population:** the human factor for rock desertification mainly refers to population and its density. By 2005, the population density of Guizhou Province increased to 223 per km\(^2\) from 185 per km\(^2\) in 1990. Population density shows that human beings have an impact and effect of ecological environment, including cultivation and utilization of land, deforestation and destruction of forest and utilizing intensity of grass resource, etc., which indirectly influences the intensity of rock desertification. The distribution of the whole province’s population density is small in the edge areas, large in the middle areas, and small in the southeastern areas but becoming larger gradually to the northwestern areas. Guiyang, Anshun and Zunyi cities, located in the middle Guizhou, have the largest population density over 1000 per km\(^2\), which constitute the center of the province’s population density. And the population density becomes reduced gradually when spreads to all surrounding areas. Population density is highly accordant with rock desertification. In the southern karst regions with high population density, the coverage rate of forest is low and bare mountains and rock desertification can be seen everywhere because of the heavy intensity of human activities.

Table 3  
Area of land, Population Density and Grain Yield in Areas with Serious Rock Desertification and in Guizhou Province

<table>
<thead>
<tr>
<th>Name</th>
<th>Area of Land (km(^2))</th>
<th>Population ((1\times10^4) capita)</th>
<th>Population Density (capita/km(^2))</th>
<th>Average area of Cultivated Land Per Capita (mu)</th>
<th>Grain Yield ((1\times10^4) t)</th>
<th>Average Grain Per Capita (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guizhou</td>
<td>176167</td>
<td>3900</td>
<td>213.26</td>
<td>1.73</td>
<td>1170</td>
<td>300</td>
</tr>
<tr>
<td>Bijie</td>
<td>26853</td>
<td>759.66</td>
<td>272.59</td>
<td>2.46</td>
<td>263.26</td>
<td>347</td>
</tr>
<tr>
<td>Liu Panshui</td>
<td>9926</td>
<td>304.52</td>
<td>306.79</td>
<td>0.53</td>
<td>84.16</td>
<td>276</td>
</tr>
<tr>
<td>The Southwestern Guizhou</td>
<td>16805</td>
<td>303</td>
<td>180.3</td>
<td>2.21</td>
<td>110</td>
<td>363</td>
</tr>
</tbody>
</table>

**Population quality:** in recent years, the population quality of Guizhou has been improved greatly, but the proportion of illiteracy persons is still high. The population quality has a great impact on human cognition to environment which determines whether people take scientific activities or not to harmonize with nature. With low cultural qualities, people are likely to be attracted by immediate short-term interest and regardless of environment’s carrying capacity so that they pursue interests by sacrificing environment. Usually in those areas with poverty and low degree of education in Guizhou, rock desertification occurs seriously. For instance, both degrees of rock desertification and poverty of Mashan rank first among other areas in Guizhou. Fragileness of karst ecological environment and backwardness of population quality in rural areas are main barriers to restrain the ecological and economic development in rock desertification areas. According to the poll of population quality and people’s consciousness of protecting environment in rock desertification areas, as the cultural quality becomes lower, people’s consciousness of protecting environment is lower, and vice versa. By 2005, the illiteracy rate of young adults in Guizhou Province is 3.3%. Consequently, it is urgent to improve people’s population quality.

**Regional Culture:** the long-term historical process and the background of special karst environment result in the unique karst culture of Guizhou. This culture setting deep influences the formation and development of rock desertification. The special reclamation culture accelerates the evolution of rock desertification. Traditional dietary habit results in the thinking mode of that grains should be gained from lands which
increases land’s pressure. Even there are still some bad habits as slash and burn cultivation, extensive cultivation, destroying forests for reclamation, burning mountains, etc. in some areas, which accelerates the occurrence of rock desertification. In many areas, local residents are used to live in log house, bury the dead with wooden coffin, and marry men or women with wooden furniture, which consumes a great deal of woods so that large area of forest is chopped down. As a result, the forest resource in karst regions becomes less and less. Due to the restriction of economy and transportation, rural people take wooden as main fuel in wide karst areas so that the shrubs growing slowly which are regarded as fuel after being chopped down degrade sharply.

Regional development: rock desertification results from the contradiction between man and land in karst areas. The seriousness of today’s rock desertification has experienced a long historical process. From the perspective of imbalance of man and land, about 100 years ago, contradiction between man and land becomes severe. Researches show that in Ming and Qing Dynasty, Guizhou Province has been influenced by rock desertification. Development of Guizhou began in Ming Dynasty when it was set as a province, but the process is slow. After revitalization for several decades in the Kangxi Period and a series of special policies in Yongzheng Period, at the beginning of Qing Dynasty, the economy and society have been in a new stage. In Qianlong Period, the introduction of high-yielding crops with character of drought tolerance and pain resistance such as corn and sweet potato make people reclaim mountains again to plant grain which are not suitable to crop. And new food supply can foster more people who can reclaim more lands. The introduction of these crops results in the change of land-use type in Guizhou and the destruction to land is more than in Yongzheng Period. So from this perspective, there is a series of consequences by administration in Yongzheng Period. The maximum of land utilization results in the beginning of land desertification. When land desertification reaches a degree, rock desertification occurs. Consequently, the Yongzheng Period is the beginning of the cultural factor for rock desertification.

Socio-economic development: Guizhou is a mountainous province with typical karst agriculture and is one of remote poor provinces where national minority groups inhabit. Agricultural production mode and special ideology relevant to karst and with strong regionalism constitute a regional system of environment-resource-population-development featured by karst. The situation of reproduction of closed natural peasant economy for a long time shows a series of features with agricultural economic vulnerability, such as weak foundation of national economy, low level of comprehensive agricultural productivity, slow development, single agricultural structure, bad scale operation, slow agricultural accumulation, and small contribution to industrialization, etc. A lot of rural areas are in a state of lacking food which results in many bad human activities, such as expanding farmlands unreasonably, reclaiming steep slope lands, cutting trees excessively, overgrazing, etc. These activities accelerate the destruction of the local ecological environment, the loss of water and soil loss and the process of rock desertification. Where the index value—average grain yield for per capita and average net income for per peasant is low, there is serious rock desertification occurrence. This, to a large extent, objectively shows the influence of socio-economic condition to rock desertification. The average GDP for per capita of Guizhou ranks last throughout the PRC. The amount of capital investment only equals 33% of the national average level; the average local fiscal expenditure, 59.2%; and the average net income for per peasant, 61.7%. Due to the weak foundation in poor areas, the economy and society lags behind seriously. As a result, the construction of new socialist countryside in karst rock desertification areas is an arduous task.
1.2.3 Formation and Evolution of Rock Desertification
Karst ecological environment in Guizhou has the following features: wide distribution of carbonate rocks and thick sedimentation, significant vertical difference, strong denudation, a great deal of water and soil loss, short age against soil corrosion, high danger, low coverage rate of vegetation, fragile ecological environment, etc. It is also influenced more and more frequently by human activities.

**Destroying forest for reclamation:** it usually takes several decades or hundreds of years to convert from one state to another for karst lands. However, it just takes several years or even less time to convert when deteriorative ecological environment plus human activities which results in accelerating the speed of converting from forest to liana shrubs or bare land and shortening the land’s degradation period. As a result, the vicious circle is difficult to reverse. Stable and efficient ecological system is the material base for developing agriculture. The deterioration of Guizhou’s ecological environment is not only a barrier for agricultural stable development, but also a resource for poverty. Due to the excessive utilization of lands and unconsciousness of protection for a long time, the lands’ quality has a tendency of decreasing in many areas. Peasants in karst mountainous areas in Guizhou mostly are used to shoveling grasses and burning them for fertilizer. Those lands which were shoveled loss their water and soil seriously. Most peasants depend on firewood and grasses as domestic energy. But the average amount of firewood for per person is little so the contradiction between man and energy in most areas is quite outstanding. In addition, local people lack the consciousness of ecological protection for a long time so that resources can’t be protected efficiently and utilized persistently, which results in gradual decrease of forests, shrubs and volume, and water and soil loss.
**Figure 3 Formation and Evolution of Rock Desertification**

**Water and soil loss**: human activities are main motives for water and soil loss in Guizhou Plateau, most of which influences water and soil through impacting the vegetation coverage rate. Chopping trees and setting fire on mountains excessively decrease the coverage rate of vegetation. The most serious activity is reclaiming steep slope lands, which makes large area of surface soil bare in rainy season with a quite long time period and makes water and soil loss. By 1954, soil erosion area accounted for 14.19% of the province’s whole land. In the late 1950 the soil erosion area was only 35,000 sq km, accounting for 20% of the province’s whole land. By 1980, the area increased to 50,000 sq km, accounting for 28.4% and the area
further expanded in 1990 which increased to 76,700 sq km, accounting for 43.6% of the whole land. According to Water and Soil Loss Announcement of Guizhou Province in 2005, the total area of water and soil loss of the whole province is 73,179.01 sq km, accounting for 41.54% of the whole land. In accordance with water and soil loss distribution, water and soil loss in the western, northwestern and northeastern Guizhou is most serious. There are 18 cities or districts of which the proportion of water and soil loss area is more than 50% of the whole land, including most counties of Liu Panshui, Bijie, Qianxinan, Tongren and some counties in northern Zunyi City. That in Middle Guizhou is serious and the area proportion ranges from 30% to 50%, including Guiyang and Anshun Cities and most counties of Zuiyi City. That in southern and southeastern Guizhou is less serious and the area proportion is usually about 20%.

Bare rock: process of soil formation is quite slow and the ecological system is quite fragile in karst areas. Once soil in karst areas is washed away, it is difficult to form regolith because the soil layer is too thin in carbonate rock distribution areas. The rocky lands finally being bare hardly have agricultural utilization value. Plan of Construction of Ecological Environment of Guizhou Province approved and implemented by People’s Government of Guizhou Province in 1999 indicates that the area of rock desertification lands increased to 8,806.6 km$^2$ (accounting for 5%) from 13,888 km$^2$ (accounting for 7.9%) in 1985; and in early 1999 it accounted for 12.8% of the whole land, namely 22,549.4 km$^2$. In the 13 years the average annual increased area is 666.3 km$^2$. According to Comparison with data in the plan and those investigated by Guizhou Normal University and Guizhou Provincial Monitoring Station of Soil and Water Conservation in 2000, the rock desertification area increased to 37,579 km$^2$ (accounting for 21.34% of the whole land) in 2005 from 35,920 km$^2$ (accounting for 20.39% of the whole land) (Xiong Kangning, Li Ping et al, 2002). In the 5 years the average annual increased area is 334.7 km$^2$. It is thus clear that compared with the increased speed of rock desertification in the period from 1975 to 1999, that in 2000 to 2005 decreased significantly, but it still has a slow increasing tendency (Xiong Kangning and Chen Qiwei, 2010). Restoration of vegetation in rock desertification areas has been practiced largely. Such as natural formation of forest in coastal Huaxi River after prohibition destroying forests, planting trees for greening artificially in each county town and Guiyang City, Fengshui Forest in natural village protected spontaneously by broad peasant masses, planting eulaipiosis binata in slop lands, artificially cultivating Zanthoxylum bungeanum forest, rehabilitation taking basin as a unit in Nayong and Dejiang Counties implemented by national scientific projects where is difficult to plant trees, artificial afferorestation and vegetation restoration in Xiuwen County, comprehensive rehabilitation for rock desertification in Huajiang Demonstration Area during the Ninth Five-year Plan and the Tenth Five-year Plan, etc. All these practices show that vegetation in rock desertification areas in Guizhou Province can be restored. The complexity of rock desertification formation and difficulty of rehabilitation indicate that rehabilitation for rock desertification is a long-term arduous task so that it is impossible to create a beautiful landscape with green mountains within only one or two five-year plans and that not only confidence, but also perseverance is needed in the process of rehabilitation for rock desertification.

1.3 Indexes for Grading Rock Desertification

According to the definition, rock desertification is a unity of both process and result. Rock desertification distribution differs in different space and the difficulty of relevant rehabilitation differs too. Only grading rock desertification scientifically, can the current situation be investigated correctly and rehabilitation programs to its local conditions be implemented. Not only natural factors, but also socio-economic conditions must be taken into consider with man-land contradiction as starting point and harmonization of man-land system as target to grade rock desertification scientifically.
Difficult to use.

Serious; soil layers are shallow; most of the coverage rate is not obvious; in this type of lands rocks have a tendency to be bared.

Where rocks are completely bared and lands are completely deserted; soils are completely lost; in surface there is no soil to lose so that they lose agricultural values; this type of lands are typically difficult to use.

<table>
<thead>
<tr>
<th>Grades of Rock Desertification</th>
<th>Rate of Bare Rock in Every 0.2 sq km Map Spot (%)</th>
<th>Coverage Rate of Vegetation and Bare Rock in Every 0.2 sq km Map Spot (%)</th>
<th>Reference Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>No rock desertification</td>
<td>&lt;20</td>
<td>&gt;80</td>
<td>Dry croplands, paddy fields, lands for construction, etc. without artificial walls where slope is 15 degrees or less; where eco-environment is good and vegetation as trees, shrubs and grasses are bushy; where there is no soil and water loss or the loss isn’t obvious; this type of lands are better to be farmlands, forests, pastures, etc.</td>
</tr>
<tr>
<td>Potential rock desertification</td>
<td>20~30</td>
<td>80~70</td>
<td>Dry croplands, grasslands, etc. without artificial walls where slope is more than 15 degrees with sparse vegetation as trees, shrubs and grasses; where there are beneficial conditions for forming soils and where soil and water loss is not obvious; in this type of lands rocks have a tendency to be bared.</td>
</tr>
<tr>
<td>Rock desertification Slight</td>
<td>31~50</td>
<td>69~50</td>
<td>Where rocks become to be bared; soil erosion is obvious; vegetation structure in spot is simple mainly with sparse shrubs and grasses or artificial dry land vegetation.</td>
</tr>
<tr>
<td>Rock desertification Moderate</td>
<td>51~70</td>
<td>49~30</td>
<td>Where rocks are bared and lands are deserted more intensively; soil erosion is serious; soil layers are shallow; most of these lands are farmlands with slope and bare rocks and sparse vegetation as shrubs and grasses.</td>
</tr>
<tr>
<td>Rock desertification Intense</td>
<td>71~90</td>
<td>29~10</td>
<td>Where rocks are bared and lands are deserted most intensively; soil erosion is serious even there is no soil to lose; most of these lands are going to lose agricultural values and difficult to use.</td>
</tr>
<tr>
<td>Rock desertification Highly intense</td>
<td>&gt;90</td>
<td>&lt;10</td>
<td>Where rocks are completely bared and lands are completely deserted; soils are completely lost; in surface there is no soil to lose so that they lose agricultural values; this type of lands are typically difficult to use.</td>
</tr>
</tbody>
</table>

Non-karst areas the issue of rock desertification needn’t to be considered

Figure 4 Rock Desertification tendency in Guizhou Province (unit: km³)

Table 4 Standard of Grading Karst Rock Desertification for RS Survey
1.4 Hazards of Rock Desertification and Relevant Cases

Karst rock desertification, an environmental geological disaster, accelerates deterioration of eco-environment and causes a group and a chain disasters taking rock desertification as core, mainly displaying an agglomeration occurrence and causal circulation, namely water and soil loss-rock desertification-disaster of flood and drought-ecosystem degradation circulation, which finally results in loss of land resources, azonal drought, losses of lives and property, etc. Rock desertification not only results in destruction of resources and eco-environment, but also causes quite fragile ecosystem, deteriorative living conditions, sharpening contradiction between man and land (decrease of arable lands, difficulty of drinking for people and livestock, frequent disasters of flood and drought, low productivity of land, etc.), which results in much more backwardness of economy which is backward itself and forms a Poverty Trap with vicious circle of fragile-environment-poverty-seizing-resources-deteriorative environment-acceleration of poverty.

Degradation of ecosystem and decrease of biodiversity: karst rock desertification not only results in ecosystem diversity decreasing and even gradually disappearing, but also forces karst vegetation to change to adapt to the environment, which results in forest degradation in karst mountainous areas, decrease of regional plant species, community structure being simple and even mutating. In many karst rocky mountainous areas with rock desertification in Guizhou Province, the forest coverage does not exceed 10%, the structure of biological community is simple and most of them are for xerophytic plants community, such as fujimoto thorn bushes, dry naturally hetian this irrigation grass and succulent pulp thickets etc., which makes the ecosystem in rocky mountainous areas in a vicious circle and the habitat be fragile. Due to the ecosystem degradation, biodiversity impairment, the protection is difficult and threatened wild plant species are increasing. In 1984, the threatened species needed to be protected in the whole province were 73 species, which were 19.8% of national species, including 60 species distributed in karst areas, which were 82.2% of the threatened species of the whole province. In 1998, the threatened species of only angiosperm were 86 species, which were 10.12%of the national angiosperm species, including 71species distributed in the karst areas, accounting for 82.6% of the province's threatened species. Latest researches show that the threatened and endangered peculiar seed plants of the whole province are 89 families, 402 species which is 5.5 times of that in 1984, accounting for more than 10% of the national species. Including 84 families, 342 species distribute in karst areas, accounting for 85% of the whole province’s threatened species. The increase of threatened plants in the karst areas has close relation with rock desertification. In rock desertification areas as Liupanshui and Qianxinan regions in Guizhou Province, ecosystem’s succession reverses. Eupatorium adenophorum, one of four evil grasses listed on the Convention on Exotic Harmful Biological control and International of Bio-control invading into the rock desertification areas and grows quite well and becomes a kind of typical landmark plant for ecological degradation. According to the results of a preliminary investigation in Guizhou province, the invading area of Eupatorium adenophorum is more than 322 million mu, which soon excludes the native plants and form a large area of single optimal community. It will bring disastrous consequences to agriculture production, and ecological construction if this goes on.

Decrease and shortage of water supply: due to exiguous vegetation in karst rock desertification areas in Guizhou, thin soil or bare bedrock, a dual structure - the surface and subterranean karst geological structure, serious leakage, and high infiltration coefficient, the capacity of water conservation of the earth’s surface is weak; steam and river runoffs decrease; wells and springs dries up; the lands are arid; and lead people and livestock are lack of drinking water. The annual precipitation in Guizhou usually reaches more than 1000 mm,
but the development of karst makes water loss and surface water lack, causing a drought problem under a humid climate. According to the Bulletin on China’s Water Resources in 2004 by the ministry of water resources, Guizhou is one of the ten provinces or cities, such as Beijing City, Tianjin City, Shanxi Province with developed economy and dense population, which are most lack of water in the PRC. Due to high mountains, steep slope lands and deep valleys in karst mountainous areas the soil and water are quite short in these areas. As a result, rural people and livestock are lack of drinking water. In arid season, it takes a lot of labor forces costs to draw water. Consequently, difficulties of drinking water have becoming a prominent problem to restrict people to alleviate poverty in rock desertification areas in Guizhou. In addition, the karst rock desertification terrain is difficult to conserve water, and people get water only from the rainfalls in a lot of places. Water and drought have being a serious factor affecting the local agricultural production and an obstacle to restrict people alleviating poverty. According to the Water Resources Bureau of Guizhou Province, currently there are 13 million people who are lack of drinking water, and there are more than half counties which are short of water. In Guiyang and Anshun Cities Guizhou Province, the annual average water volume for per capita is 1457 cubic meters, which is less 243 cubic meters than the warning line of 243 cubic meters announced by the world. And annual average water volume for per capita in Guiyang City is 715 cubic meters which is less than 1/4 of the average volume. In addition, the insufficient investment of construction of water sources causes the engineering shortage of water and the increasing pollution of environment causes the shortage of water for the water quality. All these make the rock desertification areas become prominently short of water.

Decrease of arable land and decline or loss of land productivity: According to data, Guizhou cultivated land area in 1996 4903.5 thousand hectares, 2002 4699.5 thousand hectares, in 2005 4505.4 thousand hectares. Arable lands decrease, 80% cultivated lands are slope steep barren low cultivated land, in which per capita share of grain is below 300 kilograms cordon. Population is seriously overloading, reaches 47.35%, that make local peasants destroy forest. Slope high proportion is key factor caused low food production, instability, soil and water loss and poverty. The newly reclaimed sloping farmlands mostly loose farming value in three to five years, even into rocky hillsides. Large amount of farmland are universal and steep, coupled with frequent heavy rains, fertile soil of surface land was eroded, then land productivity reduced, agricultural economy at a lower level. Extensive management and backward production accelerated the rock deserted speeding and land resources reducing, which make the local farmers into “reclaiming - rock desertification - reclamation again - rock desertification” the vicious circle, eventually lose living conditions, form poverty.

Severity of disaster of drought and flood: Karst rock desertification area is the main inducement natural disasters, it not only damaged originally extremely vulnerable ecological environment, but also reduce the ability to resist natural disasters, causing drought, floods and other natural disasters, a serious threat to people's life and property security. In 2003 humankind's economic losses was more than 3 billion yuan, the area of crops of drought was 10,960 thousand mu, unproductive 1240 thousand mu, direct losses from drought 22.1 billion yuan. Meanwhile, floods happened in some regions, which resulted in 84 people dead, 3783 thousand mu crops flooded, direct economic losses 860 million yuan. During January to June in 2005, 80 counties affected disaster in different degree, disaster-affected population 11.34 million, 42 people dead, 2 people lost, 740 people injured, 531 thousand hectares crops affected, 80 thousand hectares crops unproductive, 3873 houses collapsed, 141 thousand houses damaged, 82.8 thousand victims migrated, 592 large animals dead, direct economic losses 960 million yuan, including agricultural losses 852 million yuan.
Frequent occurrence of landslide and debris flow: A large area of mountains in Guizhou Province is steep topography and broken, cutting serious, in which soil is shallow, weak anti-erosion. Many landslides and debris flows occurred frequently during rainy season. Roads’ anti-disaster ability is poor and quantity is few in rocky mountains, and many rural roads cannot work, that is severe. Due to the occurrence of landslide and debris flows during the annual rainy season, transportation, telecommunication, power supply interrupted, impacting economic development of Guizhou. Such as June 6, 2005, floods and debris flows destroyed Qingshuixi Bridge belonging to No.210 national highway in TongZi county, causing main roads connected Guizhou, Sichuan, Chongqing broke off, then thousands vehicles stopped.

Threatening the ecological security of the middle and lower reaches of the Yangtze River and Pearl River: Guizhou is located in the watershed area of the Yangtze River and the Pearl River. Due to serious rock desertification, vegetation is sparse, rocks are bare, water conservation is degraded, water and soil loss is accelerating and the capacity of adjusting and depositing flood is obviously decreasing. In 2005, the amount of soil loss is 252.15 million tons, with an average annual soil erosion modulus of 1818-1820 tons per km$^2$ per year. Among them, the area of water and soil loss in Yangtze River Basin is 51,646.82 km$^2$, accounting for 44.62% of its total land area; in the Pearl River Basin, 21,532.19 km$^2$, 35.64%. Most of the sediments inflow to the Pearl River and the Yangtze River, depositing in the middle and lower reaches of those rivers which results in river channels becoming narrow and lakes and their capacity decreasing annually and the capability of depositing and draining flood decreasing either. All of these directly threaten the ecological security of areas of the middle and lower reaches of the Pearl River and Yangtze River.

1.5 Evolution Tendency of Rock Desertification

Since the 1980s, enclosing the hills for natural afforestation, converting farmlands to forest, planting trees for afforestation and other measures have been implemented to rehabilitate for rock desertification in Guizhou Province. But due to the complexity of rock desertification genesis, the rehabilitating effect is not good as a whole displaying a situation of improvement in some areas but acceleration as a whole. According to comprehensive analysis on current situation of rock desertification, the evolution tendency of rock desertification of Guizhou Province is that the area of intense rock desertification keeps stable nearly, that the area of slight and moderate rock desertification increases as a whole and that the area of no rock desertification displays a decreasing tendency. Areas with acceleration of rock desertification or low improvement mainly centralize in poor mountainous areas, mining areas and other areas with strong human activities. Rock desertification areas in the whole province is facing a dual pressure of poverty and deteriorative eco-environment, as a result, alleviating and solving the poverty is key to rehabilitation for rock desertification.
2. Preliminary Assessment on Rehabilitation Work for Rock Desertification

Under national support, aiming at vegetation deterioration, water loss and soil erosion, and land deterioration eco-environmental problems in karst rock desertification area, Guizhou province has implemented serial projects concerning rock desertification rehabilitation in succession and intensified integrated rehabilitation about mountains, rivers, forests, fields, roads, grass, marsh. Among projects implementation integrated rehabilitation has gained great achievement, the currency of eco-environmental degradation has been retorted ultimately, eco-environmental condition in all over the province has been improved better, many successful experience and failures have been achieved.

2.1 Current Situation and Measures of Rehabilitation for Rock Desertification

Forestry ecological construction and rehabilitation: Rock desertification is caused by the destruction of forest vegetation and soil erosion. Accordingly, the restoration of forest should be the core and the key of rock desertification integrated rehabilitation. Through the construction of forest protection and forest vegetation, the forest and grass vegetation and the regional ecology of rock desertification areas in Guizhou has been increased and improved. The rock desertification integrated rehabilitation in Guizhou Province has completed an area of 1377 km² by the August of 2010. During “The 11th Five” periods, the province's forest coverage increased by 1% per year, ecological conditions have been significantly improved, soil erosion has been initially curbed, water conservation function of forests has been fully reflected and the farmland have been strongly protected. Through combination forestry building with poverty alleviation, the income of farmers has been improved. Adhering to “Building Forest and Richening Farmers” guiding principle, Guizhou province combined the implementation of the forestry building with poverty alleviation, readjustment of the industrial structure in rural areas and the village green landscaping has formed into special economic mode according to local conditions. 520 thousand mu of Chinese traditional medicines bases, 250 thousand mu of tea bases and the province's forestry output value of nearly 23 billion have been achieved in the process of rock desertification control. Forestry is becoming new way of employment and richening for farmers in Guizhou rock desertification areas. By typical research and fixed demonstrating sites, we have summarized and put forward a number of plant materials and successful model of governance. Through fixed demonstrating sites, a group of epipetrous, chalk-loving, high-temperature and drought-enduring among local tree species have been selected, successfully explored a number of ecological and economic win-win effective control technology and mode for forestry such as planting modes of honeysuckle, pepper, cedar, oak and other plants in Liupanshui, Southwestern Guizhou and Bijie area, which has provided effective technical reference for rock desertification rehabilitation in Guizhou. Great social benefits and national eco-awareness have been formed and promoted. The ecological and economic benefits of forestry made people in rock desertification area witness the achievements brought by forest building and cultivating desertification and experience the benefits from the development of forestry. Building and protecting forest has been the spontaneous actions and united will. The modes of production and life have been improved fundamentally and that eco-conscious concerning green loving, protecting and enlarging has been becoming. The effective implementation of the ecological construction and ecological restoration has layed solid ground for karst rock desertification integrated rehabilitation and steadily promoted ecological barrier construction of the "Two Rivers" upstream.
**Water conservancy and soil conservation works:** The shortage of engineering water in Guizhou is prominent, the effective irrigation areas are less. Guizhou Province, always paying attention to quality awareness and combining "Open Source" with "Closure", through a number of large irrigated areas, dangerous reservoir management, "long project ",and drinking water projects, always put water conservation work into the throughout work of ecological management. According to the information from Department of Water Resources, all over the province, 240 ponds were refurbished and 4451 gullycontroldams,1040 sediment dams,13480 reservoirs, 2,070.43 km cut-off drains were built ,meanwhile erosion control area of 23,041.78 square kilometers were completed. Stabilizing the protecting area of cultivated and irrigated land constantly and taking soil erosion and desertification into control effectively, played a strong role in basic support and protection for social and economic sustainable development in Guizhou.

**Construction of basic farmland:** High mountains and steep slopes in Guizhou, result in which that sloping land has a large proportion in cultivated land. According to local conditions, specific guidance, comprehensive management, around the object that half an acre of effective irrigation in 2010 in the rural per capita farmland, highlighting the 6 ° ~ 25 ° slope land management focus, through terracing, dry changing into water, broken to changing into whole, the new land opening and other measures ,we tried to explore gardening farming in dam areas. According to data from the Agriculture Department and Agriculture Construction Office of Guizhou Province, 2,501.87 million yuan was totally invested in the whole province, 8057.5 thousand mu farmland were effectively treated, accounting for 26% of the total area of arable land of 6 ° ~ 25 ° slope land. Through a serial of constructing measures for basic farmland, in accordance to the principle that “Treat a side of the slope, Keep a dam field and Rich a part of people”, change " Running in three land, " into the " Keeping in three land", aim at improving land quality and get the effect that “Be convenient for cultivating, Keep soil and fertility, Drainage and drought, Stablize and increase productivity”, so that avoid soil erosion and rock desertification effectively.

**Construction of Biogas:** The consuming style that “Ask firewood for mountains” is the important key that keeps biology construction of Guizhou Province slow. Therefore, the Guizhou Province regarded the rural construction of biogas as one of 10 practical matters included in the work schedule in recent years, from 2000 year to the June of 2005 year, 540000 biogas digesters had been built in the province, 1400 thousand tons of fuelwood had been saved annually, equivalent to 2160 thousand mu of forest land avoiding to be cut off. Gradually form into a new pattern of Agricultural Production - Energy – Environment, increase and promote agricultural savings and efficiency ,improve the standards and quality of local residents, adjust the province's energy structure in rural areas effectively, become one of the important safeguards that consolidated construction achievements of returning farmland to forests, protecting natural forest.

**Residence changing for alleviating poverty:** Poverty is an important factor that worries ecological construction and economic development of Guizhou. Because of the practical condition that Guizhou has a large area and depth of poverty, Guizhou Province adheres to the principle of unified planning, the voluntary and local conditions in carrying out poverty-relief activities ,takes the style that "Scatter the big, Concentrate the small " etc, and bings vigorously the relocation of measures for poverty alleviation into effect, relying on small towns and tourism (Xiong Kangning, 1999). According to statistic, Guizhou has got 210 thousand poor people removed by planning from 2001, educing the pressure from population on the environment, thereby speed up the pace of ecological reconstruction.
Ecological agriculture: Guizhou has a great mountainous area, the agricultural ecosystem of which is vulnerable. Since 20th century 70 years, Guizhou Province has always adhered to the principle of harmonious development between economic and environment, absorbed in all kinds of successful experience about agricultural mode of production, and according to the principle of ecology and ecological economic, combining with the actual local resources and regard the construction of biogas as a link, has launched the extension work on ecological agriculture demonstrations, established recycling economic model, such as "Pigs - Biogas - Wild pepper ", "Pigs - Biogas - Fruits", "Cow - Biogas - Food " etc (Zou Xixia et al, 2009). Currently, there are 9 state-level ecological demonstration zones , 2 national eco-agriculture demonstration counties and 250 eco-agriculture model villages. Efficient implementation of ecological agriculture demonstration projects has played a strong role on promoting the recycle of biological resources, the formation of virtuous circle about ecology and economic, and the realization of sustainable agricultural development in Guizhou Province.

Ecological animal husbandry: With a warm and humid climate, the condition on growth of herd and animal feed production is excellent in Guizhou, it has a low cost on livestock and is abundant in animal variety, which is adaptability and has a great resistance against disease, a short term, and the fleshy is excellent. What the introduction of national de-farming and restoring forest policies, " the regional cooperation of " Pan-Zhujiang Delta " and the establishment of ASEAN Free Trade Area, provide the development of ecological animal husbandry in Guizhou a historic opportunity and expand livestock markets of the domestic and international. More than 20 projects such as" Technical service projects of grass seed breeding farm in Guizhou", "Ecological research projects on animal husbandry in Guizhou", "Grassy mountains and slopes developed in southern China " and "Milk aid projects between China and EU" had been performed in Guiyang, Huaxi, Anshun, Zunyi, Qinglong, Hing Yan, Xingyi from 1983 to 2005. The operational mechanism like " Pasture with farmers" "Base with farmers ", " Companies with the farmers " and "Association with farmers had been established successfully. The added value proportion of province's livestock industry accounting for agriculture has increased from 24.5% during the "Ninth Five-Year Plan to 33.3% during the " Tenth Five-Year Plan " period. With accelerating pace for the construction of ecological animal husbandry province and constantly promoting agricultural efficiency and rural incomes, the rock desertification had been effectively curbed.

Ecological Medicine: Guizhou province is one of four great traditional Chinese medicine production zones. During" Tenth Five-Year Plan " period, Guizhou Province, clearly put promoting the modernization of Chinese medicine industry as a historic opportunity which seized by the province in the western development and regarded ecological medicine as the important content of the adjustment for agricultural structure. In 2001, Guizhou was identified as "National Scientific and Technological Modernization of Chinese Medicine Industry (Guizhou) Base" by the National Science and Technology, which is a strong impetus for the development of Chinese medicine industry in the province. From 2000 to 2005, the province established Gastrodia elata, Eucommia, Dendrobium and other more than 30 production herbs bases, attracting Shenqi, Yikang, Yibai and other182 pharmaceutical companies, to Chinese medicine, and the average annual output of pharmaceutical industry which were main Chinese Medicine and National Medicine increased from 3.3 billion yuan to 8.58 billion yuan with an average annual increase of 32%.By 2005, there had been a planting area of 1100 thousand mu of traditional Chinese medicine and about 100 species of planting varieties and the traditional Chinese medicine bases had become a farmer's "green bank". The development of ecological medicine has considerably reduced the dependence of farmers on the land, effectively alleviate the
desertification rate of evolution.

**Eco-tourism:** The strange karst landscape and colorful national culture in Guizhou are important foundation for the booming tourism industry. However, because of the very fragile karst environment, it is the best choice for tourism development that taking the dual objectives of eco-tourism both economic development and natural conservation into consideration, especially in some ethnic minority tourist destinations. In 2000, embarking on a tourism product structure adjustment and following the principle of eco-appropriate, the province gradually adjusted visiting tourism in the past to the compound tourism, the representative of which are tourism eco-tourism and cultural tourism, combined the tourism development with promoting ecological construction and local farmers anti-poverty, and promoted pro-poor tourism and tourism enriching career. During "Tenth Five-Year Plan " period ,Guizhou province laied emphasis on eco-tourism development, so that a series of eco-tourism projects such as the "Virgin Forest Tourism " in Libo Zhang Jiang Scenic Area, "Natural Scenery Tourism" and “Rhododendron Viewing in hundreds of miles ” in Fanjingshan were built to achieve the sustainable development of tourism and ecological environment in Guizhou.

### 2.2 Process of Rehabilitation Projects for Rock Desertification during the Eleventh Five-Year Plan

#### 2.2.1 Introduction to Pilot Counties for Rehabilitation for Rock Desertification during the Eleventh Five-year Plan

Karst rock desertification project in Guizhou karst area is complex, integrated system engineering, considering the current situation and country's financial possibility. Recently, we should concentrate on performing governance pilots, stress the focal points, and take the way that combining points with the entire area and points promoting the entire area ,keeping projects advancing orderly. According to the overall arrangement of "Outline of Karst Rock Desertification Area (2006 ~ 2015)," 55 pilot counties have been selected as representative pilots ,during the period of the "Eleventh Five-Year", in which special funds were arranged and investment was increased, the purpose of which is establishing effective coordination, integrating various funding channels available, striving to explore a set of comprehensive management model of rock desertification ,and to create conditions for promoting rock desertification treating projects during the "twelfth five-year plan".

During the 11th five-year plan, the principles for selection of counties of rock desertification treatment in Guizhou are following: The first is those places in which rock desertification is serious , the rate exceeds a certain proportion , the extension speed of rock desertification is very fast ,and which has constituted of great effect for the production ,life and the development of society and economic of local farmers. The second is those places which has a lagging rate of economic development, a lower farmers' income, a high population density, and self poor management ability. The third is where the treating mode is comparatively mature, the relevant departments of the state have a certain work foundation in the local, and the governance during the "11th five-year plan" period can get very successful achievement. The fourth is that those places should have certain representative condition and can cover different distribution types of rock desertification in province. The fifth is the important ecological location, which has certain influence on the national ecological construction. The sixth is in those places local governments take rock desertification comprehensive treatment seriously, has a better cadres and masses foundation with high enthusiasm, work solidly and can arrange properly state funds.

According to the above principles, taking such factors as the rock desertification status in Guizhou (state,
city), extension condition, damaging degree and the level of economic development into comprehensive consideration, the determined pilots concerning 55 counties of 9 states such as Guiyang, Liupanshui, Zunyi, Anshun, Tongren, Zunyi, Tongren, Southwestern Guizhou, Bijie, Southeast Guizhou and South Guizhou. And the total land area of which is 12.36×10^4 km^2, including 8.79×10^4 km^2 karst area and 3.23×10^4 km^2 rock desertification area.

2.2.2 Contents and Scale of Pilot Construction

(1) Uction Contents and Scale by National Special Funds

During the period of "11th five-year plan", all the pilot construction contents on which national rock desertification comprehensive treatment pilot special funds are put include: closing hillsides for afforestation, artificial afforestation, grassland construction, development of plant-eating livestock and terracing and matching projects of small water conservation. By the local counterpart funds using, we have been continuing to speed up the construction of rural energy, developing renewable energy, steadily promoting poverty alleviation relocating and labor export, exploring and utilizing resources reasonably, developing regional economy and improving monitoring systems for the rock desertification treatment.

Vegetation protection and construction: Plan to build 127771hm², closing hillsides for afforestation, 112181hm², artificial afforestation, including 11670hm² shelter-forest, 19087hm², water and soil conservation forest, 1417hm² fuel forest and 80007hm² characteristic economic fruit-bearing forest.

Grassland construction and plant-eating livestock development: plan to build 80398hm² grassland, including artificial 27320 hm² planting grassland, 53078hm² improved grassland, 10.11 thousand livestock, 50.55×10^6m² covered pen, 1.01×10^4 set forage machinery, 60.67×10^4m³ horizontal silo.

The basic farmland construction and the development and utilization of water resource: Plan to build 16248 hm² terracing and construct 521km production field roads, 372 km aqueducts, 274 km drainage ditches, 1434 block sand dams and the water and soil conservation facilities of slope and gully. Arrange to construct 265 kilometers diversion for springs point water, 158 pumping stations, 13336 small pools (supporting settling basin) a, and 13051mall water cellars.

The management area that concerning national rock desertification control special funds is 3366 km²

(2) Construction Contents and Scale by Other Existing Investment Channels

During "11th five-year plan" period, on the basis of national special funds being arranged in conducting pilot counties for rock desertification integrated treatment, we still need stablize and integrate existing various channels of rock desertification control capital channel and continue to put more efforts on the implement of surface treatment.

According to “The 11th five year plan of national economic and social development in Guizhou Province”, “The propulsion plan for Guizhou’s ecological animal husbandry (2008 to 2012)”, “The construction of providing work as a form of relief in Guizhou during the 11th five-year plan”, “The special plan for agricultural development in Guizhou during the 11th five-year plan”, “The special plan for ecological construction and forestry development in Guizhou during 11th five-year plan in Guizhou”, “The special plan for water conservancy development in Guizhou during the 11th five-year plan” and “The special plan for land
resource utilization and protection in Guizhou during the 11th five-year plan”, the ecological construction projects of the whole province have been already issued released by Development and Reform Commission, Agricultural Bureau, Forestry Bureau, Bureau of Water Conservancy and Land and Resources Bureau in Guizhou Province during the 11th five-year plan are planed to be:

Development and Reform Commission: Build $33.33 \times 10^4$ hm$^2$ artificial grassland, $8.53 \times 10^4$ hm$^2$ basic farmland and $30.33 \times 10^4$ hm$^2$ small watershed integrated treatment area.

Agriculture department: Construct $16.67 \times 10^4$ hm$^2$ basic farmland, and $11.67 \times 10^4$ hm$^2$ karst region for grassland treating.

The forestry department: Achieve the construction of $46.67 \times 10^4$ hm$^2$ characteristic economy and fertility timber forests, the conservation project for $49.34 \times 10^4$ hm$^2$ natural forest, and $10.33 \times 10^4$ hm$^2$ shelter-forest of the Pearl River during the second phase and continue to consolidate the $104 \times 10^4$ hm$^2$ area of returning the grain plots to forestry projects from the results of the “tenth five-year period”.

Water conservancy department: Build $52.07 \times 10^4$ hm$^2$ soil and water conservation project.

Land and Resources Bureau: Build $3.20 \times 10^4$ hm$^2$ the arrangement and reclamation land and not using land.

From the above situation, the capacity of other existing investment channels were $5522$ km$^2$ management area in rock desertification pilot counties, which could completely satisfy $4239$ km$^2$ governance area of pilot counties required for integrated treatment in the face.

(3) Total Construction Scale of Rehabilitation for Rock Desertification during the Eleventh Five-year Plan.

During the period of "11th five-year plan”, the special management area of national rock desertification control was $3366$ km$^2$ and the other management funds in the rock desertification control pilot counties was $42,397,605$ km$^2$. Adding those two areas, the total rock desertification control area during the 11th five-year plan period in Guizhou were $7605$ km$^2$.

2.3 Experiences and Lessons of Former Rehabilitating Work for Rock Desertification

(1) Rehabilitating Experiences

Adhering to forestry construction is the main part of integrated rehabilitation in karst rock desertification: The formation of karst rock desertification is the destruction of forest vegetation, and the intensification of soil erosion. Therefore, the restoration of forest vegetation should be the key to rock desertification rehabilitation and forestry construction is the main part of the comprehensive management of rock desertification. The functional position of forestry in the most important function of rock desertification control is the ecological function and the function should most be enhanced is enriching features. In the process of forestry construction in karst desertification areas, we should base on different rock desertification levels, regard ecological construction and improvement of living and income of local residents as the key, put the Pearl River and Yangtze River as the central axis, take piece type, network type and organized type as the layout of forestry ecological construction, create multi-level, diversity, multi-functional green barrier and concentrate on building east, west and middle of Guizhou the three forest ecological system. While develop a
complete set of forest tenure reform and forestry industrial system, extend the industrial chain and increase the economic benefits of the industry, promote the enthusiasm of people getting rich in karst rock desertification areas and local economic development and build long-term mechanism and stable mechanism of forestry development in rock desertification areas.

**Adhering to comprehensive management of the small watershed area, integrating development into governance, and promoting rapid economic development in river basin:** Constructing comprehensive management in small watershed area is the experience of controlling soil erosion in decades, particularly for the mountain areas of Guizhou. In the Measures and models of treating we should change the single measure into the integrated approach and the passive protection management type into the positive development governance type, and seem the development of small watershed economy as the goal and the improvement and transformation of sloping land as a breakthrough, at the same time construct vigorously basic farmland, so as to achieve development in governing and promotion of developing in governance.

**According to local conditions, barriers making against hazard and scientific planning, and develop the right counter measures for government:** Many years’ successful experience of ecology and environmental governance at home and broad lay the theoretical foundation of water and soil conservation in karst areas, rock desertification comprehensive control and ecological rehabilitation. With large undulating terrain, complicated geological conditions and the different characteristics and status of rock desertification around Guizhou Province, the control measures and methods can not be stereotyped. Only by following the natural law and rules and according to local conditions, barriers making against hazard and scientific planning, seizing the main problem of ecological environment, implementing appropriate farming for farming, appropriate forestry for forestry, appropriate livestock industry for livestock industry and appropriate fishery for fishing and controlling rock desertification in the most economical and most effective way is the best choice for rock desertification comprehensive management.

**Leaders’ value, the coordination among various departments and public participation:** To safeguard operations of rock desertification control smooth, we need leaders’ attention, the division of labor and cooperation of different departments and public participation, and work together to deepen the management of rock desertification in Guizhou.

**The joint research and division of labor among multi-disciplinary and different departments:** Karst rock desertification is a huge systematic project involving many disciplines and research projects, must rely on key projects and multi-project integration, need the joint research of multidisciplinary and multi-departments and increase the technological content of research projects to find effective means and measures for governance, rehabilitation, reconstruction of ecological environment.

**Multi guide and investment increasing:** Rock desertification control needs multi-boot and investment increasing, integrating the strength and resources from all source, and actively establishing a diversified investment and financial system. Put the rock desertification control into national key ecological projects such as returning farmland to forest engineering, soil and water conservation and other major of ecological engineering countries and areas, and promote rock desertification treatment.

**Taking the operation of “Government, experts, farmers and company”**: The participation of government
in project implementation can ensure the concrete implementation of some elements in the project; experts in
the dominant position of project implementing could ensure scientific and technological content and
effectiveness; farmers is the final project implementers, beneficiaries and the key to success; the company's
participation can make rock desertification control based on the condition of province, people and market
price for industrial positioning, value proposition, market position and focus on the topic “enriching farmers”
to do large-scale farming, extend the industrial chain, and form into large industry.

(2) Rehabilitating lessons

① The support of research investment and technology is not enough, and now some implementing plans of
rock desertification control is not scientific, with a low capacity technology and relatively low quality of
construction.

② Lacking in good ecological economic breeding native species of, and the potential quality risks of
inducing a forest tree seedlings, such as walnut etc. is high, which lays hidden problems for farmers to get
rich.

③ For factors such as catching the working terms and utilitarian, the situation that not following the plan and
the implementation of the program have occurred sometimes, so some of the implementation of programs
should be revised. Because of the huge difference between the investment and the actual needs, large number
of individual projects is difficult up to standards and regulations of implementation required, even if
reluctantly lowering of standards implementation is also difficult to achieve the desired results. When the
projects completed, they the results are often difficult to be effectively cemented because of lacking of
necessary funds for management and protection.

④ Lacking of the necessary response to natural disasters and especially un-closely joint of water conservancy
construction, ecological construction and rock desertification control, the years’ results of ecological building
suffered serious damage from the rare drought in 2010. For example, from the last fall to the spring of this
year, Liupanshui have suffered a sustained high temperature and drought in history, because of long duration
and wide range of the droughts, in addition to the city's shallow karst mountain soil and poor water-retention
capacity, which have resulted in the huge damage of large numbers of afforestation and seedlings, with an
damaged area of $116.23 \times 10^4$ mu and economic losses of 340,332,600 yuan. Which has directly affected the
survival and progress of closing hillsides for afforestation, economic forest, protection forest and artificial
garss in the pilot project of comprehensive treatment ,and brought a loss of 8.53 million yuan, so has leaded
to that the completion time will be postponed to next year.

2.4 Preliminary Conclusion and Assessment on Former Rehabilitating Work for Rock
Desertification

Rock desertification treatments are based on the ecological system’s characteristics and the benefits of
ecology, economy and society. These experiences have combined the eco-environment construction and
anti-poverty. Former treatments have recovered some vegetation and the environment of rock desertification,
established some powerful radiation demonstration zones. The treatments have good effects on local society
development, peasants fortune making, fragile eco-environment balance and the extend of rock
desertification. For example, Haozhang county of Bijie area have use remarkable quality walnuts to develop
the walnut industry. Combined with returning farmland to forests, water and soil conservation, scientific and
technological aiding poverty and other measures, this walnut output has break 5 million kilograms, with value more than one billion yuan. As result, Haozhang county has been chose as “the Standard Demonstration Zone of National Walnut Forestry” and “the Hometown of Walnut in the PRC”. This county has established a walnut milk enterprise with 6000 tones output per year, which extend the industry chine and added the added value successfully. Base on these facts, we can make a summary for the rock desertification treatment, which has begin from last eighties:

① Karst area is a fragile ecological environment, not the rock desertification, but a natural phenomenon, including the geochemical processes and topography which formed by the erosion of water to in carbonate. However, rock desertification a natural disaster, is the process of contradictions in karst area between people and land, which is mainly caused by the imbalance between people and land.

② Rock desertification is the unity of the process and result, which has a different spatial distribution in the degree of strength and different difficulty in recovery and management work Only by the scientific division of rock desertification, can we accurately identify the status of desertification and carry recovery and management projects out according to local conditions in targetedly.

③ The development of rock desertification has great features and patterns of itself and the concept of rock desertification has a kind link with forest cover and soil erosion area, but a not necessarily logical association. The rock desertification control must be integratedly treated by taking agriculture, forestry, water, animal husbandry, ecological migration and development, rural energy construction and regional economic development etc, and in the process of treatment, the idea that the comprehensive prevention and treatment combined with anti-ideological should be reflected.

④ The technology invested in rock desertification control in Guizhou Province is not enough, and the basic scientific research, integrated research of demonstration and the promotion of advanced control technology are relatively weak and inadequate, which are very limited for scientific and technological support of rock desertification treatment. This weakness is reflected in both the not enough capital investment and the less participation and input of scientific and technological strength.

⑤ The increased rate of rock desertification in Guizhou Province has been significantly lower, but still slowly upward inclined; rock desertification control is still a long, arduous task and to curb fundamentally the growing trend of rock desertification and deterioration of ecological environment still needs continued investment from state and local.

⑥ At present, the subsidy of rock desertification control unit is 20 yuan /km2 from central, and this standard is based on the original construction of the central subsidy standards, and taken the national financial resource into consideration. But given the current price level, it is recommended that investment in rock desertification control efforts should be further increased and the integration of efforts should be also further increased around the Guizhou Province to ensure the overall efficiency of investment.
3. Strategy of Rehabilitation for Rock Desertification

3.1 Guiding Principles

Has a direct bearing on people’s living standards, rock desertification is the important component of Guizhou Niangjiang green shelter. Rock desertification treatment has caused close attention of the Central Committee, the State Council and Guizhou Provincial Committee and the Provincial Government. The proposal for Twelfth Five-Year Plan of Guizhou national economic and social development made by CPC Guizhou Provincial Committee has proposed overall progress of the rock desertification comprehensive treatment.

In the comprehensive treatment experimental of rock desertification of Guizhou, some principles should be abided: sticking to integrated planning and comprehensive controlling, keeping ecology and protection be first, positioning on local conditions and guiding on different species, insist on ecological improvement combined with economic development, exploring a long-term mechanism of projects, respecting reality and promote all measurements harmony. All the following respects should develop coordinately: rock desertification treatment, industrial structure readjustment, local economical development, shaking off poverty and getting rich, industrialization and urbanization. Ecological construction and economical development, present and future, the parts and the whole, development and protection, all of the relationships should be handle property.

3.2 Periodic Strategic Goals and Tasks

According to national plan outline (2006-2015) on rock desertification, Guizhou province should control rock desertification area $177.26 \times 10^4 \text{ hm}^2$ during 2006 to 2015, in other words $17.73 \times 10^4 \text{ hm}^2$ every year. At this rate, from 2006 to 2020, Guizhou would control $265.89 \times 10^4 \text{ hm}^2$ rock desertification, which is 80.33% of the whole area of this province. Beside the controlled $41.78 \times 10^4 \text{ hm}^2$ rock desertification from 2008 to 2009, the area which will be controlled from 2011 to 2020 is $224.11 \times 10^4 \text{ hm}^2$.

— From 2011 to 2015, newly added rock desertification and soil erosion area is $160.71 \times 10^4 \text{ hm}^2$, with rock desertification growth rate is about 0% and the whole worsen trend could be control elementary.

— From 2016 to 2020, newly added rock desertification and soil erosion area is $63.41 \times 10^4 \text{ hm}^2$, with rock desertification growth rate within -1% and the worsen trend could be turned. Moderate and over rock desertification grade could be redacted in some degree. The production and living conditions of local people can be improved and the beneficial cycle of ecology-economic system could be achieved.

In 2020, most area would be contained on the whole, and the whole trend of the worsen ecology could be turned radically. The structures of land use and agricultural production would be optimized constantly. Animal husbandry and specialty industries develop, the living standard increase steady, the whole rural economy steep in sustainable development orbit.
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5. Energy Construction in Rural Areas

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<td>Hydroelectric Power (kw.)</td>
<td>114000</td>
<td>114000</td>
</tr>
<tr>
<td>Biomass Pool</td>
<td>1601582</td>
<td>1601582</td>
</tr>
<tr>
<td>Firewood-Saving Stoves</td>
<td>1601582</td>
<td>1601582</td>
</tr>
</tbody>
</table>

6. Poverty Alleviation Moving and Labor Export

| Poverty Alleviation (person) | 260483          |
| Poverty Alleviation (householder) | 57886         |
| Labor Train for Transfer (person) | 1358094      |
| Labor Export (person)        | 1358094        |
| Total treatment area         | 2241100 1859379 381721 100.00% |

3.3 Strategic Layout

In the forest construction progress of Guizhou rock desertification, the whole work should base on the different grades of rock desertification, with the work key on ecology construction and local people’s living standard’s increase, axis on Zhujiang and Changjiang. The ecology construction layout takes type of strip, network, cluster, creating a multi-level, multi-function and diversity green ecological shelter, concentrating the efforts on the construction of the east, west and middle part of Guizhou forest ecological system.

1. The east area should focus on rock desertification treatment, restoring the vegetation as soon as possible. The rock desertification grade of Bijie, Liupanshui and Qianxinan area are high, the whole region ecological environment is worsen, these areas are the key constructed area of upper reaches of Changjiang and Zhujiang soil erosion work. Therefore, ecological treatment should be improved with strictly ban of forests to restore. Increase the force on returning cultivated land to forest and afforestation in the waste mountains to restore original ecological functions and to build a soil and water conservation system with main function on control soil erosion.

2. The middle part of the whole area should focus on development as well as treatment, making development promote treatment. The middle part of Guizhou province is the main part of Guizhou plateau, which covers Guiyang, Zunyi, Tongren, Qiannan, Anshun area. Over cutting and cultivating on steep slope have ruined the native vegetation, making rock desertification problem poked up. The treatment work aims on the recovering the zonal vegetation, giving consideration to the ecological, economic and social benefits. Multifunction water resources conservation forests and water and soil conservation forests, which aim at restoring water would be build. When local ecological environment were improved, local forestry economy would develop as well.

3. The east part should speed up the forestry system set as an industry, exerting great efforts to promote timber stands and specialty forests industry. There is no distinct rock desertification in most counties of Qiandongnan, east part of Guizhou province. However, long-term improper cutting has lessened forests, destroying the ecological environment in some degree. Forestry raw material base of economic forests and
fast-growing commercial forests could be build to accelerate forestry development, improve added value of forest products, promote local people earnings and local economy development and guard against rock desertification happen again.

3.4 Main Point and Measures of the Strategy

(1) Main Point of Strategy
Rock desertification is progress and result of karst effect. When rain and runoff offer karst erosion effect with full exogenous force, arousing distinct land surface and underground erosion, which result in soil grain of upper layer decrease, so the soil decrease. Generally speaking, the upper sloping lands of carbonate area are seriously erosion region. In these areas, the agglutinating value the upper layer is poor, which is easily erosion by flow. When vegetation was destroyed, the density of plants root would decrease, result in physical erosion is easily happen. Gradually, the base rock would be exposed, rock desertification developed. Base on the biological vulnerability, bearing capacity of resources and social economy, and the rock desertification treatment strategy analysis of Guizhou province, this survey make the departure basic of treatment strategy as serving the region economic development and the social economic development is based on the bearing capacity of environment.

So the key strategy of rock desertification treatment should be the mild and moderate rock desertification area. And the treatment of these areas should be the one in development. However, the treatment in none and potential rock desertification area should emphasize using as well as preventing. Serious rock desertification areas are typical representation of seriously poor region in fragile eco-environment and the result of karst progress. The treatment strategy should focus on the recover of the ecology, so strict fence for afforestation, natural recover, limited explore and other comprehensive treatment should be took to promote the vegetation’s consequent succession (Xiong Kangning et al, 2002; Mei Zaimei et al, 2004; Xiong Kangning et al, 2007).

1. Mild rock desertification area: there are 22,155.76 km$^2$ is mild rock desertification area, mainly distribute in fenglin-valley and fenglin-plain area in northwest, east, northeast and some parts of Guizhou which covers 12.58% of the whole province. The land source of these area are diversified, the exploring methods are various. However, dense population, frequently human activity, large proportion of medium and low yield fields, prominent contradiction between human and land, these areas still belong to backward traditional agricultural region. Even hold some land source and major vegetation, the local people still living on land exploring. Some peasants destroy vegetation for land, or even explore steep slope for direct cultivation without any protection to keep soil, water and fertilizer. What’s worse, planting along slope accelerate soil erosion. And at poor traffic places, people cutting for energy. If people in these mild rock desertification areas keep on reclaiming wasteland by deforestation, illegal cutting and improper land use, the grade of soil erosion and rock desertification would increase.

So rock desertification treatment should concentrated on mild one, with the eco-strategy“mainly on treatment, strengthen prevent”to promote karst ecology recover and regional economy development. This strategy could promote local ecology’s positive development, turning the worsen trend of rock desertification.

2. Moderate rock desertification: the moderate rock desertification area covers 10,868.95 km$^2$ in the whole
province, which sizes 6.17% of Guizhou. These area main distribute in south, southwest, some parts of northwest and few parts of northeast of Guizhou fenglin-mountain, fenglin-valley and watershed of plateau areas. Karst progresses are typical in these areas, valleys, ravines and steep slopes developed, forming original fragile environment. On the other hand, local people explore the land by firing original shrub and forests. Without plant roots fix, soil erosion will speed up, the bearing capacity of the environment would decrease. In history, it is that slope plowland has play an important role on solving local people’s living. However, over cultivation would make soil erosion and rock desertification worse in the ecology point of view. Without plants’ cover, plowland would be easy erosion during rain, forming poor soil and rock desertification, even slip, mudflows and other natural disasters.

So moderate rock desertification area is the work key of the treatment of the whole province, the strategy is concentrate on eco-strategy, which need improving eco-environment and people’s living as well as increasing peasants’ income, turning the moderate rock desertification area’s eco-environment for the better obviously.

3. None and potential rock desertification area: the area of none and potential rock desertification area of Guizhou province covers 34,026.58 km², which sizes 19.31% of the whole province. Distribute on hill and intervals, basins and plateaus, these areas main covers on middle, northern, northeast of Guizhou, which. With long explored history, convenient traffic, rapidly developed urbanization, dense population, concentrated land, high cultivation index, certain scaled intensive farming, as the bread basket of Guizhou, these areas’ commodity economy developed well. However, the land use of present has serious disorder: on one hand, the extending of town and the construction of market and development zone occupies a mass of fertile fields, especially those limited karst plain; on the other hand, in order t solve land problem, people reclaim steep slope and destroy forest for land, which lead to slope land increase. Although there is no distinct rock desertification, difficulty utilized land still existed, which mainly located on the grass slope of middle and lower parts of mountains, once destroyed, difficult to control.

So the treatment strategy of none and potential rock desertification of karst area concentrates on protection and prevention, insisting on using and prevention. The region slope no more than 15°, agriculture industrialization should be accelerated and efficient crop production should be developed. The other region should grow forests to increase tree storage and accelerate the high added value of the forestry to promote mountain area sustainable development. Combined with the Innovation of Forest Poverty Right System, property land use and the adjustment of industry structure, a eco-assurance system should be set up. Base on the law of market economy to reform the operation mechanism, promoting regional sustainable development. At the same time, guarantee people of mountain and plain areas have solid steep on fortune making, and make sure the eco-environment keep green at none and potential rock desertification area.

4. Serious rock desertification area: the area of serious rock desertification area of Guizhou covers 4,572.65 km², which sizes 2.60% of the whole province. These areas mainly distribute in fenglin-depression and fengcong-valley areas in west, southwest, south parts of Guizhou. At these places, stone hills covers around while small plain are hard to find, as serious soil erosion, rock desertification has developed well. The whole environment has extremely depredated. The relationship between human and environment has serious imbalanced, forming a vicious cycle “poverty—plunder sources—environmental degradation—further poverty”. Lacking of water and soil sources, a slide of water and soil can never raises a slide people, leading to eco-environment collapse and forming the extremely poverty.
So the strategy of serious rock desertification area should concentrate on ecology recover, taking strict forbidden, natural recovering, limited exploring and other comprehensive treatments to promote vegetation consequent succession, to repair ecology system and its original function, and to turn the whole trend of the rock desertification of the local area.

(2) Strategic Measures

—— Overall planning, comprehensive treatment; emphasizing key points, step-by-step implementation: unified planning, executing by various departments, combine biological, engineering and technical measures tighter for comprehensive treatment. Taking the method of combining the particular point with entire area, using the experience of one point to lead entire area, the project should emphasize key points to promote orderly control, getting “treatments take on serious, success in all”

—— Ecology first and development should take into consideration as well, measurements work on local conditions and rational deployment: local economy development and the treatment should take on at the same time, finding ecological economic development outlet for rock desertification area, at the same time holding on achievement. The whole project should insist on fence for protection and open for development combine together, promoting ecological recover by ecological measurements, and accelerating the outcrop of land and source bearing capacity by engineering measurements. We should take full understand on dual nature of forestry on public benefit and basic industry, especially on potential and mild rock desertification areas. Undertook the tasks of ecological building and forests products supply, forestry takes head position of the rock desertification treatment of Guizhou. So, we should take particularly attention on forestry, accelerating its industry construction by the help of the Innovation of Forests Poverty Right System.

—— Central government supported, with multi-investment, policy guide with all people take part in. The project should be remains on central specific fund, meanwhile, present capital channel should be stabled and multi-investment objects’ various sources should be integrate, making sure the treatment further development. At the same time, the whole work should close associate with the development desire of local people and take full respect on peasants’ wish. During improving cadres’ eco-treatment cognition to motivate them take part in the treatment work, rock desertification treatment could transfer from particular department arrangement to whole society involved.

—— We should take science and technology as support, make efforts to promote technology, and act according to laws and rules, that is to say, in accordance with the idea of testing first and promoting after demonstration, we should select and integrate a model with remarkable ecological benefits as well as economic benefits, which requires enhancing application of new technology. To establish appropriate rules and regulations, as legal basis, is the primary task of the whole project.

—— Strength on leadership, define well in responsibility, departments corporate: all the levels of government should set up a particularly lead team with main leader and sub-leader, holding joint session of rock desertification control to solve the problems in the treatment timely. Also, engineering technical guide team, inspection team, logistical team and so on should be set up to make sure the measures have carried on. In addition, the responsibility of difference departments should be carried on timely as well as the construction task and founds. Well system and mechanism should be set up to standardized the work’s going on, making sure the rural development, rock desertification treatment, returning farmland to forest, natural forest
protection, water conservancy project build, soil and water conservation and other projects’ fund can be integrated well to devote max treatment effect.
4. Technological System and Modes of Rehabilitation for Rock Desertification

4.1 Rehabilitating Principles

(a) Follow the principle of sustainable development strategy, set the forest coverage in rock desertification area as the main objective with considerations on concentrated treatment, ecological benefit, ecological benefit and social benefit.

(b) Follow the principle of combine with the adjustment on patterns of different industries and calculation on the new main industries.

(c) Stand by the principle of scientific and technological progress. Play a full supporting role on scientific and technological in rock desertification treatment, use advanced, mature scientific technology in rock desertification treatment, explores new technology, measurement and craftwork possibly.

(d) Follow the principle of high standard and quality to organize construction. Pay attention on actual effect.

(e) Follow the principle of combine with collective forest ownership. Business Entity should be clearly defined and it should be the proprietor of the land.

4.2 Rehabilitating Technologies

As a serious poor area example, in the area of strength rock desertification, with the imbalance of the relationship between human and environment, lack of the basic life condition, local farmland cannot feed local people; therefore this area has become the example of lifting themselves out of poverty with environment emigrants. So that, ecological strategy of nature restoration has carried out ecological immigrants, forest conservation artificially, ecological integrated treatment modern of karst ecological tourism to carry out the integrated technology planting trees on stone mountains, explosive planting and punching bag irrigation.

In moderate rock desertification area, where still in development circumstance, excess reclamation is the main reason of aggravated water and soil loss and rock desertification. The ecological strategy with the main idea of manages, has controlled the situation and develops virtuous cycle. The ecological treatment mode of returning land for farming to forestry, ecological forest, and grassland agriculture has been carried out to select plant and deploy quick mature, economic and high efficiency plants, animals stable breeding, feed animals scientifically and product marching.

In slight rock desertification area, there are various kinds of land resources and explore methods. Now the backward traditional agricultural area of densely inhabited district, feeding and clothing problem has depend on land exploitation and development. Therefore, the main ecological strategy is treatment and defense to follow the integrated treatment mode of ecological agriculture, courtyard economy to carry out slope to terrace, low yielding field alteration, fodder variety selection and high yielding technology, mash gas tank construction and utilization, pond and cistern construction and pipeline system construction, rice irrigation, drought land irrigation, trickle agriculture, etc.
4.3 Rehabilitating Modes

According to the fragile eco-environment, serious contradiction between man and land, large area of rock desertification with serious degrees, slow social developing speed and low rate of economic growth in karst mountainous areas of Guizhou Province, modes and technologies for rehabilitating rock desertification were put forward (Sui Zhe, Xiong Kangning, 2010).

4.3.1 Modes guiding by comprehensive rehabilitation for rock desertification and ecological agriculture

Theoretic foundations for modes: with comprehensive consideration of natural resources, situation of economic and social development, degrees of rock desertification and other factors in rock desertification areas, and of combination developing direction of regional agricultural production and land-use plan, taking restoration of forests and grasses as a main goal, ecological and special agriculture are mainly developed in those rock desertification cultivated lands with high level of assessment in land resources, which will promote orderly development of ecology and economy and their dynamic balance. These modes combine rehabilitation of rock desertification and adjustment of agricultural industry together, including compound mode of three-dimensional agriculture and forestry, mode guiding by forest, fruits and medicine, mode combining forestry with animal husbandry, mode combining animal husbandry with agriculture, mode combining agriculture with animal husbandry and other compound ecological agricultural modes combining forestry, grains, animal husbandry, grasses and bio-gas together, which will promote to form an agricultural system featured by “forests taking mountains as roots, mountains taking forests as support, water taking forests as source and grains taking forests as foundation”.

Technological methods for modes: fruits trees, medicine plants, herbage are mainly planted in the lower
reaches of catchments areas; quick-growing trees, fuel trees or fruits trees and herbage and other economic trees, in the middle reaches of the catchments areas; and trees which has capacity to conserve water through holding back rainfalls by their crowns, in the upper reaches of the catchments. Small water conservancy projects should be rationally configured. According to the principle of combining mountaintop rehabilitation with the foot rehabilitation, namely, from the mountaintop to the foot of the mountain, from the gully head to the gully tail, from the upper to the lower reaches of the catchments, projects to prevent disasters should be set. These projects, grasses will promote forests and grains development and combine grasses, agriculture and forestry together. Ditches holding rainfalls back or drawing water away, water storage project and irrigation project should be set in the terracing area on the slopes; check dams, settling basins, protection embankments and other projects, in the valleys. All these projects will improve the capacity of comprehensive agricultural production by utilizing water resources to the maximum. That is to say, according to the eco-environment and land-uses, three dimensional and multilevel mountainous ecological and economic modes should be set, which keeps eyes on emphasizing three-dimensional layout of rehabilitating measures of rock desertification. Agriculture, animal husbandry and forestry will be closely combined in the mountains by rational layout. This mode will bring good ecological, economic and social benefits.

**Areas suitable to spread the modes:** karst valleys, peak cluster-depressions and karst plateaus mainly with slight and moderate rock desertification are suitable to spread in which the modes are typical, representative and popular, especially those karst ecological areas with altitude below 2000 m, average temperature about 14°C annually, plentiful rainfalls and temperate climate and those rock desertification areas mainly with slight and moderate rock desertification. In accordance with slightly fragile ecoenvironment, sparse distribution of soil coverage and thin soil layer, large area of sloping lands, simple land-uses, serious contradiction between man and land, monotonous product mix and other ecological and economic problems in rock desertification areas, taking the thought of comprehensively developing forestry, grains and grasses to combine them together, the mode guiding by ecological agriculture is suitable to apply to rehabilitate rock desertification. It will speed up the pace of industrial adjustment. This mode combines rehabilitation of rock desertification with rural industrial adjustment, local economic development and that peasants get rid of poverty and become better off, and actively searches the economic growth point for the rural areas to consequently promote ecological rehabilitation and rebuilding for rock desertification areas.

**4.3.2 Modes guiding by closing hillsides to facilitate afforestation and ecological rehabilitation for rock desertification**

**Theoretic foundations for modes:** according to the eco-system evolution rules, especially the principle of integration, harmonization, circulation and regeneration, following the principle that trees should be planted where it is suitable to plant trees, so should be grasses, trees, shrubs, vines and grasses with high economic values featured by drought-enduring, poverty-enduring, calcium-enjoying, growing in the rocks, fast-growing and wide scope of application should be planted. This measure is implemented to rehabilitate and rebuild those ecosystems which have been damaged or degraded.

**Technological methods for modes:** in accordance with distribution of rock desertification lands with different degrees in the catchments in the process of rehabilitation of rock desertification, the ecological restoration and rebuilding measures should follow the situation of ecoenvironment, nature, social and economic status to systematically and scientifically plan. This mode emphasizes ecological measures with engineering measures as supplement. The ecological measures should combine with economic development.
When plantation, closing hillsides to facilitate afforestation and other rehabilitating measures for vegetation are implemented, measures to solve local peasants’ life and to meet their demands for fuel should be implemented, too, which sufficiently embodies ecological, economic and social benefits.

**Areas suitable to spread the modes:** it is suitable to apply the mode in those areas with large proportion of rock desertification in every province, in remote mountains, part mountainous areas with potential and slight rock desertification areas and source areas of water. These areas are mainly divided into karst plateau, karst valley, karst peak cluster depression comprehensive rehabilitating zones. Those zones are key rehabilitation zones of which soils are mainly yellow and lime soils and the vegetation coverage rate is relatively low.

### 4.3.3 Modes guiding by plantation and forestry for rock desertification

**Theoretic foundations for modes:** with consideration of climate, landforms, soils, agricultural uses, market and other conditions, economic forest and fruit forest are developed in the sloping lands and barren mountains where the site conditions are good. This mode takes developing special economic and fruit forests as a main body measure and sufficiently utilizes the locational advantage of the mountainous areas.

**Technological methods for modes:** in those catchments featured by relative low latitude, gently topography, large per capita area of cultivated land and great potentiality of construction of economic forests, economic trees which have great market prospect strong land adaptability are planted and small water conservancy are constructed to support the economic forests. Plant-eating animal husbandry is also properly developed, which can solve peasants’ livings. The implementation of this rehabilitating mode will promote the regional economy.

**Areas suitable to spread the modes:** it is suitable to apply the mode in valleys, low middle mountains and hills. These areas are mainly divided into karst plateau, karst valley, karst peak cluster depression comprehensive rehabilitating zones. In those areas of which soils, with relatively thick layers, are red, yellow and lime soils and the degree of rock desertification is slight, measures are taken mainly for prevention. This mode will develop ecological forests and agriculture and build resource economic system to change the former high resource-consuming economic system. Considering natural resources, terracing, afforesting, water conservancy, grasses with animal husbandry and other measures are implemented. All these will gradually realize the “forest, fruits and grasses—pigs, cows and sheep—bio-gas—forest, fruits and grasses” circulation mechanism, which will bring long-term benefits for the areas’ people.

### 4.3.4 Modes guiding by grassland construction and ecological animal husbandry

**Technological methods for modes:** with comprehensive consideration of natural resources, situation of economic and social development, degrees of rock desertification and other factors in rock desertification areas, and of combination developing direction of regional agricultural production and land-use plan, aiming at grasslands and ecological plant-eating animal husbandry, grasslands construction and ecological plant-eating animal husbandry are mainly developed in those rock desertification cultivated lands with high assessment level of land resources, which will promote orderly ecological and economical development and their dynamic balance. This mode combines rehabilitation for rock desertification with grasslands construction and adjustment of animal husbandry.

**Theoretic foundations for modes:** the first method is grasslands construction, which includes planting grasses artificially and grasslands reforming. In slight and moderate rock desertification areas, getting rid of
weeds from grasslands, supplementary planting, fertilizing, fencing and other measures are implemented to transfer the former bad grasslands into good high-production grasslands. Meanwhile, artificial grasslands would be constructed if it is actually needed and the conditions are suitable. The second method is developing plant-eating animal husbandry. In accordance with the balance between grasses and livestock, rational capacity of animals would be arranged. Grasslands resources and crop straw resources should be sufficiently utilized so that livestock structure and breed would be improved. Consequently, the pace of developing plant-eating animal husbandry would be accelerated.

**Areas suitable to spread the modes:** the mode has some typicalness and representativeness and popularization in those areas with high population density, serious contradiction between man and land, bad quality of cultivated lands with slight, slight-moderate rock desertification, especially in those typical karst areas with the mild climate featured by dry and wet in the summer, and relatively large height difference, complex tectonics and bad agricultural producing conditions. In accordance with slightly fragile eco-environment, sparse distribution of soil coverage and thin soil layer, large area of sloping lands, simple land-uses, serious contradiction between man and land, monotonous product mix and other ecological and economic problems in rock desertification areas, taking the thought of comprehensively developing forestry, grains and grasses to combine grasses and livestock together, the mode guiding by ecological animal husbandry is suitable to apply to rehabilitating for rock desertification. It will speed up the pace of industrial adjustment. This mode combines rehabilitation of rock desertification with rural industrial adjustment, local economic development and that peasants get rid of poverty and become better off, and actively searches the economic growth point for the rural areas to consequently promote ecological rehabilitation and rebuilding for rock desertification areas.

**4.3.5 Modes guiding by water and soil conservation and basic farmlands construction**

**Theoretic foundations for modes:** with comprehensive consideration of natural resources, situation of economic and social development, degrees of rock desertification and other factors in rock desertification areas, regarding solution to grain security as breakthrough point, sloping lands improvement and basic farmlands construction are key measures and reservoirs, diversion channels, irrigating channels, drain ditches and other water conservancy projects are supplementary measures. By improving the quality of sloping lands, sufficiently utilizing the limited water and soil resources and improving the land production, people’s basic living demands in rock desertification areas should be meet firstly. This mode will reduce the loss of water and soil and provide support to forests, grasses and other vegetation restoration.

**Theoretic foundations for modes:** the first method is suitable to apply in those areas where leading factor for rock desertification is sloping cultivated lands. In those sloping cultivated lands with a slope of 5 to 25 degrees, serious water and soil loss, low rock desertification degree and thick soil layers, measures as terracing to enlarge effective area of cultivated lands, holding back soils to enhance land fertility are implemented. Roads for agricultural production, reservoirs, diversion channels, irrigating channels, drain ditches are constructed for irrigation effectively which can store rainfalls. Consequently, the goal of rehabilitation for rock desertification would be achieved. The second method is suitable to apply in karst basins, poljes, depressions and other important areas for producing grains. In those dams, depressions and basins with a slope below 10 degree, diversion channels, drain ditches and other farmland water conservancy measures are implemented to ensure farmlands’ production to transfer the bad “runoffs from rainfalls→ soil and water loss→ drought and flood” circulation to the good “rainfalls→ storing rainfalls for irrigation→ high
stable production” circulation. As a result, a “terraces fields + technologies + water conservancy + roads for agricultural production + industry” way for rural areas to get rich is explored.

**Areas suitable to spread the modes:** the mode has some typicalness and representativeness and popularization in those areas with high population density, serious contradiction between man and land, bad quality of cultivated lands with slight, slight-moderate rock desertification, especially in valleys with rock desertification, centralized farmlands, slow slopes, plenty rainfalls and mild climate, by basic farmlands construction with supplementary measure of small water conservancy production of basic farmlands would be improved. This mode can control water loss for sloping cultivated lands and rock desertification.

### 4.3.6 Karst water resources development and irrigation agriculture oriented pattern

**The theoretical foundation of the pattern:** based on an overall consideration of the natural resources, social development of rocky desertification area, the rocky desertification degree, aim at solve the rural water use's problem, the low cost of surface karst water resources development and irrigation techniques were choosed, precipitation's collection and lifting, flow's concentrated and well would be constructed, with effective measurements to improve the efficiency using of water, to solve local people's living need, and offer support for agriculture, forestry and husbandry.

**The realization way of the pattern:** First, collate rain water by roof collection and water. storage works on sloping land, then build water cellars to keep water. Second, useing karst surface water and bedrock fissure water by two ways: "springs - pipes or canals - cellers - output network - man and livestock drink of land irrigate "; "springs - pipes - water for production and living". Third, develop water-efficient irrigation by some projection or biological measurements to build water-saving society.

**The areas of spread:** This pattern suit for the area with density population, land is enough while water in shortage.

### 4.3.7 Karst rural energy resources development and Rural Garden Economy oriented pattern

**The theoretical foundation of the pattern:** The rural energy development should act according to circumstances, pay close attention to results, policy should adopt a balanced energy mix, and take comprehensive utilization into consideration. Meanwhile development and conservation on energy should be taken in too, when guided by the market and aim at rural economy development. From the current practice, rural methane development is the key, at the same time firewood-saving stoves, solar energy, fuelwood forest and small hydro-electric should be developed.

**The realization way of the pattern:** The rural energy resources development is focus on clean energy development, using clean energy to replace firewood to decrease local people destroy vegetation. Combined water, cabin, kitchen, lavatory and colony house's remedy, methane should be developed to improve rural sanitation environment. The waste liquid and sludge could be used as organic fertilizer to develop rural garden economy pattern and to form “agriculture production – energy – environmental production – cost-less and earn-more”, leading plants and culture develop harmoniously, helping agriculture development, local people’s living quality, the feature village increase. All the measures can cement the ecological progeny of land to forest and the production of natural forest.

**The areas of spread:** This pattern is suitable for the slight-middle rocky desertification area that with simple
vegetation structure, density population, huge firewood requirement, especially at the fengcong- depression and karst hill-depressions. The development of methane’s and vegetable-fruit can help in vegetation protection and economic increase.

4.3.8 Karst ecological emigration and natural recover oriented pattern
The theoretical foundation of the pattern: Take the natural resources, society economy development and the degree of rocky desertification into comprehensive consideration, aim at ecological recover and people’s living guarantee, the local people could be induct to emigrate out to release the environment pressure. At the same time, the vegetation should be recovered by natural or man-accelerate measurement. And some property measurement should be took to help the emigrants production and earn-living.

The realization way of the pattern: Focus on abroad and deep poverty in karst area, this pattern could be chose, by “decentralization in large scale and convergence in small one” method, and based on well development countys and well traffic villages, helping the poverty step out to wealth.

The areas of spread: This pattern is suitable for the serious rocky desertification area that with low vegetation rate, short in water source, serious man-land contravention, especially the faraway, rocky and cold mountains area. In order to lead people to step out the vicious circle, release the environment’s pressure is first thing.

4.3.9 Karst ecological emigration and natural recover oriented pattern
The theoretical foundation of the pattern: Take the natural resources, society economy development and the degree of rocky desertification into comprehensive consideration, aim at the tourist development and industry structure adjustment, the pattern promotes ecology and economy develop the same time. In other words: the ecological and cultural environment could be explored for tourist development in those areas with special natural feature and eco-culture. The tourist development could promote peasants’ earn increase; decrease their reliant on land, adjusting the economic structure of rocky desertification area.

The realization way of the pattern: Take rocky desertification area’s tourist sources into consideration, such as: caves, valleys, stone-forest, minority customers, etc. many related tourist could be explored. At the land of rocky desertification area some economic forest could be planted for enjoy; at the stone hill some specially plants with soil and water hold function; at the scenic, some ornamental could be planted. On one hand, the plant could protect the whole scenic, and on the other hand the ecological scenic could help with tourist development, industry structure adjustment, people earn and job increase, forming a benign circle of ecology and industry. According to the principle of tourist plan, the tourist equipment should be consummated to increase people’s living standard.

The areas of spread: This pattern is suitable for all kind of degree of rocky desertification area that with good natural sources, especial rocky scenic or rich eco-culture, especially in the national or province gardens. The turist and the ecological environment building could be combined together to got the maximize of development, and promote the Third industry development, speeding the industry structure adjustment.
5. Rehabilitating Countermeasures and Political Measures for Rock Desertification

5.1 Rehabilitating Countermeasures

① Find out the basic matters of rock desertification, control the increasing of population, and effectively harmony the relationship between human and environment.

Rock desertification occurred in Guizhou Province because of the background of fragile karst eco-environment, fast population growth as well as development and use of resources at the expense of environment for basic survival. In the case of economy getting behind and resident being poor, people reproduction gets into a jam of procreation causing poverty and poverty acting on procreation in turn, which speed up the damage of eco-environment. So a series of short-term or long-term control targets under overloading circumstances of environment, population and land can’t be achieved only by taking action to improve eco-environment, in other words, all the achievement of environmental control by earnest endeavor shall be counteracted by fast population growing. Therefore, the areas of well eco-environment protection, high control efficiency and fast economic growth always correspond to the areas of the best Planned Parenthood and population growth control.

② Get hold of the key conflicts. Focus on the construction of water-soil-forest system, and restructure rural industries to resolve villager’s living and survival problems. In karst rock desertification area, there’s a serious water shortage rested with engineering step, thus, there’s no guarantee of drinking water, agricultural and ecological water demands, and water resource has been a key limiting factor for regional economic and social sustainable development. What’s more, the farmland in karst area is characterized by poor soil, serious water and soil erosion and falling into pieces, in one word, the agricultural production condition is bad, which cause a low and unstable food yield, and the villager’s life lose guarantee. Accordingly, efficient rock desertification control must be based on the solution of water problem, making a combination of taking advantage factors and eliminating adverse factors. Specifically, on one hand, change the situation of slope soil erosion by water to regular water flow, keeping soil on the mountain. On the other hand, aiming at the situation of being dry and short of water in karst region, to resolve irrigation demand of crops and trees by drawing and storing river water, making adverse factors become advantage factors. In addition, to resolve villager’s survival problem, comprehensive control of slope farmland should be thought a break, specifically, aiming at gentle slope farmland of below 25°with weak rock desertification and thick soil, carry out engineering of changing slop land to farmland and farmland leveling, and match with hydraulic and road items, making the gentle slop farmland a basic farmland and increasing food yield per unit area, which promote to the transformation from farmland to forest, help to consolidate the achievement, and form the foundation of restructuring rural industries and developing technology agriculture.

③ Seek for alternative energy sources and strengthen methane tank construction to relieve rural energy shortage. Firewood is one of the main life energies in most place of Guizhou Province. Long-term overage deforestation in the past leads to widespread water and soil erosion, and causes rock desertification. Thus, in the process of rock desertification control, there are many things to be attended, such as seeking for
alternative energy sources, strengthening the construction of methane tank and minitype hydraulic engineering, well resolving rural energy problem, preventing vegetation from damage, keeping the achievement of ecological forest construction and ecosystem recovery, and speeding up vegetation recovery.

④ Take advantage of the self-recovery function of ecosystem and pay special attention on prevention and protection to prevent rock desertification from happening. Guizhou Province is located in humid climate zone, with abundant rainfall. Thus, plant grows fast and ecosystem shows strong self-recovery function. As far as rock desertification concerned, passive control needs multiple technologies, characterized by huge expense and work amount, and active prevention needs relatively simple technology, characterized by low expense and work amount. Accordingly, rock desertification should obey the law of nature, and take advantage of the self-recovery function of ecosystem to achieve vegetation recovery as soon as possible and to speed up the step of rock desertification control. In addition, achieve the transformation from passive condition to active condition, combining prevention and control, paying more attention on prevention. Strictly enforce the procedure of submission for approval of water and soil conservation programme, and strictly enforce the system of the design, implementation and application of the main items carrying out in parallel.

⑤ Follow eco-economic principles, promote forming industry chain, and increase villager’s income. Rock desertification and poverty occur in parallel. And rock desertification control should be based on the principles of ecology and eco-economy. It should take eco-environment construction as a breakthrough point, and pay more attention on the formation of industry chain. Considering the facts of single agricultural structure, extensive cultivation and poverty, it should make a combination of rock desertification control and rural industry restructuring as well as making villager’s get rich, and develop salable woods according to actual condition, which promote to the formation of ecological industry chain, increased the villager’s income, and finally promote economic development of rock desertification region.

⑥ Get hold of the key factors. Protect biodiversity and maintain project achievement. Biodiversity is valuable heritage getting down in four billion year’s creature evolution, which forms the foundation of human survival and development. Well eco-environment and sustainable biodiversity forms the key factors for sustainable development of regional economy. What’s more, biodiversity plays an important role on conserving soil, keeping water, regulating climate, maintaining the stability of ecosystem, and so on. Thus, rock desertification control should hold key factors, conserve biodiversity, and actively put agriculture-forest control pattern in practice, fully playing the role of vegetation on keeping water, conserving water and soil and regulating climate, overcoming the problem of single programme, single artificial forest-grass structure and single species and the problem of low survival rate, low keeping rate and low economic benefit, finally to achieve eco-environment restoration and economic sustainable development.

5.2 Political Measures

5.2.1 Managing Safeguards

Organization and guidance: Rock desertification control as key project of ecological protection and construction has been brought into the outline of the 11th five-year plan for domestic economy and social development of Guizhou Province. The government of Guizhou Province has established relevant leading group of rock desertification control heading by nomarch, in order to strengthen the management and guidance of rock desertification control as well as organization coordination. Specifically, for all the parts of
programme arrangement, organization coordination, fund management, project construction, and so on, they require that all responsibilities, target tasks and management measures must be put into practice.

**Heading by government:** Rock desertification control is heading by local government, the specific targets and tasks of which are confirmed as important aspects of examining the performance of the leaders at all level. The government at county and town level should bring rock desertification control into the programme of local economic and social development, and bring it into the important agenda. Responsibility system of practicing the targets of rock desertification comprehensive control is required. And rock desertification control shall be confirmed as an aspect of examining leader’s performance, carrying out examination termly, and the result shall show to the public.

**Item integration:** It needs to integrate all kinds of resources of rock desertification control, which forms the resultant force. Thus, it is required that according to state ecological construction plan, confirm specific organization, personnel and special fund and actively promote the integration of items from relevant departments of agriculture, forestry, water conservancy, water and electricity, state land, environment protection, science and technology, construction, industry, education and so on, in order to put rock desertification control into depth.

**Project examination and approval:** Authorized government departments of submitted projects at all level should evaluate them strictly. They should completely enforce the state rule concerning project environment management, and perfectly accomplish the procedure of project definition, examination and approval as well as checking after completion. In one word, all the construction project should be evaluated at first, then carry out construction, and firmly prevent rock desertification from happening.

**Project management:** Project management should be carried out strictly according to the construction procedure. And establishing project bank of rock desertification of Guizhou Province should closely combine with the target, task and layout of project programme. It requires a further quality improvement of engineering explore and design, requires a flexibility in carrying out project bidding system, requires a enhancement of project checking after completion, requires a high attention on further management and maintaining after project completion, and require to establish further evaluation system concerning project effect.

**Project supervision:** Project supervision ensures the accomplishment of rock desertification of Guizhou Province. It should strictly accord to relevant rule to carry out project supervision and to establish and perfect the system of rock desertification, should combine the aspects of administration supervision, public and social supervision, dealing with and correcting the work problem in time.

5.2.2 Political Safeguards

**Ecology compensation mechanism:** Rock desertification should insist on the principle of developer corresponding to protector, beneficiary corresponding to compensator. Ecological compensation system to rock desertification area should be established and perfected. A series of accesses should be provided to achieve the support of the development area on economic and social development of rock desertification area. For the industry companies in rock desertification area, responsibility mechanism of environmental restoration should be established and perfected.
Day-work promise mechanism: For adapting to present tendency of rural tax-fee reformation and expelling rural two kinds of duty labor, in the process of rock desertification, day-work promise mechanism should be fully advocated, which can inspire the enthusiasm and activity. Employ local villagers to involve in engineering construction in priority to ensure the labor demand.

Relationship of property right of rock desertification land: In the process of rock desertification construction, the systems of farmland and forest properties should be established and perfected. It is required of establishing legal exchanging and further management systems to consolidate the achievement, of the principle that controller correspond to beneficiary, and of encouraging all possible fund, technology and labor to involve into the comprehensive control of rock desertification.

Industry development project in rock desertification area: Closely combine with west development and rural development projects, projects concerning agriculture should be practiced in key area of rock desertification control. Provincial and state governments by the accesses of providing fund and subsidy, etc., encourage and support rock desertification area to develop characteristic and backbone industry, and encourage establishing or making flagship companies to involve in the development of forest production and agricultural production processing.

Establishment of rural corporation economic organization: In the process of rock desertification control, a large number of rural economic cooperation organizations should be established to make the famer an intact benefit community, to make the famer more competent in the front of competitive market, and to provide strong economic foundation for rock desertification.

Devotion to education and healthy industries: Pay more to improve the education and health conditions of rock desertification area, and improve local public’s health perception.

Reward policy for the achievement of rock desertification control: For some key projects of rock desertification comprehensive control and their technology development and demonstration, fund invest and subsidy should be provided. Of course, it is necessary to actively encourage technology organization to achieve present problem’s resolution and innovation, to reward person with well performance and make them pacemaker of eco-environment construction in rock desertification area.

5.2.3 Safeguards by Laws
Strengthen lawmaking, and carrying out work by law: It requires to fully realizing the tendency and task of rock desertification control to improve the understanding to the importance, urgency and hardness of rock desertification control. It requires to obey lawmaking procedure, to combine the public’s wisdom, to study and establish imperative and basic law system of rock desertification, which define right and duty, ensure their implementation, provide law guarantee for rock desertification, and make comprehensive control of rock desertification come into normalization and legalization. What’s more, by all kinds of mediums and accesses publicize the policy and guideline of the Party of Republic of China, and publicize the cases from poverty to rich by protecting ecosystem and changing traditional operation pattern. Put a series of laws in practice as Agriculture Law, Grassland Law, Forest Law, Water and Soil Conservation Law, Environment Law, Basic Farmland Protection Law and so on.
Perfect supervision mechanism, and strengthen supervision of law implementation: It requires that of establishing and perfecting public supervision mechanism of rock desertification control, innovating supervision mode, multiplying supervision methods and accesses, creating access to complaint, fully taking advantage of broadcast, television, newspaper and so on, setting complain center and reporting telephone and encouraging the public to bring all kinds of law-break behavior on eco-environment construction into light. What’s more, it also requires that of strengthening law enforcement, strictly fighting and forbidding over deforestation, transformation from forest and grass land into farmland, damage of hydraulic facilities and basic farmland, illegal occupation of farmland and so on. In addition, it further requires that of perfecting supervision organization of law enforcement, equipting personnel, improving the quality of law enforcement official, strengthening law enforcement, strictly eliminating the behaviors of law break and resource damage, gradually ending the phenomena of law in no practicing or in bad enforcement or in low-efficient enforcement.

5.2.4 Safeguards by Funds

Increase investment: The fund use of state and provincial basic construction fund, agricultural support fund, comprehensive agricultural development fund and so on, must take the comprehensive control of rock desertification as an important aspect, give an overall arrangement, and increase them gradually according to financial condition. Provincial finance department is required to continually strengthen transfer payment to rock desertification area, where the environment is bad and with bad carrying capacity, to provide financial guarantee for local government well practicing their service duty and their regular running, and to make corresponding compensation for ecological protection, gradually making the resident here get equal public service as the resident in other place. The government and authorized departments burden different government responsibilities of power and financial rights, according to which they make a long-term arrangement for rock desertification control. The banks at all level should increase the credit for rock desertification control, and prolong the deadline according to actual condition.

Multiple ways of financing: It is required to establish and perfect the investment mechanism of multiple investors and invest approaches. The fund for rock desertification control has many sources. They should get overall use. Except for the special subsidy from central and provincial government, the funds from departments as agriculture, poor supporting, water conservancy, state land, environmental protection and so on, can be used for rock desertification, and should be used in overall arrangement. According to the principle of investor corresponding to manager make special policy, encourage all investor invest for rock desertification, encourage and support enterprise and public institution in the light of methods of joint stock, joint operation and benefit sharing by stock develop timber woods, commodity woods or private park, actively take advantage of foreign investment, take foreign long-term soft loan and grant loan in priority for comprehensive control of rock desertification, and according to law make raising fund, greening fee and ecological compensation to be used for comprehensive control of rock desertification.

Put forward financing mechanism: It’s required to study and establish fund guarantee mechanism and tax policy which is good for target achievement of eco-environment construction, and to promote extension of financing market and access, specifically, in the case of government intervening fund collection, absorb multiple funds for eco-environment construction. The public is the main force of eco-environment construction. Thus, it’s necessary to arouse the crowds, continually perfect labor accumulation system, and take advantage of rural surplus labor force and free time to carry out eco-environment construction. What’s
more, in rural carry out afforestation, and basing on the implementation of a series of policy as forest ownership reformation, stick to the policy of the creator corresponding to the owner and collective creation corresponding to collective ownership to fully arouse public’s positivity to protect and develop eco-environment. Person of well performance shall be rewarded, and foreigner who had made dramatic contribution to eco-environment construction should be rewarded by the state.

**Perfect management system:** In order to ensure the fund for rock desertification control correspond to the project itself, guidance and overall arrangement should be strengthened. The project should set special account, take special fund for special use, follow close to the line of financial regulation, and practice account rendered regulation. According to the regulation of fund management, put the fund, management and accounting in practice, and allocate fund according to implementation scheduling, achieving special fund for special use, clear account and perfect procedure. All rule-break phenomena on fund management should be strictly ended. And it’s necessary to make financial policy which is good for rock desertification control, to perfect compensation system of natural resource use and its price system, and establish economic compensation and ecological buying mechanisms which are good for resource reward. In addition, it’s required to strengthen the use and management of all existing funds to ensure they shall be completely be used for rock desertification control. It’s also necessary to actively create new financing accesses, to strictly carry out payment policy, to carry out work and plan at early stage should consider farmers’ work performance in defining work pay. Project implementation unit who receive help from town government, organize local villagers to involve into construction, meanwhile, labor payment should be well carried out, achieving opening, full quantity, to inspire local villager’s positivity and activity of involving in project construction.

5.2.5 Safeguards by Science and Technology

**Formation of implementation plan:** with a reference of Outline of comprehensive control of rock desertification in Karst Region, based on the comprehensive analysis of soil, climate, hydrogeology, and economic condition and so on, define the main direction and work, and according to the order of importance and emergency put them in practice. Draw up the implementation programme of rock desertification control in 55 counties of Guizhou Province during 11th five-year plan period. Take the area of important ecological location and typical representation as demonstration area, pay attention to the debation of rock desertification in different type and scale, and finally submit them to National Development and Reform Commission of Guizhou Province for approval. Take rock desertification control a important part of economic and social development of Guizhou Province, combine it with rural economic development and regional poverty alleviation, and make it a chance guide villagers get out traditional production mode which is bad for rock desertification control.

**Innovation of science and technology:** It requires to deeply study the act mechanism and essential rule of karst development in Guizhou Province, revealing its resource-environment effect and eco-environment fragility, to study its evolution rule in different area in order to establish a index system on karst resource and environment evaluation and a data information system on karst ground water and geology environment, to study the relationship between resource sense and environment behavior, the relationship between economic sense and development behavior to reveal the effect of human behavior on ecosystem evolution, aiming at the special human-environment relationship in karst minority nationality region, restructure industry structure , carry out theory and technology study, and explore the effective ways of harmonizing ecosystem restoration.
and economic development, and to carry out karst comparation and international academic exchange around the world.

**Science popularization:** It requires taking multiple way to carry out wide and deep publicity concerning comprehensive control of rock desertification, to popularize the technology and experiences. It also requires strengthening training to the leaders at all level and the villagers to increase villager’s sense on eco-environment construction and protection, making them realize the importance, long-term and hardness.

**Scientific monitoring:** It requires to pay more attention on the formation of monitoring and implementation programme, to fully integrate the monitoring facilities of multiple departments as water conservancy, environment, forestry, state land and so on, to add relevant special monitoring and ensure an exact collection of monitoring data in time, to promote the modernization of monitoring technology and approach to provide technology support for scientific analysis and evaluation.

5.2.6 Social Safeguards

**Control the increasing of population:** In order to lightening the ecological damage from human survival pressure in rock desertification area, it’s necessary in the light of land carrying capacity to take measures to control fast population growth. Meanwhile, it should be pay more attention to transform people’s mind from population growth to increasing public’s quality and promoting their well and round development.

**Increase export of labor force:** It requires to give a priority to the development of vocation education, to promote rural surplus labor’s skill training to increase labor export, and help to promote the transform of rural labor force from the first industry to the second and the third industry, and from village to city.

**Restructure industry combination:** Carry out strategic adjustment, optimizing the relationship of agriculture, forestry and stock raising. Strengthen the construction of social service system which include the supply of quality variety and agricultural facilities, information, technology, marketing, processing and so on, and provide well social environment and guarantee facilities for rock desertification control.

**Make sure central task:** The comprehensive control of rock desertification of Guizhou Province can be divided into three parts of the east part, the medium part and the west part. Bring resource cultivation into in vegetation restoration system, make development and control the central task, raise vegetation coverage, perfect land use pattern, and develop multiple use modes.

**Strengthen propaganda:** Put propaganda and education in the first place all the time. Take multiple levels, accesses and forms to public the necessity and importance of rock desertification to society, and to make it widely known.

**Improve public sense to rock desertification control:** Organize local leaders and crowds to visit some successful engineering sites, according to which educate the crowds and make them correctly handle with the relationships between immediate interest and long-term interest, partial interest and the whole interest, economic and environment benefit, finally to keep rock desertification in limit.

**Make the public an important part of rock desertification control:** Fully arouse the villager’s positivity,
encourage them provide money or labor to build their beautiful hometown, and to promote the achievement of ecological reconstruction as well as economic and social sustainable development.

**Promote community development:** Combine it with community development. By the involvement of all the villagers, taking the principle from down to up to establish mutual-help group, to develop their community sense, to strengthen its cohesion, to achieve community integration, to steer its transformation and finally make it into a state of self development.
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Appendix 1:

Cultivation Pattern of Honeysuckle in Zhenfeng County

1. Habitat Condition

The honeysuckle of the southwest of Guizhou is free-living and of high quality. It belongs to the voluble and evergreen shrubs. Its leaf has the shape of ovoid and it has advantages of tolerance of drought and poor soil. Besides, honeysuckle has strong adaptions. Zhen Feng Lonicera fulvotomentosa is branched and is full of blossom. Flowers are born from the axil. At first, the flowers are white, then yellow. The rate of intensive picking is high, and the high yield is stable. Its yield is 30% much more than other species with high quality. It is appropriate for the 400-to-1400-meter highland, and its annual average temperature is better at around 16℃. It’s better choose the acid soil born from the carbonatite.

2. Technology Consideration

Lonicera fulvotomentosa is a special medicinal plant in Zhenfeng County of the southwestern Guizhou. It has a strong resistance, long life and the strong function of water conservation. It has the obvious ecological and economic benefits. The benefit of the development of the production of honeysuckle is connected with the economic interests of the locals and the treatment of stony desertification: Stony Desertification Control, which is beneficial for the promotion of bead prevent project and Grain for Green Project. Besides, it is also helpful for the strengthening of the achievement of afforestation project.

3. Key technology Steps

(1) Culture of seedling: Firstly, choose the thick and fertile soil layer, and make it as the seedbed after harrowing it flat. Secondly, choose one or two-year-old branch, and sever it into sections of 20~30 cm, and each section has more than 4 axillary bud. Then, pick off leaves and plug them in to the farmland obliquely, with the line spacing 25cm, row spacing 10cm. 1/3 of the section should be retained on the land, then, the earth should be trodden down and be watered for the reason of moist. At the same time, weeding and pest control should be noticed. After 6-10 months, each section will turn into the shoot. In addition, seeds can be used to breed. After the collection of the seeds, they can be bred in segmentation, which means broadcast sowing. When the seeding grows to 10cm, they should be transplanted to the seedbed for the second breeding. When they grow to 40cm, they can come out and be planted on the mountains.

(2) soil preparation: the soil should be prepared before afforestation. The standard is 40×40×30. The plant destiny is 80~100 in each unit of area. The soil preparation and potholing are better in autumn. After the potholing, the surface soil should be backfilled in the bottom. If possible, base fertilizer can be used.

(3) Afforestation: Avoid the spring or winter season. Plants should be planted in wet season. The lateral roots of naked shoots can be cut off. At the same time, Water-retaining agent can be used to dip roots. 1/3 of the leaves should be cut off. When the weather is dry, 1/2 of the forest can be cut to enhance the survival rate of the forest.

(4) Management and protection: After the forestation, we should loosen soil, foster and earth up. In the second year, pruning should be done at regular intervals and fertilizer is needed. Besides, fire protection,
plant diseases and insect pests and the treading of oxen and horses should be paid attention to.

4. Achievement Evaluation

The honeysuckle of Zhenfeng County is native. After conceding of the sloping farmland, based model can be adopted to change the utilization of the soil, replant the vegetation and reduce the loss of soil and water. It is an effective way for the locals to cast off poverty to get rich and also it is a mainstay industry for the farmers when our country stops the subsidy 8 years later. This model makes prominent benefits in ecology, economy and our society after it is promoted in rocky mountains and semi-rocky mountains.

5. Typical Extend Area and Potential Areas

This model has been extended in Zhenfeng County of Southwestern Guizhou for 30 thousands units of area and now Guizhou has planned to enhance it to 300 thousands units of area. This model can be promoted in Guizhou, Guangxi and Yunnan where their subtropical Karst has mild or moderate stony desertification.
Sub-report 5: Study on the Strategies of Economic Development of the 50 Counties with the Priority of Poverty Alleviation and Development in Guizhou Province

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Introduction

Guizhou is located in the southwest China, an inland province with many mountains. Restricted by many factors, Guizhou’s economy and society have been underdeveloped for a long time and rank the lowest in China’s provinces. In 2009, the per capita GDP in Guizhou is only 37% of the country’s average level; the per capita net income of rural residents is 58% of the country’s average level, and the urbanization rate (29.8%) is 64% of the country’s average level. The State Council of the PRC issued the “National Program on Poverty Alleviation and Development in Rural Areas during 2001-2010” on June 13, 2001. According to the program, eighty-three (of the total 88 in Guizhou) counties (cities and districts) had the task of poverty alleviation and development, of which 50 counties were given the priority of poverty alleviation and development during the new period. The 50 counties accounted for 8.4% of the total 592 counties with the priority of poverty alleviation and development in the PRC, making Guizhou rank 2nd in the total provinces of the PRC. In 2009, the poverty-stricken population in Guizhou was over 5.55 million, accounting for 13.9% of the total 40.07 million poverty-stricken population in the country. In 2010, because 0.5 million of the poor got rid of poverty, the number of poverty-stricken population, including the people with a low income, were 5.053 million in Guizhou, accounting for 28.9% of the 17.51 million in the western part and 18.8% of the 26.88 million in the country. Guizhou is one of the provinces in the PRC with the largest number, the largest area and the highest level of poverty.

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Column 1 Determination of Counties with the national priority of poverty alleviation and development

In order to better conduct poverty alleviation and development in the new century, the central government of the PRC decided to give the priority of poverty alleviation and development to the areas inhabited by minority nationalities, old revolutionary base areas, border areas, and particularly poor areas in the west and middle parts of the country and selected the priority countries in the two parts. In the principles of “clear responsibility, coverage of the majority, scientific estimation, relative stabilization, and provincial implementation”, the State Council of the PRC decided the total number of poverty-stricken counties and the selection rules; the provincial governments within the west and middle parts selected the particular poverty-stricken counties within their provinces and reported the result to the State Council Leading Group of poverty alleviation and development for examination, approval and documentation. The total number of priority counties in the country was selected by an index of “631”. The “6” means that the poverty-stricken population has a weight proportion of 60% (of the whole country), of which the absolute poverty-stricken population accounts for 80% and the other 20% are the population with a low income. The “3” means that the number of counties with a lower per capita net income of farmers has a weight proportion of 30% (of the whole country). The “1” means that the number of counties with a lower per capita GDP and a lower per capital financial income has a 10% weight proportion. The criterion of low income is 1,300 yuan for other parts of the country, while 1,500 yuan for the old revolutionary base areas, areas inhabited by the minority nationalities, and border areas. The criterion of per capita GDP is 2,700 yuan. The criterion of per capita financial income is 120 yuan.

By the principles and methods mentioned above, 592 counties in 21 provinces (autonomous regions and municipalities) were decided to be given the priority of poverty alleviation and development. Those counties were mainly located in areas inhabited by minority nationalities, old revolutionary base areas, border areas and particularly poor areas.


Since 2000, Guizhou province has had a great achievement in the poverty alleviation and development. However, before 2020 the task of poverty alleviation and development is still very arduous for the following reasons: the natural environment is specific; the conditions of production and life are relatively adverse; the construction of infrastructure for transportation and water supply is seriously lagging; the cultural, educational and hygienic undertakings are lagging, the way of development is extensive; the level of management is not high. In addition, the poverty-stricken population is mainly distributed in the remotely mountainous areas, stonily mountainous areas, high and cold areas, and areas mainly inhabited by minority nationalities.
The proportion of the poverty-stricken population, the total areas, and the gross production output in the 50 counties with priority of poverty alleviation and development is 76%, 66%, and 33.9% in those of Guizhou, respectively. Guizhou would be never fairly well-off as a province without that the 5 million poor get rid of poverty and become better off. Therefore, the meaning will be significant to develop the 50 counties’ economy for the economic and social development of Guizhou and the accomplishment of the poverty alleviation and development in the future.
1. General Situations of the 50 Counties

1.1 Location and Features of the 50 Counties

1.1.1 A Large Poverty-Stricken Area

Guizhou is one of the provinces with the largest area and the highest poverty-stricken proportion. Guizhou has a tenth of poverty-stricken population in the country. Of the total 28 million rural residents, more than 5 million are poor. Eighty-three counties (cities, districts) have the task of poverty alleviation and development during the new period, accounting for 94.3% of the total number of counties in the province. Fifty of the 83 counties are given the priority of poverty alleviation and development. The 50 counties distribute in 8 of the total 9 cities (prefectures) in Guizhou. The one left is Guiyang city. That is, all the other cities (prefectures), except the “Qianzhong economic zone” around Guiyang, have an arduous task of poverty alleviation and development. The 50 counties account for 56.8% of Guizhou’s total counties. The area of the 50 counties accounts for 66.0% of Guizhou’s total areas. The farmland and population of the 50 counties account for 59.2% and 49.6% of Guizhou’s total farmland and population, respectively. In 2009, the poverty-stricken population in the 50 counties was 4.20 million, accounting for 75.58% of the total 5.55 million in the whole province. By the end of 2010, there were still 5.05 million rural poor. Guizhou has the most poverty-stricken population in the country; 95% of the poor are living in the Wuling mountainous areas, Wumeng mountainous areas, Miaoling mountainous areas, and Daloushan mountainous areas. In average, 10% of those poor returning back after getting rid of poverty. More people returned to poverty in years with heavy natural disasters. The normal reasons for the people returning to poverty after getting rid of it are natural disasters and diseases. If the poverty line rose from 1,196 yuan to 1,500 yuan, it is expected that the poverty-stricken population would reach 9 million or so, nearly 1.4 th of the entire population in Guizhou.

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<td>12</td>
<td>6</td>
<td>Libo, Sandu, Changshun, Dushan, Luodian, Pingtang</td>
<td>50.0%</td>
</tr>
</tbody>
</table>
1.1.2 A High Poverty-Stricken Proportion

The average poverty incidence of the 50 counties is higher than 20%; 36 of the 50 counties have a poverty incidence higher than 20%. There are 16 counties (cities) in Qiandongnan prefecture, of which 14 counties (cities) have the priority of poverty alleviation and development; and all of the 14 counties (cities) have a poverty incidence over 20%. Seven of the 8 counties (cities) in Qianxi’nan prefecture are given the priority of poverty alleviation and development; all of the 7 counties (cities) have a poverty incidence near or over 20%. Qinglong county has the highest poverty incidence, 25.4%. In 2009, the farmers’ per capita net income in the 50 counties was 2,700 yuan, 52.40% of the country’s average level. The county with the highest farmers’ per capita net income is Panxian county; the county with the lowest farmers’ per capita net income is Wangmo county. Farmers’ per capita net income in those two counties was 3,038 yuan and 2,163 yuan, respectively, accounting for 58.95% and 41.98% of the country’s average level, 5,153 yuan, respectively. The rural residents’ per capita net income was less than 2,500 yuan in 10 of the 50 counties with a lowest per capita net income of rural residents.

Table 2: Basic information of the 50 counties in 2009

<table>
<thead>
<tr>
<th>County /district</th>
<th>Rural poor (10,000)</th>
<th>Rural poverty incidence (%)</th>
<th>Per capita GDP (yuan)</th>
<th>Per capita grain (kg)</th>
<th>Farmers’ per capita net income (yuan)</th>
<th>Laborers employed outside counties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liupanshui city</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liuzhi</td>
<td>8.89</td>
<td>16.4</td>
<td>7563</td>
<td>370</td>
<td>2881</td>
<td>19639</td>
</tr>
<tr>
<td>Shuicheng</td>
<td>16.50</td>
<td>22.3</td>
<td>7878</td>
<td>365</td>
<td>2820</td>
<td>326</td>
</tr>
<tr>
<td>Panxian</td>
<td>18.39</td>
<td>17.9</td>
<td>15394</td>
<td>354</td>
<td>3038</td>
<td>748</td>
</tr>
<tr>
<td>Zunyi city</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zheng’an</td>
<td>9.10</td>
<td>15.8</td>
<td>4005</td>
<td>438</td>
<td>2660</td>
<td>340</td>
</tr>
<tr>
<td>Daozhen</td>
<td>6.07</td>
<td>20.0</td>
<td>4944</td>
<td>525</td>
<td>2478</td>
<td>880</td>
</tr>
<tr>
<td>Wuchuan</td>
<td>7.07</td>
<td>17.2</td>
<td>4264</td>
<td>448</td>
<td>2475</td>
<td>3380</td>
</tr>
<tr>
<td>Xishui</td>
<td>10.80</td>
<td>17.2</td>
<td>7325</td>
<td>474</td>
<td>2737</td>
<td>160</td>
</tr>
<tr>
<td>Anshun city</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puding</td>
<td>8.03</td>
<td>19.8</td>
<td>6617</td>
<td>313</td>
<td>2745</td>
<td>1100</td>
</tr>
<tr>
<td>Zhenning</td>
<td>6.94</td>
<td>20.3</td>
<td>6292</td>
<td>343</td>
<td>2765</td>
<td>7790</td>
</tr>
<tr>
<td>Guanling</td>
<td>7.18</td>
<td>22.0</td>
<td>6330</td>
<td>358</td>
<td>2689</td>
<td>970</td>
</tr>
<tr>
<td>Ziyun</td>
<td>7.94</td>
<td>23.0</td>
<td>4088</td>
<td>339</td>
<td>2701</td>
<td>1120</td>
</tr>
<tr>
<td>Tongren prefecture</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jiangkou</td>
<td>4.33</td>
<td>21.1</td>
<td>5764</td>
<td>447</td>
<td>2649</td>
<td>937</td>
</tr>
<tr>
<td>Shiqian</td>
<td>7.66</td>
<td>20.3</td>
<td>5007</td>
<td>450</td>
<td>2759</td>
<td>340</td>
</tr>
<tr>
<td>Si’nan</td>
<td>11.25</td>
<td>18.4</td>
<td>5339</td>
<td>386</td>
<td>2539</td>
<td>920</td>
</tr>
<tr>
<td>Yinjiang</td>
<td>7.61</td>
<td>19.2</td>
<td>5415</td>
<td>369</td>
<td>2611</td>
<td>2043</td>
</tr>
<tr>
<td>Dejiang</td>
<td>8.50</td>
<td>20.6</td>
<td>6156</td>
<td>416</td>
<td>2425</td>
<td>1020</td>
</tr>
<tr>
<td>Yanhe</td>
<td>11.49</td>
<td>20.3</td>
<td>5063</td>
<td>356</td>
<td>2553</td>
<td>1160</td>
</tr>
</tbody>
</table>
## 1.1.3 A Poor Economic Basis

In 2009, the 50 counties have 66.0% of Guizhou’s total area, 49.6% of the population, 33.9% of the GDP,
25.5% of the scale industrial added value, 67.7% of the grain production, 24.2% of total retail sales of consumer goods, 25.6% of the savings deposits of urban and rural residents, respectively. In 2009, the per capita GDP of the 50 counties is 7,026 yuan, 68.15% of Guizhou’s average level (10,309 yuan) and 27.23% of the PRC’s average level (25,796 yuan). Of the 50 counties, Panxian county, Liupanshui city, is the only one with an average per capita GDP over 15,000 yuan (This is because Panxian county is one of the one hundred top counties in the west part of the PRC and Panxian county has also an early place in the provincial list of top economic counties. In 2009, the total GDP of Panxian county is 17.078 billion yuan, of which the output value of the first industry is 1.21 billion yuan, the secondary industry is 12.236 billion yuan, and the tertiary industry is 3.632 billion yuan.) Of the counties, three counties have a per capita GDP over 8,000 yuan but less than 9,000 yuan; six counties have a per capita GDP over 7,000 yuan but less than 8,000 yuan; nine counties have a per capita GDP over 6,000 yuan but less than 7,000 yuan; the per capita GDP in all the other 31 counties is less than 6,000 yuan. The county with the lowest per capita GDP is Wangmo, only 3,803 yuan; average per capita net income of rural residents is only 2,163 yuan, 42% of the country’s average level (5,153 yuan).

### Table 3: The major economic index of the 50 counties in 2009

<table>
<thead>
<tr>
<th>Item</th>
<th>Guizhou</th>
<th>The 50 counties</th>
<th>(2)/(1)*100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total area (10,000 km²)</td>
<td>17.61</td>
<td>11.63</td>
<td>66.0</td>
</tr>
<tr>
<td>Normal farmland (1,000 ha)</td>
<td>1757.82</td>
<td>1041.43</td>
<td>59.2</td>
</tr>
<tr>
<td>Population at the end of the year (10,000)</td>
<td>3798.00</td>
<td>1885.69</td>
<td>49.6</td>
</tr>
<tr>
<td>GDP(100 million yuan)</td>
<td>3912.68</td>
<td>1324.92</td>
<td>33.9</td>
</tr>
<tr>
<td>General budget revenue (100 million yuan)</td>
<td>416.48</td>
<td>83.59</td>
<td>20.1</td>
</tr>
<tr>
<td>General Budgetary Expenditure (100 million yuan)</td>
<td>1372.27</td>
<td>434.23</td>
<td>31.6</td>
</tr>
<tr>
<td>Total output value of agriculture</td>
<td>875.2</td>
<td>512.37</td>
<td>58.5</td>
</tr>
<tr>
<td>Grain production (10,000 ton)</td>
<td>1168.27</td>
<td>791.42</td>
<td>67.7</td>
</tr>
<tr>
<td>Scale industrial added value (100 million yuan)</td>
<td>1170.29</td>
<td>297.94</td>
<td>25.5</td>
</tr>
<tr>
<td>Total retail sales of consumer goods (100 million yuan)</td>
<td>1247.25</td>
<td>301.92</td>
<td>24.2</td>
</tr>
<tr>
<td>Savings deposits of urban and rural residents (100 million yuan)</td>
<td>2676.09</td>
<td>685.91</td>
<td>25.6</td>
</tr>
</tbody>
</table>


### 1.2 Causes of Poverty

#### 1.2.1 Natural Causes

Naturally, Guizhou is located in the Eastern Yun-Gui Plateau, higher in the east while lower in the west,
with slopes from the central part to the north, east and south. The average height is 1,100 meters above sea level. The topography is composed of plateau, hills and basins. 92.5% of the total area is mountains and hills. A typical description of Guizhou is “80% mountains, 10% water, and 10% farmland” (“8 mountains, 1 water and 1 farmland”).

(1) Poor quality of farmland. Guizhou is the only province in the PRC that is inland but has no plains; most of the areas are mountains. Therefore, it is short of land suitable for agriculture. More farmland is on hill slopes. Erosion is serious. Natural disasters are frequent. Farmland is infertile. And the agricultural basis is vulnerable. The contradiction between more people and less land is severe. According to the second land survey in 2009, there are 15.2547 million ha (228.82 million mu) land for agricultural purpose in Guizhou, accounting for 86.6% of the total areas. Of the agricultural land, farmland was 4.4962 million ha (67.4433 million mu), accounting for 25.52% of Guizhou’s total area. There are 47 pieces of flat farmland with over 10,000 mu per piece; the total area of the 47-piece farmland was 83,300 ha (1.25 million mu), accounting for 0.47% of Guizhou’s total area. Of the total farmland in Guizhou, nearly 60% are dry land. The major problem of dry land is dry, infertile, sandy, and leaking. Most of the dry land distributes in the northwest, west and north Guizhou. This kind of farmland is usually on a slope of 10~25 degrees, infertile, cultivation extensive, and the production is low and unstable.

The 50 counties have 59.2% of Guizhou’s farmland and 49.6% of the total population. Although the per capita farland is more than Guizhou’s average level, the 50 counties, in general, still belong to more people with less farmland, and it is particularly short of basic farmland. At the same time, the quality of farmland is poor. For example, Dejiang county has a large area of stony desertification. Dejiang’s farmland on slopes over 25 degree accounts for 32.1% of its total farmland, 3 times of the provincial average value. More people with less land, poor situations of the farmland, lack of basic farmland with a high and stable production, all of these have been the important constraints to the development of Guizhou’s agriculture, rural economy, and the entire economy.

(2) A high proportion of stony desertification. Guizhou is located at the central part of the western karst area, and the ecological conditions are vulnerable. Guizhou is the province in the PRC that has the largest karst area, all classes of karst, THE deepest degree and the most harm of karst. Of the total 176,000 km² areas of Guizhou, the mountains and hills account for 92.5%; karst topography 109,000 km², accounting for 61.2% of Guizhou’s total area. Of all the karst areas, stony desertation area is 37,600 km², accounting for 21.34% of Guizhou’s total area. The mountains are tall; the valleys are deep; the slopes are steep, and the ecological conditions are very vulnerable. All the places with heavy stony desertification are the poorest.

In the second half of 2007, the central government decided to implement a pilot project of comprehensive treatment of stony desertification in 100 counties. Guizhou had 55 counties to implement the pilot project. Of the 55 counties, 35 counties are in the 50 counties with the priority of poverty alleviation and development. Of the 50 counties, 30 counties have an area of stony desertification over 20% of the total areas. There are 9 counties in Guizhou that has a stony desertification area over 40% of the total areas (Xingren, Anlong, Shuicheng, Liuizi, Xingyi, Guanling, Hishui, Changshun, and Ziyun). Of the 9 counties, 7 counties are in the 50 counties with the priority of poverty alleviation and development (Xingren, Anlong, Shuicheng, Liuizi, Guanling, Changshun, and Ziyun).
Table 4: Seven of the 50 counties with the most severely stony desertification

<table>
<thead>
<tr>
<th>County/district</th>
<th>Total area</th>
<th>Area of stony desertification</th>
<th>Proportion in the total area (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liuzhi</td>
<td>179210.0</td>
<td>110361</td>
<td>61.58</td>
</tr>
<tr>
<td>Shuicheng</td>
<td>358910.0</td>
<td>121068</td>
<td>33.73</td>
</tr>
<tr>
<td>Guanling</td>
<td>146800.0</td>
<td>56060</td>
<td>38.19</td>
</tr>
<tr>
<td>Ziyun</td>
<td>228370.0</td>
<td>72650</td>
<td>31.81</td>
</tr>
<tr>
<td>Xingren</td>
<td>178530.0</td>
<td>65808</td>
<td>36.86</td>
</tr>
<tr>
<td>Anlong</td>
<td>223760.0</td>
<td>93906</td>
<td>41.97</td>
</tr>
<tr>
<td>Changshun</td>
<td>155460.0</td>
<td>76226</td>
<td>49.03</td>
</tr>
</tbody>
</table>

Source: Professor Xiong Kangning.

(3) Backward infrastructure. The general problem in all of the 50 counties is the double poorness – the farmers poor and the public finance poor. Because of the double poorness, it is short of the infrastructure investment, and the traffic transportation, communication, culture, education and sanitation are severely backward. And there are many difficulties for the people to go outside the villages, to go to schools, to get drinking water, to go to hospitals and to communicate with the outside. At present, Guizhou has only two indexes with a high value: over 90% of rural households have electricity and over 90% of villages can be reached by vehicles. Besides that, all the other indexes, such as broadcast and television, paved roads reaching to villages and further, clinics at village level, phones reaching the farmers’ home, and safe drinking water, have a proportion of 50% or so. For instance, in Zongdi township, Ziyun County; Wangyou, Chang’an, and Dayin towns/townships, Huishui county, most of the villages have no paved roads. The present roads at the village level are low in the classes and poor in the quality. Therefore, almost all the roads can be used only during fine days and cannot be used during raining days. The present projects for drinking water are far away from meeting the local people’s demand for the production and life. For example, of the 22 administrative villages in Zongdi township, only 7 villager groups in 2 of the villages have tapped waters without any disposal, and there are still 210 villager groups in the other 20 administrative villages getting the water from the nature. The primary public services were done too little in the past, which is one of the significant reasons for the huge distance between Guizhou and the east part of the PRC, the important constraints of the farmers’ poverty alleviation, and the key to affect Guizhou’s development in a same step with the entire country.

1.2.2 Social Causes

(1) The population growth fast while structure update slow. Guizhou’s population growth rate dropped from 11.33‰ in 2001 to 6.96‰ in 2009, but still ranks No. 9 on the PRC’s provincial list, higher almost 2-10th of percentage points than the average level of the country. Of the total new born population, 90% are living in rural areas, which make the poverty alleviation and development further difficult. The rate of birth defects in Guizhou is higher than the average level of the country. Within Guizhou, the rate of birth defects in rural areas is higher than that in urban areas; the rate of birth defects in the places where the minority nationalities are located is higher than the average level of the province. Every year, there are nearly 20,000 birth defects in Guizhou.
Table 5: Rate of population growth in the PRC and Guizhou (%)

<table>
<thead>
<tr>
<th>Year</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>the PRC</td>
<td>5.25</td>
<td>5.17</td>
<td>5.08</td>
<td>5.05</td>
</tr>
<tr>
<td>Guizhou</td>
<td>7.26</td>
<td>6.68</td>
<td>6.72</td>
<td>6.96</td>
</tr>
</tbody>
</table>

Sources: China Statistical Yearbooks, Guizhou Statistics Yearbooks.

In most of poverty-stricken poverty towns and townships within the 50 counties, the proportion of rural people is more than 90% and there are few industrial enterprises or services. The major sources of farmers’ income are crops and livestock. The major crop is corn. The major livestock is hogs and buffalos. Most of the rural households have still not gotten rid of the traditional way of agricultural production. For years they are still staying at the situation “to feed buffalos for plowing, to feed hogs for the Chinese Spring Festival, and to feed hens for money to buy salt”. Therefore, it will be very difficult to increase the farmers’ income. The level of their production and life is still low.

Most of the 50 counties are located in the remote mountainous areas, rocky mountainous areas, high cold mountainous areas, and the inhabitation places of minority nationalities where the natural conditions are very adverse; the society is underdeveloped; and the level of social services is low; the natural environment is harsh; the farmland is less in quantity and poor in quality; and the ecological environment is destroyed heavily. For a long time, because of the pressure of population growing too fast, the over-reclaimed land, more proportion of farmland on slopes, relevant harsh natural conditions, the poverty-stricken areas are frequently attacked by natural disasters, and many of the natural disasters happen at the same time, such as flooding and droughts. Those counties with the priority of poverty alleviation and development are often having the heaviest disasters, and many poor families returned to poverty again after getting rid of poverty. Therefore, it will be very arduous to keep those families from becoming poor again.

(2) The obvious dual structures and the limited help from industry. Compared with the average level of the country, Guizhou has a more obvious characteristic of dual structures. The gaps are increasingly bigger in the development between the agriculture and non-agricultural industries and in the consumption between urban and rural areas. And the developments between areas are further unbalanced. In 2009, Guizhou’s industrial added value accounts for 32.02% of GDP, lower than 39.20%, the country’s average level. Guizhou’s per capita industry output value is 9,022 yuan, one fifth of the country’s average level. Guizhou’s level of industrialization is over ten years behind the country’s average level, and the 50 counties’ further behind Guizhou’s. Almost all the 50 counties have a poor finance, and it will be very limited for the industry to support the agriculture and for the urban areas to support the rural areas.

(3) Insufficient supply of education and fewer skills of labor forces. Influenced by the complicated topography, people in Guizhou live relevant scattered; traffic transportation is inconvenient; costs of education are quite high, and effect-cost of education investments is low. And because of the hard conditions, it is severely short of high-level professional teachers at the local areas. In addition, because the income of local residents, particularly those living in the poor mountainous areas is low, the investment in education is beyond their grasps. In 2009, the per capita education expenses were 713 yuan
in Guizhou, around 73.6% of the country’s average level, and lower than those in the provinces around. The population with high education experiences was 190 and 312 in every 10,000 in 2000 and 2009, respectively, accounting for 52.67% and 45.71% of the country’s average levels and 78.01% and 77.76% of the western average level in 2000 and 2009, respectively. In 2009, the rate of compulsory education is only 76.5%, far less than the country’s average level, 89.7%. Sichuan’s 90.3%, Yunan’s 89.0%, and Guangxi’s 85.0%.

According to Guizhou’s “2010 Sixth National Population Census Bulletin”, published on May 10, 2011, the illiteracy rate in Guizhou is 8.74%, more than double times of the country’s average level (4.08%). According to the data of the second agricultural survey, by the end of 2006, the rural labor’s illiteracy rate in Guizhou was 16.18%, while the country’s and the western average levels were 6.8% and 10.7%, respectively. The proportion of labor forces with education higher than high schools is 11.0% in the PRC, 8.6% in the western part, and only 1.73% in Guizhou province. In the Qianxi’nan prefecture where poverty-stricken counties gather, the illiteracy rate of rural labor forces is up to 17.72%, while the labor forces with education higher than high schools is down to 1.74%. Rural residents in Guizhou, particularly those in the poverty-stricken counties, have a high proportion of illiteracy rate and half-illiteracy rate; the quality of the labor forces is generally low, and those are one of the major constraints to the economic and social development.

(4) Insufficient supply of medical services and a high rate to return to poverty because of diseases. In 2007, although there had been the overall rural minimum living security system in Guizhou, there were still absolute poor people 2.39 million and poverty-stricken people with lower income 4.39 million, respectively, both of which account for over 12% of the country’s average levels and around 20% of the total population in the rural areas. There are still many poverty-stricken rural residents living in Thatched and simple houses. The farmers’ conditions of production and living are still not improved completely in the poverty-stricken areas, and it is very difficult to get rid of the poverty and become rich. Very prominent situation is that, because of natural disasters and/or diseases, the people returned to poverty again after getting rid of poverty. A large group of people are getting in and out of poverty. The poverty-stricken areas have a poor and weak basis and the economic and social development are severely backward. Therefore, it is quite difficult to integrate the urban and rural development.
2. Performance and Experience of Poverty Alleviation and Development in Guizhou since 2001

In 1977, there were two third of population poverty-stricken in Guizhou. By the end of 1985, the absolutely poverty-stricken population was 10 million in Guizhou, declining by 0.87 million, accounting for 12% of the country’s total absolutely poverty-stricken population. The incidence of absolute poverty was 57.5% in Guizhou in 1985. In order to intensify the poverty alleviation and development, the central government and Guizhou provincial government established a leading group institution of poverty alleviation and development in 1986, respectively. Guizhou’s poverty alleviation and development was carried in depth. The provincial government focused on the 31 poverty-stricken counties selected in the light of the national standards (accounting for 12% of all the poverty-stricken counties in the PRC), input various funds 1.64 billion yuan, implemented around 4,000 projects of poverty alleviation. By the end of 1993, the absolute poverty-stricken population in Guizhou had reduced to 10 millions or so from 15 millions in 1985; the incidence of absolute poverty reduced to 34.4% from 57.5% in 1985, and the farmers’ per capita net income in the 31 poverty-stricken counties increased to 335 yuan from less than 150 yuan in 1985. In 1994, the central government implemented the Seven-Year Priority Poverty Alleviation Program. Guizhou had 48 counties implementing the program, accounting for 56% of the total county numbers (by then there were 86 counties in Guizhou) and 8.1% of the 592 poverty-stricken counties in the PRC. During the 7 years of implementing the Seven-Year Priority Poverty Alleviation Program, Guizhou input various funds 9.391 billion yuan for the poverty alleviation. By the end of 2000, the absolutely poverty-stricken population reduced to 3.1346 millions in Guizhou, accounting for 9.8% of the country’s absolutely poverty-stricken population; the incidence of absolute poverty decreased to 9.7%.

on 13 June 2001, the State Council of the PRC issued the National Program of Poverty Alleviation and Development in Rural China during 2001-2010. Of the total 88 counties in Guizhou, 83 counties have a task to implement the program. Of the 83 counties, 50 counties are given the priority to implement the program, accounting for 8.4% of the total 592 counties with the priority of poverty alleviation and development in the PRC. In addition, there are another 934 towns/townships given the priority of poverty alleviation and development. In 2009, the central government raised the poverty line to 1196 yuan. Including the population with a low income, Guizhou had a poverty-stricken population over 5.5 million in 2009, accounting for 13.9% of the country’s total 40.07 millions; the incidence of poverty was 16.5%. In 2010, the poverty-stricken population in Guizhou was 5.053 millions, accounting for 28.9% of the 17.51 million poverty-stricken population in the western part of the PRC and 18.8% of the 26.88 millions in the PRC.

2.1 Major Achievements of the 50 Counties

2.1.1 Economic Development Sped up and Economic Strength Intensified

In 2009, the GDP of the 50 counties was 132.49 billion yuan, 2 times of the GDP in 2005; the per capita GDP was 1324.9 yuan, 2.3 times of the per capita GDP in 2005. In 2009, the general financial budget revenue was of the 50 counties was 8.36 billion yuan, 2.4 times of the revenue in 2005; the per capita general financial budget revenue was 443 yuan, 2.8 times of the per capita revenue in 2005. In 2009, the general financial budget expenses of the 50 counties were 43.42 billion yuan, 2.9 times of the expenses in 2005; the per capita general financial budget expenses were 2,303 yuan, 3.4 times of the per capita
expenses in 2005. In 2009, the fixed asset investment of the 50 counties was 57.43 billion yuan, 2.3 times of the investment in 2005; the per capita fixed asset investment was 3,046 yuan, 2.7 times of the per capita investment in 2005 (see Table 1). The farmers’ per capita net income increased from 1,641 yuan in 2005 to 2,700 yuan in 2009.

### Table 6: Economic situations of the 50 counties in 2005 and 2009

<table>
<thead>
<tr>
<th>Year</th>
<th>Resident population (10,000)</th>
<th>GDP</th>
<th>General financial budget revenues</th>
<th>Farmer per capita net income (yuan)</th>
<th>Fixed asset investment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total (100 million yuan)</td>
<td>Per capita (yuan)</td>
<td>Total (100 million yuan)</td>
</tr>
<tr>
<td>2005</td>
<td>2180.8</td>
<td>652.4</td>
<td>2992</td>
<td>34.7</td>
<td>159</td>
</tr>
<tr>
<td>2009</td>
<td>1885.7</td>
<td>1324.9</td>
<td>7026</td>
<td>83.6</td>
<td>443</td>
</tr>
</tbody>
</table>

Source: relevant statistics.

### 2.1.2 Structural Readjustment Intensified and the Development of Specialty Industries Sped up

After years’ efforts, the industrial structure of the 50 counties had changed from 35.28:32.5:32.2 in 2005 to 25.0:36.6:38.4 in 2009; the proportion of the secondary industry rose by 4.1 percentage points. The 50 counties’ total output value of agriculture, livestock, forestry, and fishery rose from 25.587 billion yuan in 2005 to 50.229 billion yuan in 2008; yearly rate of growth is 8.8%, higher than the provincial average level. At the same time, a number of industrial bases were established; a number of specialty industries were developed. By 2010, a production pattern was primarily formed that, oil is produced in the east; fruits are produced in the west; medicinal materials are produced in the south; teas are produced in the north; vegetables are produced in the central part, and buffalos and goats/sheep are produced in all over the province.

### Table 7: Industrial Structures of the 50 counties in 2005 and 2009

<table>
<thead>
<tr>
<th></th>
<th>Primary industry</th>
<th>Secondary industry</th>
<th>Tertiary Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>35.3</td>
<td>32.5</td>
<td>32.2</td>
</tr>
<tr>
<td>2009</td>
<td>25.0</td>
<td>36.6</td>
<td>38.4</td>
</tr>
</tbody>
</table>

Source: calculated based on the relevant data.

### 2.1.3 Infrastructure Increasingly Updated and Social Welfare Improved

Guizhou provincial government paid much attention to the infrastructure construction, particularly giving the priority to the traffic transportation and irrigation. The fundamental conditions for the economic and social development were continually improved in the poverty-stricken areas. During the period of the
Eleventh Five-Year Plan implementation, it started and/or completed the express railways from Guiyang to Guangzhou, Changsha, Kunming, Chengdu, and Chongqing. By 2010, within Guizhou, there were railways 1,983 km; another 1,216 km was under construction. By 2010, the highway able to drive vehicles was nearly 150,000 km in Guizhou, 96.9% of the administrative towns/townships and 29.6% of administrative villages can be reached by the paved roads. By 2010, Guizhou had express highway 1,507 km; another 2,556 km was under construction. Besides the Longdongpu Airport at Guiyang, there are also 5 feeder route airports at Tongren, Xingyi, Liping, Libo, and Huangguoshu. The key water control project at Qianzhong was being constructed. The first stage of the “Ziqian” project was making good progress. The basic farmland increased by over 100,000 mu. The effective irrigation areas had reached to 0.64 mu per capita. The problem affecting 10.6 million people’s drinking water has been solved. The ecological construction such as reforesting the cultivated land and treatment of stony desertification has a great achievement. The forest coverage rate has been 40.5%.

Since July 2007, Guizhou started to implement the income guarantee system for the low-income families in rural areas. This system has covered 5.8535 million low-income rural families. Almost all the low-income rural families are covered by the system. In 2008, Guizhou Started to implement a pilot project of dangerous rural houses refurbished. Guizhou is the first province to implement this pilot project in the PRC. By 2010, the total investment was over 10 billion yuan; the dangerous houses of 601,700 rural families were refurbished, and the farmers’ life conditions are much better. In 2010, Guizhou provincial government arranged 1.363 billion yuan for the construction of new rural cooperative medical services; the subsidy standard was 120 yuan. The services cover 96% of total farmers in the province, and the difficulties for rural people to go to hospitals are mitigated.

2.1.4 Poverty-stricken Population Continually Declining and Poverty Incidence Continually Going down

In 2003, the 50 counties had 2.1821 million absolutely poverty-stricken population; the incidence of absolute poverty was 10.9%. In 2007, the absolutely poverty-stricken population declined to 1.6342 million; the incidence of absolute poverty declined to 8.1%. since 2008, the low-income population was added as the target group, and the 50 counties had a poverty-stricken population 4.407 millions; the incidence of poverty was 21.5%. In 2009, the poverty-stricken population in the 50 counties reduced to 4.1968 millions; the poverty incidence was 20.4% (see Table 2).

<table>
<thead>
<tr>
<th>Year</th>
<th>Absolute poverty-stricken population in the 50 counties (10,000)</th>
<th>Incidence of absolute poverty in the 50 counties (%)</th>
<th>Absolute poverty-stricken population in Guizhou (10,000)</th>
<th>Incidence of absolute poverty in Guizhou (%)</th>
<th>poverty-stricken population under the low income in Guizhou (10,000)</th>
<th>Incidence of poverty-stricken population under the low income in Guizhou (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>--</td>
<td>--</td>
<td>313.46</td>
<td>9.7</td>
<td>871.26</td>
<td>27.2</td>
</tr>
<tr>
<td>2001</td>
<td>--</td>
<td>--</td>
<td>307.32</td>
<td>9.5</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>2002</td>
<td>--</td>
<td>--</td>
<td>310.31</td>
<td>9.5</td>
<td>850.43</td>
<td>25.9</td>
</tr>
<tr>
<td>2003</td>
<td>218.21</td>
<td>10.9</td>
<td>289.8</td>
<td>8.7</td>
<td>775.71</td>
<td>23.4</td>
</tr>
<tr>
<td>2004</td>
<td>208.16</td>
<td>10.4</td>
<td>276.46</td>
<td>8.3</td>
<td>753.68</td>
<td>22.6</td>
</tr>
</tbody>
</table>
2.1.5 Training Intensified and the Quality of Labor Forces Increasingly Improved
The government departments at all levels within Guizhou actively organize technical trainings for the farmers. The training programs have been over 20, including “the training program of taking a lead to start a business and leading the women to become rich”, the training program of long-distance education in rural areas, the sunlight project, the rain program, the scientific and technical training project for new-type farmers, and so on. By the end of 2008, totally 1.329 million rural labor forces were trained in Guizhou. A number of brands of labor forces had been formed, such as Tianzhu electrical workers (the electrical workers from Tianzhu county), Qiannan loaders (loaders from Qiannan), and Zunyi Meizi (girls from Zunyi). It has primarily reached the goal to train first, transfer the labor forces second, and make them steadily work at the new position third. At present, Guizhou has over 5 million rural labor forces employed outside their villages, of which over 4 million are employed outside Guizhou province.

2.1.6 Ecological Treatment Intensified and Resources and Environment Continually Improved
By 2008, totally 18.29 million cultivated land were reforested; 10.88 million mu natural forests of public welfare were protected, and the ecological construction was pushed on. By 2008, totally 672,000 mu were planted trees and grasses; 665,000 mu were planted trees and bamboos; 367,000 mu were planted trees and medicinal materials; 700,000 mu were planted trees and fruit trees, and 2 million forests were planted for timbers. Those plants have both economic and ecological benefits. It also intensifies the construction of rural energy, the comprehensive treatment of stony desertification, and improvement of the eco-environment.

2.2 Major Experience of Guizhou’s Poverty Alleviation and Development
2.2.1 Focusing on the Three Fundamental Issues to Conduct the Poverty Alleviation and Development
The governments at all levels in Guizhou paid great attention to the poverty alleviation and development. The provincial leaders and departments had particular areas (counties, towns/townships, and/or villages) as the object of poverty alleviation and development. A system of “four helps and four promotions” is established. Ten thousands government officials/officers went to the poverty-stricken counties, towns/townships, and/or villages, as a local official/officer to help the poor. In order to improve the poor’s basic life and production conditions, expand channels of their income, and improve their basic qualities (the three issues mentioned in the title), three types of poverty alleviation were adopted, they are: to alleviate poverty by promotion of development, to alleviate poverty by relocation, and to alleviate poverty by relief/assistance. The primary unit of poverty alleviation and development was villages, combined with towns/townships. In a scale of “a hundred towns/townships and a thousand villages”, to improve the basic quality and build the capacity of self-development were taken as the essential; the training and transferring of rural labor forces in the poverty-stricken areas were actively conducted. By the development of crops, livestock, and processing of agricultural products and by-products, the poverty alleviation was conducted
in a way of industrialization, and the achievements of poverty alleviation and development are remarkable.

2.2.2 Making Planning to Promote the Poverty Alleviation and Development by Industrialization
To conducted poverty alleviation and development by industrialization was an important channel to raise the poor’s enthusiasm and initiatives to get rid of poverty, and promote the progress in the poverty alleviation and development. In the practice, Guizhou took the scientific planning as a basis, the industrialization as a support, to speed up the poverty alleviation and development. Several series planning of poverty alleviation and development and industrialization were made. In the light of the industrial distribution, “oil production in the east, fruits production in the west, production of medical materials in the south, tea production in the north, vegetable production in the central part, and buffalos and goats/sheep were fed all over the province,” Guizhou intensified the construction of industrial bases, sped up specialty and advantageous industries, established several clusters of industries, developed a group of high-grade products with a famous brand, cultivated a number of agricultural industries and enterprises, and led a lot of the poor increasing their income and becoming rich. At present, the constructed bases are 132,000 mu of tea-oil trees, 459,000 mu of teas, 270,000 mu of vegetables, 2.736 million goats/sheep and 39,000 buffalos.

2.2.3 Innovating in the Institutions to Get a Better Effort of Poverty Alleviation and Development
Taking the increase in the farmers’ income as the core, the increase in the effects of poverty alleviation as an objective, adopting the measures based on the local conditions, Guizhou actively innovated in the institutions. First, it integrated the resources to enhance the comprehensive capacity of poverty alleviation and development. By the methods of “channels clear, uses unchanged, plans made as a whole, responsibilities taken as/for one’s own, and achievements belonging to the own made them,” Guizhou province used the particular funds combined with the departments’ funds related to agriculture, took the industrialization as the start point to make efforts to alleviate the poverty, and concentrated on to help the poor improve their life and production conditions. By this way, it both raised the efficiency of the funds for poverty alleviation and development, and promoted the government departments to put their efforts together. Second, Guizhou actively explored and extended the mechanism to use the funds in a rolling way. It took the public financial funds for the poverty alleviation and development as a glue, including financial funds, social funds, and departments to invest in the poverty alleviation and development, expanding the channels of investment in the poverty alleviation and development, and making the “cake of poverty alleviation” bigger. Third, Guizhou explored and established a new mechanism of farmers’ mutual funding in the rural areas. In the lights of “four musts” (the funds must be used within the villages, not allowed to be used in other villages and not allowed to absorb savings; the poor households that have records in the government must be the first choice of the loaning; the purpose of the funds used must mainly be industrial development, and the operation must be standardized, paying attention to prevent the risks and intensifying the monitoring and guiding), Guizhou implemented a pilot project of mutual funding in 200 poverty-stricken villages, 29 counties. In the pilot villages, the mutual funds were saved in financial institutions; the financial institutions enlarged the loan proportion, the farmers together borrowed and admitted to return the loans, and the government subsidized the loans for poverty alleviation and development. This mechanism effectively mitigated the lack of financial products in rural areas and the lack of farmers’ funds for production.

2.2.4 Promoting the Poverty Alleviation in a Unit of an Administrative Area to Integrate the Development
In 1988, Bijie prefecture was taken as a pilot area of reform under the subject of poverty alleviation by
development, ecological construction and population control. During the 23 years after 1988, Bijie had been persisting in the principles to develop and alleviate the poverty together, to conduct the ecological recovery and construction at the same time, and to raise the population’s quality while controlling the population’s quantity. As a result, the economy and society had a significantly historical change. The total economy increased by 32.7 times; the poverty-stricken population declined from 3.12 millions to 318,400. Weining autonomous county took the whole county to get rid of poverty as a goal, paying attention to the poverty alleviation and development and comprehensive treatment of the karst areas, concentrating all of the county’s strength on the poverty alleviation, focusing on the six issues to get the rural poor rid of poverty, paving the roads, providing safe drinking water, refurbishing the dangerous houses, preventing and controlling epidemic diseases, improving the sanitation, and making efforts to be a good example of poverty alleviation for the other parts of the province. Yinjiang autonomous county gave the priority of poverty alleviation and development to Shanshu township and invested over 60 million yuan in 14 villages within the township for the poverty alleviation and development. The farmers’ per capita income rose from 1,580 yuan in 2006, the year the project started to be implemented, to 2,350 yuan in 2009, increased by 48.7%. The poverty-stricken population declined from 6,685 before the project had been implemented to 3,450 at the end of 2009; the incidence of poverty reduced by 20%.

2.2.5 Motivating All Parts’ Initiatives to Form a Large Scale of Poverty Alleviation

According to an imperfect statistics, from 2001 to the end of 2008, the central government had 126 officers going to and staying in Guizhou as a local officer for the poverty alleviation and development, implemented 419 projects of poverty alleviation and development, provided 306.045 million yuan for the poverty alleviation and development, financially supported 17,874 college students from poor rural families, held 187 training programs and 18,714 people/times trained, introduced 218 technicians and 79 techniques. At the same time, the designated supporter cities, Dalian, Qingdao, Ningbo and Shenzhen together donated Guizhou 966 million yuan, implemented a number of programs, constructed and refurbished 1,156 school buildings, established and improved 210 hospitals and/or clinics at town/township levels, financially supported 162,700 kids who have no schools and/or come from the particularly poor families to go to schools, financially supported the construction of 352,500 mu basic farmland, provided drinking water for 570,200 people and 506,000 domestic animals, constructed 2,396 km rural roads, sent electricity to over 100 villages, helped over 2,000 particularly poor households relocated, constructed 4,000 rural methane tanks, and helped 311 particularly poor households refurbish their houses.
3. Meanings and Conditions to Promote the 50 Counties’ Economic Development

3.1 The Meanings

3.1.1 An Important Part of Coordinatively and Rapidly Great-leap-forward Development
The 50 counties have a significant position in Guizhou province, accounting for 56.8% of the total counties, 66% of the total areas, 49.6% of the whole population, and 59.2% of the normal farmland. In 2009, the 50 counties’ GDP accounted for 33.6% of Guizhou’s total GDP; the scale industrial added value accounted for only 25.5% of Guizhou’s total, and the per capita GDP was 7,026 yuan, only 68.15% of the provincial average level (10,309 yuan). Those data show that the 50 counties’ economy is poor; both the total amounts and per capita amounts are seriously behind Guizhou’s average level.

In 2008, there were three tangible gaps in the economic indexes between the top 10 counties and the last ten counties on the list of Guizhou’s county-level GDP. First, the top 10 counties’ GDP was 107,983 billion yuan, 7.24 times of the last 10 counties’ GDP. Second, the top 10 counties’ per capita GDP and per capita net income were 6.82 times and 2.23 times of the last 10 counties’ per capita GDP and per capita net income, respectively. Third, the top 10 counties’ GDP accounted for 32.39% of Guizhou’s GDP, while the proportion of the last 10 counties’ GDP in the province was only 4.47%.

At present, the two largest problems faced by Guizhou’s development were the development slow and the development way extensive. Those two questions are particularly severe in the poverty-stricken and backward areas. In 2008, the last 10 counties on the list of Guizhou’s economic development are Wangmo, Ceheng, Zheng’an, Huangping, Ziyun, Liping, Wuchuan, Sandu, Weining and Leishan county. Those counties’ development was slower since the reform and opening up and the share in Guizhou’s GDP gradually declined. The share of those 10 counties’ GDP in Guizhou’s GDP was 7.83% in 1978 and declined to 4.47% in 2008. The share of those 10 counties’ fixed asset investment in Guizhou’s fixed asset investment was 3.5% in 1978 and declined to 2% in 2008. The share of those 10 counties’ general financial budget revenue in Guizhou’s general financial budget revenue was 4.6% in 1978 and declined to 2.5% in 2007. The 10 counties’ per capita GDP was 78.69% of Guizhou’s average level in 1978 declined to 40.57% in 2008. Therefore, it is necessary to concentrate all strength in the province to help the poverty-stricken areas and the areas inhabited by the minority nationalities speed the development up.

3.1.2 A Key Task to Construct a Harmonious Society in Guizhou
The harmony of a society largely depends on its productivity, as productivity creates the material foundation for the society. Because of the historical, natural and social factors, people in urban and rural Guizhou are still not rich; there is still a large rural area poverty-stricken. To help the poor get rid of poverty and improve their life and production conditions is an important basis and guarantee of constructing a harmony socialist society.

Guizhou is a poor province in the PRC. In 2009, Guizhou’s GDP, farmers’ per capita net income and urbanization rate were only 37%, 58% and 64% of the PRC’s average levels, respectively. In 2010, 40 of the 50 counties had a lower farmers’ per capita net income than Guizhou’s average level. Therefore, for
Guizhou to catch up the other provinces in the PRC by 2020, the difficult point is the rural area and the key point is the 50 counties.

3.2 Conditions

3.2.1 Favorable conditions

(1) A favorable policy environment. The central government has been giving the first priority to solving the problem of agriculture, farmers and rural areas. Guizhou provincial government also has a series of policies of poverty alleviation and development. These favorable policies have promoted and will further promote the improvement of the basic life and production conditions in the poverty-stricken areas, the improvement of the poor’s comprehensive quality, and the improvement of the ecological environment.

(2) Years’ experience in poverty alleviation and development

Since the implementation of the Seven-Year Priority Poverty Alleviation Program, Guizhou governments at all levels have been making great efforts to alleviate the poverty, exploring various ways of poverty alleviation and development, and accumulating a lot of experience in the poverty alleviation and development.

(3) Strong desire to get rid of poverty. For years, people in Guizhou, particularly those in rural areas, have been expecting to improve the conditions of their life and production. And their desire to get rid of poverty is very strong. Since the implementation of poverty alleviation and development programs, officials/officers at all government levels in Guizhou have been considering how to alleviate and eliminate the poverty. All the people, from aged to kids, have been working hard to get rid of poverty.

3.2.2 Difficulties

(1) Poor natural conditions. Guizhou has the largest area of karst topography in the PRC, and the natural conditions are very adverse. The quality of farmland is poor. The ecological environment is vulnerable. At the same time, Guizhou’s climate is various in both horizontal and vertical directions, which are constraints to the promotion and extension of advanced technologies and good varieties in a large area. There is a big risk for modern agriculture.

(2) Lack of infrastructure. By 2010, there were still over 500 administrative villages not able to reach by highways. Almost 100 villages had no electricity and no telephones. Over 10 million people had difficulties in getting drinking water or had not safe drinking water. Lack of infrastructure is still the bottleneck of the 50 counties’ economic development.

(3) Unreasonable industrial structures. In the 50 counties, agriculture has been having a big proportion. Within the agriculture, the proportion of efficient agriculture, green agriculture, and specialty agriculture is small. The secondary industry is backward. Most of the industries within those 50 counties are resource intensive and/or labor intensive. The tertiary industry is backward. The major part of tertiary industry is still the traditional services.

(4) The task of poverty alleviation tough. First, the poverty-stricken people have great proportion. Second, the incidence of poverty is high. Third, many poverty-stricken people are living in the areas where minority nationalities are inhabited. Forth, 95% of the poverty-stricken people live in the Wuling mountainous areas, Wumeng mountainous areas, and Miaoling mountainous areas, where the natural
conditions are tough, short of infrastructure, and the development is difficult.

Table 9: Comparison of major indexes between the 50 counties and the other counties in Guizhou and the PRC

<table>
<thead>
<tr>
<th>Year</th>
<th>Type</th>
<th>Resident population at the end of the year (10,000)</th>
<th>GNP (100 million yuan)</th>
<th>General financial budget revenue (100 million yuan)</th>
<th>Fixed asset investment (100 million yuan)</th>
<th>Farmers’ per capita net income (yuan)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total</td>
<td>Per capita</td>
<td>Total</td>
<td>Per capita</td>
</tr>
<tr>
<td>2000</td>
<td>Priority counties</td>
<td>2078</td>
<td>321.9</td>
<td>1615</td>
<td>17.6</td>
<td>85</td>
</tr>
<tr>
<td></td>
<td>Other counties</td>
<td>1678</td>
<td>671.6</td>
<td>3837</td>
<td>30.9</td>
<td>184</td>
</tr>
<tr>
<td></td>
<td>Guizhou</td>
<td>3756</td>
<td>993.5</td>
<td>2662</td>
<td>85.2</td>
<td>103</td>
</tr>
<tr>
<td></td>
<td>the PRC</td>
<td>126583</td>
<td>89403.5</td>
<td>7063</td>
<td>6406.1</td>
<td>506</td>
</tr>
<tr>
<td>2005</td>
<td>Priority counties</td>
<td>2181</td>
<td>652.4</td>
<td>2992</td>
<td>34.7</td>
<td>159</td>
</tr>
<tr>
<td></td>
<td>Other counties</td>
<td>1750</td>
<td>1326.7</td>
<td>7580</td>
<td>68.8</td>
<td>393</td>
</tr>
<tr>
<td></td>
<td>Guizhou</td>
<td>3931</td>
<td>1979.1</td>
<td>5052</td>
<td>182.5</td>
<td>464</td>
</tr>
<tr>
<td></td>
<td>the PRC</td>
<td>130756</td>
<td>185808.6</td>
<td>14185</td>
<td>15100.8</td>
<td>1155</td>
</tr>
<tr>
<td>2009</td>
<td>Priority counties</td>
<td>1886</td>
<td>1324.9</td>
<td>7026</td>
<td>83.6</td>
<td>443</td>
</tr>
<tr>
<td></td>
<td>Other counties</td>
<td>1912</td>
<td>2587.8</td>
<td>13532</td>
<td>150.1</td>
<td>785</td>
</tr>
<tr>
<td></td>
<td>Guizhou</td>
<td>3798</td>
<td>3912.7</td>
<td>10309</td>
<td>416.5</td>
<td>1097</td>
</tr>
<tr>
<td></td>
<td>the PRC</td>
<td>133474</td>
<td>343464.7</td>
<td>25575</td>
<td>35915.7</td>
<td>2691</td>
</tr>
</tbody>
</table>

Notes: 1. The priority counties are the 50 counties with the priority of poverty alleviation and development; other counties are the counties in Guizhou other than the 50 counties. 2. There were 48 poverty-stricken counties in Guizhou in 2000 and 50 counties since 2001. 3. The general financial budget revenue at Guizhou provincial level includes the general budget revenue at the provincial level, prefecture level, county level and town/township level. The general financial budget revenue at county level includes only the general budget revenue at the county level and town/township level. 4. Fixed asset investment at county level includes over 500,000 yuan urban fixed asset investment and rural non-household investment.
Table 10: Name of the 36 counties of minority nationalities in the 50 counties

<table>
<thead>
<tr>
<th>City/prefecture</th>
<th>County</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zunyi</td>
<td>Daozhen Gelaozu Miaozu autonomous county, Wuchuan Gelaozu Miaozu autonomous county</td>
</tr>
<tr>
<td>Anshun</td>
<td>Guanling Buyizu Miaozu autonomous county, Zhenning Buyizu Miaozu autonomous county, Ziyun Miaozu Buyizu autonomous county</td>
</tr>
<tr>
<td>Bijie</td>
<td>Weining Yizu Miaozu autonomous county</td>
</tr>
<tr>
<td>Tongren</td>
<td>Yinjiang Tujiang Miaozu autonomous county, Yanhi Tujiangzuo autonomous county, Songtao Miaozu autonomous county</td>
</tr>
<tr>
<td>Qianxi’nan</td>
<td>Xingren, Pu’an, Qinglong, Zhenfeng, Wangmo, Ceheng, Anlong</td>
</tr>
<tr>
<td>Qiandongnan</td>
<td>Huangping, Shibing, Sansui, Cengong, Tianzhu, Qingping, Jianhe, Taijiang, Liping, Rongjiang, Congjiang, Leishan, Majiang, Danzai</td>
</tr>
<tr>
<td>Qiannan</td>
<td>Sandu Shuizu Autonomous county, Libo, Dushan, Pingtang, Luodian, Changshun</td>
</tr>
</tbody>
</table>

(5) **Weak capacity of self-development.** Most of the 50 counties have a weak capacity of social and economic development and less public finance. First, the rural labor forces have a low education level and comprehensive quality. Second, there are not much extension and application of agricultural sciences and technologies. Third, there is little self-accumulation of funds. Consumption expenses account for over 80% of the net income. Forth, the ability of self-development is weak. The 50 counties have a relatively lower GDP, general finance budget revenue, fixed asset investment, and per capita net income than Guizhou’s average level.
4 Ideas, Objectives and Priorities to Speed the Economy Development of the 50 Counties up

4.1 Strategic Ideas and Objectives

4.1.1 Strategic Ideas. Guided by Deng Xiaoping’s theory and the three-representative ideas, in order to implement the viewpoint of scientific development, in the principles of promoting the transformation during the development and seeking the great-leap-forward development during the transformation, it should develop industrialization and urbanization, intensify the comparative advantage and develop specialty industry, make efforts to increase the farmers’ income and the counties’ capacity of self-development, optimize the environment and expand the investment, and promote the economy growth rapidly and soundly.

4.1.2 Strategic objectives. Focusing on the elimination of absolute poverty by 2020 and the farmers’ income doubled since 2008, it should work hard to reach the goal of doubling the total output value from 2010 to 2015, total financial revenue in half of the 50 counties over 400 million yuan, the farmers’ per capita net income over 5,000 yuan, poverty-stricken population reduced by a 50%. By 2020, it should raise the comprehensive economic strength of the poverty-stricken areas to a much higher level, the quality of poor people’s life to a much higher level, and the industries of poverty alleviation and eco-environment protection to a much higher level.

4.2 Guidelines

4.2.1 To promote the transformation by development and seek development during the transformation. It should put the development at the first place, create the conditions, work hard, and speed the development up. It should make efforts to expand the economic scale and intensify the economic strength of the 50 counties. It should take the strategic readjustment of economic structures as the main direction, expanding the scale of investment, enhancing the construction of priority projects, intensifying the fundamental role of agriculture, expanding the industrial economy, concentrating the strength to develop the priority industries, specialty industries, and making efforts to solve the problems that affect the priority fields and key chains of eth economic development.

4.2.2 To take the measures based on local conditions and to guide by types. It should combine the development with the real situation of the 50 counties, developing agriculture in the area suitable to agriculture, developing industries in the areas suitable to industries, and developing tourism in the areas, based on the locations, resource endowment, industry structures and the level of economic development. In addition, it should guide the development by the situations, allowing the differences between areas, and supporting the counties with a better foundation to develop rapider and earlier.

4.2.3 To take the reform and opening up as motive force and to persist in the coordinated growth of the society and economy. It should emancipate the mind, breaking the various obstacles of economic development, delegating the powers to lower management levels, allowing the reform more flexibility, and establishing a new highly efficient mechanism of economic development at the county level.

In the new period, it is crucial to alleviate poverty by industrialization. It must take the development of
industrialization as the start point, making the planning and constructing the specialty industries and advantageous industries as soon as possible. At the same time, it should give the overall consideration, making efforts to improve the fundamental conditions and environment of economic and social development, coordinating the urban and rural development, intensifying the innovation in the management of societies, increasing the supply of public goods, improving the conditions of people’s living, raising the level and quality of the people’s life in both urban and rural areas, and reaching a coordinated development between the economy and society, the population and resources and environment.

4.2.4 To enhance the combination between the help from outside with the local efforts. The 50 counties are lack of basis of economic and social development, lack of the capacity of self-development, and need to intensify the support, increase the financial investment, and improve the development conditions. At the same time, it must persist in the principle to alleviate the poverty by development. It should fully mobilize the local government officers and local people and encourage their creativeness, which is the essential guarantee to speed up the development of poverty-stricken areas. It should take the solution of the poor’s basic life conditions as the first task, giving the priority to the capacity-building of self-development of rural poor. It should take the industrialization as the start point to alleviate the poverty, further intensify the industrial development, and raise the whole area’s economic development level.

4.3 Strategic Priority

4.3.1 To intensify the construction of high-standardized basic farmland and to increase the comprehensive capacity of agricultural production. GuiZhou is province that has more people and less land, ecologically vulnerable, lack of infrastructure, and a low comprehensive capacity of agricultural production. It is very difficult to raise the production to a much higher level on the limited farmland. It must convert the way of agricultural growth and develop intensive agriculture. It should make efforts to improve the farmland with a middle and/or lower production and ensure the improvement of comprehensive capacity of agriculture, particularly grains. For Guizhou, it is necessary to emphasize the treatment of farmland on the slopes. At present, around 70% of Guizhou’s farmland has a middle or low yield. The effective irrigation farmland is only 16.31 million mu. Many of farmland is still rainfed. Therefore, it must speed up the improvement of the basic agricultural conditions and the intensification of the material and technical equipment in agriculture. It should particularly intensify the construction of middle and small irrigation projects. It must closely rely on the scientific and technological progress, speed up the transformation of traditional agriculture, raise the comprehensive production capacity of agriculture and the level of standardized production, and raise the per unit production.

4.3.2 To take advantage of resources and to develop specialty products. It should fully use the various climates and biological resources to produce specialty products and speed up modern agriculture and special agriculture. It should take the increase of farmers’ income as the core, optimize agricultural structure, and make great efforts to develop special agriculture, special crops, and forestry economy. It should consolidate the production of oilseed, tobacco, and other traditional cash crops and speed up the development of Chinese medical materials, teas, peppers, vegetables, high-quality fruits, nuts. It should speed up the construction of production bases of special products, cultivate the leading products and areas for the specialty products, and gradually form a scaled zone of high efficient agriculture. Second, it should make great efforts to develop livestock, take the livestock development as the major direction of readjustment of agricultural structures, and gradually reach the transformation from the production of crops and livestock to the production of pastures and livestock. It should actively extend quality varieties
and promote the livestock development to the direction of saving resources. Third, it should develop equipment agriculture, such as greenhouse, rain collection, and film coverage.

4.3.3 To promote industrialized agriculture and develop the industries related to agriculture.

The 50 counties have rich natural resources, which are the conditions to develop minerals, energy and construction materials. Those counties without the resource basis should develop agribusiness, expanding the total economy and wealth of the 50 counties. It should take the industrialization as the core and promote the urbanization and agricultural modernization. According to the international experience, the traditional agriculture has declined to about 2% of the GNP in the USA, Japan, European Union, and other developed countries. The share of agribusiness in these countries is stably 8-10%. The 50 counties should, in the light of the provincial government’s strategy of industrialization, conduct the deep processing of agricultural products, develop local specialty products, and develop agribusiness to match the demand of the large programs, the urban industries and the large enterprises. By 2015, it should try to make half of the 50 counties have a added value of the secondary industry higher than the added value of the primary industry.

### Column 2 Agribusiness

Agribusiness is the businesses related to agriculture. It is composed of agricultural machinery, pesticides, fertilizers, varieties, and other industries before and/or after agriculture, until the processing, food production, and transportation/distribution of agricultural products. It is an industry with a long chain.

4.3.4 To speed up the development of services led by tourism.

Guizhou has a particular topography, karst, undisturbed natural environment, special styles of the minority nationalities, and the historical revolutionary traces. Most of the 50 counties are located in the places with good natural ecology and rich cultural resources. Therefore, it should combine the poverty alleviation with the development of tourism and increase the local people’s income. According to the statistics from Guizhou provincial bureau of tourism, during the Eleven Five-Year period, there were nearly 420,000 rural people relying on the tourism getting rid of poverty; almost all the rural families who operated tourism got rid of poverty within three years after they started the tourism business.

4.3.5 To be driven by the urbanization to actively develop park-district economy.

It should select some of the 50 counties to construct the towns and small cities by developing middle- and small-sized enterprises and private enterprises, take the processing of agricultural products as a major business, and expand the town economy. It should work towards the direction to improve the functions, absorb more population, and improve the management of the towns and small cities. It should intensify the infrastructure in those towns and small cities, intensify the industries, expand the capacity of the towns and small cities to load more population, intensify the capacity to gather more people and resources and to drive the places around, and promote more information, funds, techniques, and human resources to gather at the towns and small cities.

It should be the features of urbanization, modern agriculture, and new-type industry that the economy of towns and small cities is developed as a park-district, the economy at the park-district is industrialized, and the industrial economies are gather together. By scientific planning and reasonable distribution, the 50 counties should establish various industrial park-districts and lead funds, human resources, and techniques
4.3.6 To speed up the construction of new rural areas. It should take the advantage of dangerous rural houses refurbished, speed up the improvement of rural appearance, and promote the new rural construction. First, it should lay stress on the rural features, local features, traditional features and minority features, make scientific planning of construction of administrative villages towns/townships and distributions of villages. It should intensify the construction of infrastructure and public services and intensify the village integration and dangerous houses refurbished. Second, it should actively promote the model of new rural construction. It should promote the public services for everybody, improve the infrastructure for rural education, culture, sanitation, recreation, exercise, and so on, intensify the conservation and development the particular nationalities’ villages, and speed up a number of new rural communities. Third, it should speed up the extension of urban infrastructure, improve the infrastructure of rural water, electricity, roads, gas, and houses, and speed up the improvement of the conditions of rural people’s life and production. Forth, it should enhance the treatment of rural environment solve the problems of people living scattered, with domestic animals, and chaos in the distribution. Fifth, it should intensify the construction of ecological homeland, make great efforts to plant trees, close the mountains for protecting the trees, speed up the farmland shelterbelts, road shelterbelts, yard greenbelts, and promote the rural areas ecological and green.

4.3.7 To speed up the construction of infrastructure. A research conducted by the World Bank shows that, the capacity of infrastructure grows in a step same with the economic output. The infrastructure increased by 1% per year; the GDP growth was around 1%, too. Domestic and international experience shows that, the construction of infrastructure is an important condition of the economy growing in a high speed. According to relevant information, in the PRC, one yuan added investment in the construction of infrastructure could increase the GDP over 3 yuan.

It should speed up the construction of infrastructure, including traffic transportation, irrigation, new energy, communication, information.

4.3.8 To intensify the ecological construction and environment protection.
Guizhou is located in the upstream areas of the Yangtze river and Pearl river (Zhujiang), most of the poverty-stricken counties have rich natural resources, for example, a high forest coverage. However, the ecology is vulnerable, and it is difficult to transform the resource advantage to economic advantage. It must make great efforts to develop ecological agriculture, ecological forestry and ecological tourism, construct ecological towns and small cities and ecological traffic transportation, and gradually form the industrial structures, growth styles, and consumption styles matching the ecological economy. It should develop the industries that save energy and have less emission, make great efforts to promote clean production, cultivate a number of demonstrative areas of ecological agriculture, and raise the level of comprehensive utilization of resources. It should enhance the environment protection and pollution control and treatment, particularly the pollution control and treatment in the areas of drinking water gathered, food processing, small cities and significant towns. It should continue to protect the natural forests, reforest on the cultivated land, and construct the forest shelterbelts. It should enhance the control and treatment of erosion and stony desertification. It should speed up the development of rural methane tanks, actively save energy, save water, and comprehensively use resources.
4.3.9 To deepen the reforms and to improve the development environment.

It should promote the reform of land management system in rural areas, improve the market of land contracted and the operation rights transferred, explore the ways of land combined with the programs, promote the transfer of land contracted rights, and develop various scaled operation. It should encourage the rural factors, such as land and labor forces, becoming a share and participating in local resource development. It should deepen the reform of collective forest rights, promote the pilot projects of trading forest rights and water rights.

It should put the strategic emphasis on the development of private economy, actively encourage social capitals participating in the local economic development, and realize the investment diversification.

It should further readjust and optimize the ownership structure, select a number of national properties, transfer the shares, and introduce new investment and promotion. It should support the private business to establish enterprise groups, conduct the production in a scale, and speed up their growth.
5. Suggestions on the Strategic Measures

5.1 To make the planning of ten-year poverty alleviation as soon as possible

According to the central government’s tasks and requests on poverty alleviation and development in the new century, combined with Guizhou’s real situation, it should focus on the goal to primarily eliminate absolute poverty by 2020, double the farmers’ per capita income since 2008, and make the farmers in the 50 counties have a speed of income growth quicker than the farmers’ average level in the country, it should work out well the planning of Guizhou Province Program of Poverty Alleviation and Development during 2011—2020, the Twelfth Five-Year Planning of Poverty Alleviation and Development, the planning of poverty alleviation and development in a large area in the particularly poor areas, and the planning of promoting poverty alleviation and development in a county, town/township and village as a unit. The work of poverty alleviation and development should conduct following the planning; the funds follow the projects, and the planning follows the goals/objectives.

5.2 To intensify the investment and to improve the capacity of the 50 counties’ economic development

5.2.1 The support from the central government should be intensified.

As a poor province, Guizhou has no much funding for the poverty alleviation and development. Therefore, in order to realize the goal by 2020, it is necessary for the central government to offer particular financial support. The central government should help Guizhou establish a relatively steady mechanism of financial funding growth for poverty alleviation. The growth of central government’s financial support to Guizhou should be rapider than the whole country’s financial support for poverty alleviation and development in the country. It should speed up the improvement of the mechanism of financial transfer payments to the counties with the priority of poverty alleviation and development. It should establish a system of special transfer payments for the promotion the economic development of the counties with a priority of poverty alleviation and development.

5.2.2 The provincial government should increase the investment by any means.

The growth of Guizhou’s financial support to the poverty alleviation and development should be faster than the growth of the finance revenue. On the basis of establishing the minimum financial guarantee transfer payments system to guarantee the 50 counties’ normal need, Guizhou provincial government should establish the special transfer payment and policy transfer payment systems. It should innovate in the mechanism of integrating the funds, support at county level to clear, sort and integrate the funds particularly used for agriculture, and use it together without change in the original purposes of funds.

5.3 The financial support should be intensified.

It should actively establish rural cooperative banks, village/town (township) banks, micro-finance companies, rural mutual funding cooperatives, and other new financial organizations in the 50 counties. It should encourage and support banks to establish branches at county levels and establish a long-term system to provide loans to small enterprises and micro-loans to rural households. It should innovate in the micro-financial institutions, including commercial micro-finance and NGO micro-finance. The micro-finance should be able to be used for the purpose of adopting sciences and technologies, introducing investment from outside, supporting the education, supporting the poor women to start a business, and alleviating poverty. In order to make the micro-finance institutions sustainable development and make the
funds allocated efficiently, it should connect the micro-finance institutions with large commercial banks—the latter wholesales loans to the former and the former retails the loans to rural households and small rural micro-enterprises.

5.4 The channels of poverty alleviation by social forces should be improved.

The central government has selected Dalian, Qingdao, Shenzhen and Ningbo four cities to support Guizhou, and the performance is quite good. However, the tea will be an priority industry in Guizhou. In addition to lack of funds, it needs to improve the planting techniques, the management of tea trees, the processing of teas, and the sales. Therefore, it is suggested to add Zhejiang province as a help counterpart in the developed areas to provide assistance to Guizhou. Zhejiang also has advantage in the machinery industry of tea processing.

5.5 The human resources should be greatly developed.

It should consolidate the system of nine-year compulsory education, speed up the education during the high-school period, and make great efforts to develop professional education. A planning of human resources should be made as early as possible. It should cultivate a team of human resources suitable to modern agriculture, industry, and urban management.

5.6 The scientific support should be intensified.

Another feature of poverty alleviation by sciences and technologies is relative less investment but quite remarkable effectiveness. The result is that the farmers have changed their mind, realized the benefits of sciences and technologies, and created new income sources.

For the development of advantageous resources, advantageous industries, and advantage enterprises, it should establish three systems of technical innovation, diversification investment and social services. In order to meet the 50 counties’ need for the development of specialty industries and advantage industries, it should speed up the establishment of technological development and service systems and new-type extension mechanism of agricultural sciences and technologies, and make great efforts to promote the innovation and application of innovations in agricultural sciences and technologies. It should intensify the application of new technologies, extend suitable techniques, make great efforts to develop circular agriculture, ecological agriculture, and promote the agricultural production standardized, ecological and branding.

5.7 The ways of poverty alleviation and development should be created.

First, it should expand the channel of poverty alleviation by enterprises and enterprise groups. Second, it should actively promote the poverty alleviation and development in a unit of counties (towns/townships, villages). Third, it should steadily implement the development in a large area as a unit and piece by piece.

It should make great efforts to establish a large structure of poverty alleviation and raise the whole benefits of poverty alleviation. First, it should expand the range of provincial officers’ participation in the poverty alleviation. Second, it should intensify the “four helps and four promotions” and implement the responsibility system of the officers from different department levels to contract the poverty-stricken counties, towns/townships and villages. Third, it should intensify the connection between the poverty-stricken areas with the counterparts in the developed areas, the government departments, and the social helpers.
5.8 The rights to manage county economy should be expanded.

In the light of principles to give the rights to local areas as much as possible, it should release part of regulation and authorization rights to the government of 50 counties, empowering the 50 counties’ governments. It should further reform the administrative approval system, reducing the items to be proved, and simplifying the procedure of approval.
References

Sub-report 6:

International Experience for Guizhou Provincial Development Strategy

Zhang Fan, Senior Economist of New York City Municipal Government

Introduction

How to promote the economic development in poverty-stricken areas is one of urgent global concerns. Although governments around the world and international organizations have been working hard in the campaign against poverty, a great portion of the world population remain in poverty. After the World War II, the Four Asian Tigers have managed, as the first countries in Asia, to shake off poverty. In recent years, the PRC has experienced rapid economic growth and the Chinese has greatly increased per capita income. However, people in many regions of the PRC are still struggling in poverty. Unfortunately, Guizhou Province is among such less developed regions.

By summarizing international experience, we may find that the nature and causes of poverty are extremely complex and it is difficult and time-consuming to tackle poverty issues, for a solution must build on an in-depth understanding of local conditions, including political and socioeconomic ones, in a specific poverty-stricken area. Economist Justin Yifu Lin once pointed out that most mainstream theories and systems in modern economics are put forward by economists living and working in the most developed countries on the basis of their observation of economic phenomena in such countries. Undoubtedly, those theories are of certain value in the explanation of the nature and causes of such phenomena. However, due to the different backgrounds between a developed country and a developing one in the aspects of development, endowments, culture, and history, the causes of a similar problem and the most critical constraints faced by an economic agent when making a choice often vary.

The most obvious difference between a poverty-stricken area and a developed one lies in per capita real income and output. Low per capita income reflects low productivity, little investment, obsolete technology, and lack of resources in poverty-stricken areas. Generally, land is the key factor of production in such areas. As land is also the fundamental property, land regime including its change becomes, from a systematic perspective, the most influential factor for local development. The labor market usually suffers structural imbalance where there is a lack of skilled workers and an oversupply and unemployment of unskilled ones as the population grows. These labor conditions also constitute a constraint on development. Physical capital (buildings and machinery) is scarce; capital market is underdeveloped. Low income means low savings and little investment, and results in low productivity and miserable pay, which drags
the economy into a vicious cycle. More, there is no survival of entrepreneurship in the absence of entrepreneurs and sufficient government incentives and support.

Generally, agriculture dominates in the economy in a poverty-stricken area. It offers most of employment and output. Local economy heavily depends on agriculture. In an attempt to promote the economy, many less developed countries and regions have chosen industry over agriculture; while some have chosen to focus on particular aspects of agriculture and succeeded in regional economic development by growing commercial crops and cash crops. In some developed countries where some rural and mountain areas are less developed, the governments have laid down rural development policies and worked together with NGOs to help those less developed areas promote local economy with the resources from developed areas. And the results are great.

The history shows that promoting the industry is the most productive way for a country to gain economic take-off. Industrial development, which can change a country within a short term, relies on capital, labor, and technology that enhances labor productivity and improves the standard of living. Indeed, industrialization is kind of self-driven for good and for bad. In its early stage, a lack of awareness of environmental protection and preservation of resources left severe pollution; and in a sense, it might impoverish cities or bring rural poverty to cities.

Each of the first 5 sections herein contains a case about global experience in the economic development. The first 2 cases present how the mountain areas make use of natural resources and environmental advantages for agricultural development and depict the basic idea to find strengths in the general weakness. The 2 cases that follow tell historical stories about how industry helped promote the economy in less developed regions. Old as they are, these cases are the fine example to prove promoting the industry is the most efficient and powerful means to make change. The last case is about the U.S. defense procurement. It illustrates that some appropriate policy arrangement and regulations system can make the defense industry another economic drive. During the process of economic development, we must focus on change of policy and system.
1. Development Policy for Agriculture in Mountain Areas in Austria

The case in this section is about a national rural development policy for less developed mountain areas in a developed European country. The experience of Austria’s mountain development highlights bottom-up development, grass-roots initiative, decentralization, and synergy between government and NGOs. And regional consulting structures directly offering help to farmers are important. The case shows that external assistance must respond to the initiative of local farmers and men could help themselves out.

In the Central Europe and of a population of 8 million, the Republic of Austria, is a largely mountainous country. Only 32% of the country is below 500 meters. The Alps are the highest mountains in Austria.

Austria has quite a history and its sovereignty and territory have changed several times in the wars of the Europe. It was an integral part of the once powerful Austro-Hungarian Empire (Vienna – Austria’s current capital was the capital of the Empire), which collapsed with the end of World War I. Austria was occupied and annexed by Nazi Germany just before World War II and regained independence after the War.

Austria is a developed market economy, in which private business and farm owners are active. Per capita income is high in general but the economy in mountain areas is relatively less developed. Austria is economically close to Germany, which is Austria’s largest trading partner.

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<tr>
<th>Table 1: About Austria (2008)</th>
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<tbody>
<tr>
<td>Population (million)</td>
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<td>Area (sq km)</td>
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<tr>
<td>GDP Per Capita (in US dollars)</td>
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<td>Mountain Area (the percentage of areas above 500 meters)</td>
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Austria's mountain development mainly involved agriculture and animal husbandry, for mountain areas cater for 49% of the country’s agriculture and animal husbandry business. Mountain development has been a major concern of the Government and many NGOs and been a focus of government policies for many decades. In 1970’s, a special support program was established to promote mountain development and farming growth.

Topographically and economically, Guizhou Province is similar to Austria's mountain areas where, despite quite a change and growth, the infrastructure was less developed than that of cities, the income of farmers was less than that of urban dwellers, and the economy was less active than that of cities. Considering similar natural conditions and the same goal to narrow the rural-urban gap, Guizhou Province can learn from Austria’s experience in mountain development.
1.1 Plans that Covers Valuation of Non-marketable Goods

Austria's mountain development focused on (1) the ways and means of supporting the agricultural sector, and (2) measures aiming to preserve and manage land resources sustainably under the difficult production conditions in mountains. At the core of the mountain policy is a valuation of non-marketable goods (e.g. environmental advantages and natural resources). As the fundamental advantages, such valuation must be included in sustainable development plans.

Those potential advantages of mountain areas made it possible for bottom-up development. Mountain development depends on certain amenity character of mountain areas; natural resources and unspoiled environment constitute the unique basis for development. Basically, mountain development depends on the approaches to make best of such advantages and develop a particular amenities-driven economy.

The globally accepted system of national accounts to estimate national income and output shows the value of goods and services produced in an economy within a certain period of time only. However, a great number of goods are non-marketable and therefore not calculated for GDP. Among them are the environment and natural resources. Economists have developed many methods to evaluate such goods. New GDP calculation affects performance assessment of government officials and helps improve government action. It is a bold and provident attempt for Austria to include the valuation of the environment in the assessment during mountain development planning.

1.2 Dependence on Grass-roots Initiative

Austria’s mountain development plans increasingly focused on small-scale initiatives at the community level and bottom-up, endogenous development. Designed to trigger the initiative of people in various economic activities across territories, the mountain development policies emphasized that the initiative and enthusiasm of economic actors towards regional development are the most important factor in regional economic development.

Being regarded as a typical case in Europe, Austria’s mountain development policy has been copied in recent years by Switzerland, France, Spain and others. In Austria, such policy was widely discussed and generally accepted to some extent.

Ultimately, economic development depends on the initiative of economic actors; every progress in technology and every return on investment, physical or capital, depend on the enthusiasm of workers and managers. An economic actor becomes self-driven only when he is convinced that economic development is in his interest, which is proved during the PRC’s economic reform, especially in the rural management responsibility system.

Incentives are the good way to trigger grass-roots initiative. Tailored incentives could allure economic actors to willingly participate in regional development initiatives for their own benefit.

Austria's mountain development policy also called for cross-industry and inter-agency coordination and a holistic solution.

The development policy involved each level of the government but required most efforts at the provincial
level. Therefore, it is a local government rather than the central government that frames and implements the policy. The decentralization enables a local government to use its knowledge of local economy and customize policy to suit local needs, and also stimulates the local government to promote local economy. It is widely acknowledged that a local government has better knowledge than the central government does regarding local economic data, issues and solutions. In the PRC, an economic reform is usually subject to a pilot scheme on the local level before being adopted nationwide. Austria’s mountain development experience also proves that the enthusiasm of a local government plays an important role.

1.3 Core Approach: Regional Consulting Structures

To establish regional consulting structures, through which farmers can reach help from experts on a one-on-one basis, is the core approach in Austria’s mountain development. In less-developed mountains areas, farmers face 2 main problems, namely, the lack of confidence and the lack of information, knowledge and means necessary to improve their economic conditions. The 2 problems have one thing in common: both are related to poor communication. In its mountain development endeavor, Austria defined the core approach as to establish regional consulting structures, which, bringing experts and farmers together on a one-on-one basis, helped economic actors (1) gain confidence and (2) learn knowledge about production and management.

Austria’s mountain development policy also contains many other efforts, such as:

- Improve rural community conditions and the social status of farmers, helping reduce the abandonment of farming and the risk of a diminishing farming population;
- Give special treatment to very backward areas, for example, particular favorable policy and strong support from both the central and provincial government to Lesachtal at the western end of the province of Carinthia (the case also proved the synergy among different levels of the government and different agencies);
- Suit the development mode to local characteristics, for example, in Pasche where there are cultural and historical heritage, shaping cultural landscapes and preserving historical sites to promote the tourism.

In all, Austria has achieved a great success with its mountain development policy. Today, mountain areas provide the country with a lot food while preserving natural resources. Successful economic development in mountain areas also helps keep some population and protect particular cultures.

1.4 Conclusion and Lessons

Economists have established a good variety of mathematical models to study economic development and growth. The neo-classical model that explains the overall economic growth by the increase of capital stock, labor force, and productivity, is structurally almost perfect, but is still an inefficient tool to explain a particular real-world case. It is discovered later that the problem lies in the per capita computation of labor. In reality, labor differs in quality. Such difference is an important reason for the difference in economic development. The new endogenous growth model that considers labor quality as an endogenous factor indicates that economic growth depends not only on the increase in capital and labor input, but also on the improvement of labor efficiency. That is, man is the subject matter during production process and an important factor for economic growth.
We can learn from Austria’s mountain development experience shows that the campaign against poverty depends on the initiative of people – the subject matter in production, and the knowledge of modern production and management. These are the only magic to inspire creativity and better the quality of forces of production.

(Source: austria farming World Prout Assembly Institutions for Democratic and Decentralized Sustainable Mountain Development A Case Study.mht)
2. The Rhön Biosphere Reserve: Developing Local Agricultural Products

This case shows how to revitalize an economically decaying biosphere reserve in a central European country by developing local agricultural products. It illustrates that comparative advantages shift along with development. The advantages of less developed areas in terms of the environment and resources are increasingly recognized as the natural environment of developed areas suffers damages during economic development. Therefore, it may be a feasible development strategy for a less developed area to promote the economy by making use of such advantages.

In the centre of Germany and 150km east of Frankfurt, the Rhön Biosphere Reserve, a part of former German Democratic Republic, was designated in 1991 after the reunification of Germany. It covers 1,850 square kilometers and has a population about 130,000. Settlements are mainly small villages and towns.

In the 1980’s and during the transition to reunification, the Rhön region was a neglected land, with the central part uninhabited. Local economy was a mess. During the transition, local agriculture was in decline and agricultural land was abandoned by 4% each year.

There are hills and mountains. Far away from settlements lies local wealth: diversity of species, wind resources, medicinal plants, water sources, tourism and culture. Once on a tour in eastern Germany, I noticed this vast land with dense forests and little habitation.

After the reunification, the region revitalized economically by making use of local natural resources and promoting a new economy that features local natural and cultural resources in the undeveloped areas. The region includes parts of several regional administrations. Biological diversity is an important factor in regional economic integration.

In the process of economic development, the natural environment in developed areas is undermined and environmental assets devalued; while the value of the unspoiled environment in less developed areas becomes relatively higher. The higher degree of development in developed areas, the higher relative value of the unspoiled ecological environment of and quality products from less developed areas. Regional difference in ecological value provides for balanced development among regions. It is a strategic development option for a less developed area to promote the economy by making use of local ecological value.

2.1 Socioeconomic Background in Germany

The German Democratic Republic, a.k.a. East Germany, one part of the 2-state solution in the mid-20th century, established in the Soviet occupation zone after the World War II. It followed the Soviet political and economic structure that features public ownership and planned economy. This system once worked in the post-war recovery. As the most developed state in the Eastern bloc, East Germany ranked the first among the bloc states as to production and living standards. However, just like all other Soviet planned economies, East Germany faced many issues about such economic planning, such as low efficiency, lack
of motivation, and huge information the planning agency could not handle with. This economic system and all the other Soviet planning systems ceased to exist at the end of the 20th century.

Supported by the Allies, the Federal Republic of Germany, a.k.a. West Germany, regained economic strengths soon after the War. Chancellor Erhard proposed and implemented the social market economy that places free competition as core content and builds on private ownership. In this system, the government only intervenes in economic activities to the extent of providing social security and reducing unfair competition. In 1948, Erhard abolished, without the consent of the Allies, the price-fixing and production controls as to more than 40 commodities. From 1950 to 1970, West Germany had a rapid economic growth. From 1949 to 1958, the Federal Republic of Germany's gross national income grew from 47 billion to 85 billion marks. In terms of input, the Federal Republic of Germany's economic take-off was due to: (1) large fixed capital investment; (2) comprehensive upgrading of industrial equipment with the state-of-the-art technology of the time; (3) highly-skilled local labor who survived the War and foreign labor; (4) large-scale research and development activities, acquisition of patents, and process improvement.

The Germany reunited in 1990, putting an end to the two-state solution after the World War II. The reunited Germany is the strongest and leading economy in the EU.

2.2 Local Agricultural Products

The reunification brought to some economically backward rural areas new opportunity for development. The economic growth in the Rhön region after the 1990’s was attributed mainly to the recurring enthusiasm of economic actors after the reunification. Back then, local residents began to exchange farm produce with farmers from neighboring once-West-Germany areas; and such exchange resulted in new demands. Later, a series of revitalization initiatives were carried out in the region.

Local farmers started to reintroduce the traditional Rhön sheep breed. They also adopted traditional farming method, believing that slow growth gives better taste. The farming grew rapidly. In the 1980s, the Rhön sheep were only 100 animals registered; while in 2005, there were over 3000. Prices doubled over the same period; and Rhön lamb sells for twice the price of imported lamb. Traditional farming, environmental quality, and even culture become key factors for the prices.

As another renowned produce of the region, Rhön milk, a high-quality organic product, sells 10 to 30% higher than the conventional product. The price reflects true value of the product and further promotes production. Production also brings benefits to a number of upstream and downstream businesses. As the unspoiled local environment is an important reason for the high quality of milk, the value of the environment is included the price of the milk.

Tourism also benefits from the production and trade of local produce. Natural landscapes and organic farming attract a large number of tourists. 70% of the farmers are involved in tourism-related activities and are paid for their products and/or services.

2.3 Tourism

The Rhön region has a long history of tourism, particularly for spas and countryside recreation. A survey shows that 81% of Rhön tourists thought that nature is the most important and valued attraction and they
enjoyed hiking in mountains and boating in valleys in the region. Local residents are also the beneficiaries. In another survey, when asked what the word “Rhön” made them think of, 99% of local residents listed a beautiful landscape; 80% thought of serenity, security, intact nature, high quality food, and the diversity of species.

In the Rhön region, many farmers participate actively in various tourism-related activities. Such activities bring services to tourists from all the parts of the country and an extra income to local farmers.

**2.4 Participation and Coordination**

The Government also played an important role in the development in the Rhön region. In accordance with EU regulations, the regional government subsidized farming good to the nature, and offered incentives to organic food production and allowances for mountain farming.

The development of the Rhön region is due to the broad participation of: (1) the government who established specialized agencies for organization and coordination, (2) NGOs, (3) the EU who offered great financial support. A joint effort across agriculture, retail, tourism and environment protection also help regional economic development.

Farmers are the key economic actors in the region. They offer a variety of farm produce. They are also the main protectors of natural resources. They played an important role in keep water resources from contamination by pesticide and fertilizer. As they are better informed than the Government, they can deliver effective conservation of resources. They also help protect endangered species.

It is the joint effort that brings success to the development of the Rhön Biosphere Reserve, making it one of most successful reserves in the world.

**2.5 Conclusion and Lessons**

This case shows that a regional development strategy must rely on local comparative advantages. Such advantages can be discovered by studying into and understanding of the characteristics of regional factors. Relying on such advantages can ensure a lasting, stable, and remarkable economic development.

Regional comparative advantages are changing in the process of economic development. The intact nature and natural resources in less developed areas may become comparative advantages as the environmental conditions deteriorate in developed areas. Less developed areas must modify constantly their development strategies based on the dynamic change of comparative advantages, so as to make best of local characteristics and keep up with the economic development in developed areas.


**3. The Industrialization of Pittsburgh**

This case gives us a brief review of the early industrialization of a city in the eastern United States in the 19th century, with an analysis of several factors crucial to successful industrialization during the economic take-off. It illustrates that the industrialization of a city depends on an industrial system suitable to local
and regional factor characteristics, large investment, sufficient labor, and transport infrastructure that helps deliver products to target markets.

Surrounded by mountains, Pittsburgh, Pennsylvania, the U.S.A. anchors the western area of the Appalachians and the Ohio River Valley. Pittsburgh is known as "The City of Bridges" and "The Steel City" for its many bridges and former steel manufacturing base (all the largest steel companies based in Pittsburgh). After the decline of the steel industry and a successful economic transformation, the City of Pittsburgh is the 22nd largest urban area in the United States.

<table>
<thead>
<tr>
<th>Table 2: The Population (2009) of Pittsburgh</th>
</tr>
</thead>
<tbody>
<tr>
<td>The City</td>
</tr>
<tr>
<td>The Metropolitan area</td>
</tr>
</tbody>
</table>

Source: http://en.wikipedia.org/wiki/Pittsburgh,_Pennsylvania

3.1 Mountain Resources and Early Development

The early industrialization of Pittsburgh depended mainly on regional resources. Back to the very beginning, local industry included shipbuilding, which has much to do with the rivers around the City. At the end of the 18th century, glass began to be manufactured in the City.

Abundant mineral resources in mountains and great access to water transport, Pittsburgh became the metallurgical center in the eastern United States in the early 19th century. By 1815, Pittsburgh was producing significant quantities of iron, copper and tin. Wood from surrounding mountains was the fuel for local metallurgical industry.

Pittsburgh was an industrial city where resource-oriented enterprises gathered. As the transportation costs of iron ore, coal, and other raw materials for the metallurgical industry were high at the time, those resource-oriented businesses had to anchor near to the producing areas of such raw materials. Pittsburgh was a typical example of such industrial cities.

3.2 Bottlenecks

In the process of development, Pittsburgh encountered the first bottleneck - transportation. The high costs of product transportation restricted the growth of manufacturing. The construction of transport infrastructure helped the City overcome this problem. Highways and the Erie Canal linking this small city in mountains and the outside world, shortened the distance between the City and the eastern coastal areas, and helped promote the trade and expand the market for local products.

The shortage of labor was another bottleneck for local economic development. However, a great number of immigrants from across the Atlantic helped. Job opportunities created by industrialization attracted many highly-skilled immigrants from Europe. Local population increased dramatically, and Pittsburgh grew from a small town into a big industrial city with a strong metallurgical industry. In Pittsburgh, it was industrialization that promoted urbanization.

The gathering of steel companies in Pittsburgh brought about a strong economy of agglomeration. A large number of local metallurgical enterprises shared (1) intermediate products supplied by other businesses, to
be specific, iron ore and coal; (2) a pool of highly-trained labor force, particularly skilled workers in the steel industry; (3) steel production knowledge and information. Such agglomeration produced a self-reinforcing effect.

By 1830, Pittsburgh could offer all kinds of iron products and became the United States’ Birmingham (the UK iron production center.) By 1857, the City had 1,000 works, which consumed 22 million tons of coal a year. Smoking chimneys was seen everywhere.

In 1875, Andrew Carnegie established the Edgar Thomson Steel Works – the former Carnegie Steel Company. In 1901, the U.S. Steel Corporation, the world's largest steel manufacturer at the time, was incorporated. In 1911, Pittsburgh became the 8th largest city in the U.S. with an urban population of 50 million. Local steel output was one third of the total in the U.S. and Pittsburgh was known worldwide as the City of Steel.

The agglomeration of the steel industry in the City of Pittsburgh is referred in economics to “localization economies”. Localization refers to many firms in the same industry located in a city; localization economies refer to the accompanying economic efficiency. Pittsburgh’s steel economy was a typical localization economy. On the other end of the spectrum are urbanization economies, which refer to the accompanying economic efficiency when many firms of different background located in the same city.

### 3.3 Urban Transformation

In the second half of the 20th century, owing to a number of factors at home and abroad (among which the most important ones included the rising labor cost and technical obsolescence in the U.S.) and at the final stage of a typical industrial cycle, the U.S. steel industry declined. As a result, Pittsburgh was the first city that took the punch.

In order to save the City from industrial decline, Pittsburgh launched, after the World War II, clean air and economic revitalization campaigns. Later in 1977, it made another revitalization effort to promote cultural and community development. In the 1970’s and the 1980’s, many factories closed as a result of the industrial decline.

Despite the great pressure after the decline in the steel industry, the City of Pittsburgh managed to complete urban transformation in the 1980’s, shifting economic focus from the heavy industry to high tech (robot technology) and service sector. Now, Pittsburgh's economy is supported by health care, education, technology and financial services.

In Pittsburgh, the fall of the steel industry is so bad that there is no steel plant left. New apartments, office buildings and retail facilities stand on the grounds that were once the sites of steel works. Many a large corporation headquarters in Pittsburgh.

The history of Pittsburgh tells a story about how the industry makes and ruins the city and how industrial restructuring revitalizes it.

### 3.4 Conclusion and Lessons

This case is about early economic development in a developed country. It is adopted because in some
cases, early instances in developed countries are more inspiring (than recent ones) to less developed areas looking forward to an economic take-off, for the early socio-economic conditions, economic development, and rules and regulations in developed countries are more similar to the present conditions of less developed areas. Of course, the similarity and applicability is limited.

This case illustrates that in the take-off stage, the economic growth must be accelerated by sufficient investment. Paul Rosenstein-Rodan’s Theory of Big Push Model describes the relationship between industrial sectors and the need of investment to make such sectors complement each other. Considering the small market in less developed areas, an economic take-off must rely on large-scale investments in interrelated businesses.
4. Early Industrialization and Urbanization in the United States

This case describes the process of industrialization in the United States in the 19th century, with an analysis of the drives of the early American industrialization. The 19th century is an important period in the American history. Large-scale inputs in factors enabled the industry to have an economic take-off in the second half of the century, which enabled the U.S. to replace the UK as the largest industrial country in the world. Along with industrialization came urbanization – the result of industrialization, which also provided market for industrialization. The early American industrialization would be a good reference for Guizhou Province, because it is a case about rapid economic growth building on large-scale inputs in factors, which is very inspiring for less developed countries and regions longing for economic take-off.

It was the increase in labor, capital, natural resources (e.g. land) (rather than the advance of technology) that fueled the economic growth in the U.S. in the 19th century. The American economic growth in the 19th century featured large-scale capital investment, particularly investment in manufacturing plants and machinery for mass production.

Owing to the shortage of human resources, the American development in the 19th century was a capital- and resource-intensive growth, which helped save human resources.

4.1 A Big Picture of the Growth

The U.S. economic growth can be summarized by stages:

(1) From the early 19th century to 1839: It was the early process of industrialization. From 1810 to 1840, the output of pig iron increased from 54,000 tons to 287,000 tons, and the manufacturing output doubled. From the early 19th century to 1839, farm employment decreased from 72.8% to 68.6%, and the portion of the revenue provided by agriculture in national income dropped from 39.5% to 34.0%.

(2) From the 1940’s to the Civil War: Farm employment declined by 5% every decade in the 1940’s and 1950’s. The manufacturing output increased152% in the 1950’s. The portion of manufacturing output in the commodity output increased from 17.4% in 1839 to 32% in 1859.

(3) From the Civil War to the 1873 crisis: Railway construction played an important role in economic development, by creating a huge demand for the manufacturing industry.

(4) At the turn of the 20th century: Financial market fueled economic growth by providing a large amount of money.

(5) The 20th century: This stage featured strong government intervention. Wars and the Great Depression had a great impact on economic development. The U.S. economy reached a peak in the mid-20th century.
### Table 3: The U.S. GDP and GDP Per Capita in the 19th Century

<table>
<thead>
<tr>
<th>Year</th>
<th>GDP</th>
<th>Annual Growth</th>
<th>GDP Per Capita</th>
<th>Annual Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1700</td>
<td>527</td>
<td>%</td>
<td>In million Geary-Khamis dollars (1990)</td>
<td>%</td>
</tr>
<tr>
<td>1820</td>
<td>12,548</td>
<td>3.8%</td>
<td>1,257</td>
<td>0.9%</td>
</tr>
<tr>
<td>1830</td>
<td>18,219</td>
<td>4.3%</td>
<td>1,376</td>
<td>1.4%</td>
</tr>
<tr>
<td>1840</td>
<td>27,694</td>
<td>4.4%</td>
<td>1,588</td>
<td>1.3%</td>
</tr>
<tr>
<td>1850</td>
<td>42,583</td>
<td>5.0%</td>
<td>1,806</td>
<td>1.3%</td>
</tr>
<tr>
<td>1860</td>
<td>69,346</td>
<td>5.6%</td>
<td>2,178</td>
<td>1.9%</td>
</tr>
<tr>
<td>1870</td>
<td>98,374</td>
<td>6.0%</td>
<td>2,445</td>
<td>1.2%</td>
</tr>
<tr>
<td>1880</td>
<td>145,335</td>
<td>4.0%</td>
<td>2,980</td>
<td>1.7%</td>
</tr>
<tr>
<td>1890</td>
<td>214,714</td>
<td>4.0%</td>
<td>3,392</td>
<td>1.6%</td>
</tr>
<tr>
<td>1900</td>
<td>312,499</td>
<td>3.8%</td>
<td>4,091</td>
<td>1.9%</td>
</tr>
</tbody>
</table>


Note: the above-mentioned Annual Growth indicates the rate in a decade. E.g., the 1850 Annual Growth indicates the rate from 1841 to 1850.

The table shows that in the 19th century, the U.S.'s GDP growth is at a higher level between 3.8% and 5%, with the peak between 1850 and 1860. The growth of GDP per capita is smaller as a result of increasing population, but it is still higher than that of other countries in the same period.

The U.S.'s GDP growth is partly attributed to the remarkable increase in productivity.

### Table 4: The U.S. Productivity Growth (1899-1900=100)

<table>
<thead>
<tr>
<th>Periods</th>
<th>All Product Output 1899=100</th>
<th>1900=100</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Per Hour, Capita</td>
<td>Actual Hourly Income</td>
</tr>
<tr>
<td>1859-1860</td>
<td>55</td>
<td></td>
</tr>
<tr>
<td>1869-1870</td>
<td>31</td>
<td>61</td>
</tr>
<tr>
<td>1879-1880</td>
<td>46</td>
<td>67</td>
</tr>
<tr>
<td>1889-1890</td>
<td>71</td>
<td>82</td>
</tr>
<tr>
<td>1899-1900</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>1909-1910</td>
<td>143</td>
<td>125</td>
</tr>
</tbody>
</table>

Source: Harris 1961, 72.

In 1774, just before the Independence, the U.S. was economically strong (its GDP was more than one third of that of the U.K. (excluding Ireland)) but ranked after Spain, France, the PRC and India. After a rapid growth, the U.S. became before the World War I, the largest producer in the world, and its GDP was much than that of the UK and Germany combined.
Table 5: The U.S. Economy and Comparison In Million Geary-Khamis dollars (1990)

<table>
<thead>
<tr>
<th></th>
<th>The U.S.</th>
<th>The UK</th>
<th>Germany</th>
<th>France</th>
</tr>
</thead>
<tbody>
<tr>
<td>1820</td>
<td>12,548</td>
<td>36,232</td>
<td>26,819</td>
<td>35,468</td>
</tr>
<tr>
<td>1860</td>
<td>69,346</td>
<td>81,760</td>
<td>59,096</td>
<td>70,577</td>
</tr>
<tr>
<td>1870</td>
<td>98,374</td>
<td>100,180</td>
<td>72,149</td>
<td>72,100</td>
</tr>
<tr>
<td>1880</td>
<td>145,335</td>
<td>120,395</td>
<td>86,626</td>
<td>82,792</td>
</tr>
<tr>
<td>1890</td>
<td>214,714</td>
<td>150,269</td>
<td>115,581</td>
<td>95,074</td>
</tr>
<tr>
<td>1900</td>
<td>312,499</td>
<td>184,861</td>
<td>162,335</td>
<td>116,747</td>
</tr>
<tr>
<td>1910</td>
<td>460,471</td>
<td>207,098</td>
<td>210,513</td>
<td>122,238</td>
</tr>
</tbody>
</table>

Source: Maddison 2006.

In the 19th century, the U.S.’s output growth was mainly due to the increased inputs in the factors, which contributed to an 82 to 85% growth. In the 20th century, such inputs contributed more in the growth of the total factor productivity. (Engleman 2008, 11)

Table 6: The Breakdown (%) of the U.S.’s Economic Growth in the 19th Century

<table>
<thead>
<tr>
<th></th>
<th>Year</th>
<th>Real GNP</th>
<th>Labor</th>
<th>Capital</th>
<th>Land</th>
<th>Total Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real Growth</td>
<td>1800-1840</td>
<td>3.92</td>
<td>3.09</td>
<td>3.98</td>
<td>2.80</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1840-1900</td>
<td>4.10</td>
<td>2.72</td>
<td>4.96</td>
<td>2.17</td>
<td></td>
</tr>
<tr>
<td>Weighted Growth</td>
<td>1800-1840</td>
<td>2.10</td>
<td>1.15</td>
<td>0.08</td>
<td>0.59</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1840-1900</td>
<td>1.85</td>
<td>1.44</td>
<td>0.07</td>
<td>0.74</td>
<td></td>
</tr>
<tr>
<td>Contribution to Output Growth</td>
<td>1800-1840</td>
<td>54</td>
<td>29</td>
<td>2</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1840-1900</td>
<td>45</td>
<td>35</td>
<td>2</td>
<td>18</td>
<td></td>
</tr>
</tbody>
</table>

Note: The estimated Real GNP includes the Real GNP on average for the calendar year 1800, the census years from 1834 to 1843, and from 1894 to 1903. Capital and Land data are the estimated values of 1799, 1840 and 1900.


Jeffery Williamson estimated that 43% of the U.S.’s NNP growth between 1870 and 1930 was attributed to labor, 27% to capital, 4% to land, and 27% to educational, organizational and technological changes. (Hughes 330-331)

4.2 Manufacturing

In the 19th century, the U.S. economy experienced a major change, with the economic focus shifting from agriculture to manufacturing. In the colonial years, the U.S. manufacturing was insignificant. The U.S. manufacturers could compete with their British peers only in shipbuilding and processing (wine, flour and iron.) At the early 19th century, the U.S. economy built on agriculture and much relied on imports for manufactured products. In 1812, the war against the Britain and trade embargo gave the United States a chance to promote domestic manufacturing. During the war, a number of cotton businesses established in Massachusetts. Some of them had factories, employed many women workers, and made use of water transmission systems. During this period, there was also some growth in the footwear manufacturing in New England, the mining, logging and metal processing in the Mid-Atlantic regions. Just before the Civil
War, the U.S. manufacturing further developed, with increasing investment, further division of labor, standard processes and new machines. In 1860, cotton, timber, and footwear manufacturing were the top 3 trades in terms of the value added. Footwear, cotton and men’s clothing manufacturing hired most.

Table 7: A Comparison of the Top Value-added Trades in the U.S. in 1860 and 1910

<table>
<thead>
<tr>
<th>Year 1860</th>
<th>Year 1910</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value Added (in million dollars)</td>
<td>Employees (×1,000)</td>
</tr>
<tr>
<td>Cotton</td>
<td>55</td>
</tr>
<tr>
<td>Timber</td>
<td>54</td>
</tr>
<tr>
<td>Footwear</td>
<td>49</td>
</tr>
<tr>
<td>Flour</td>
<td>40</td>
</tr>
<tr>
<td>Men’s Clothing</td>
<td>37</td>
</tr>
<tr>
<td>Iron</td>
<td>36</td>
</tr>
<tr>
<td>Machines</td>
<td>33</td>
</tr>
<tr>
<td>Wool</td>
<td>25</td>
</tr>
<tr>
<td>Carriages &amp; Trucks</td>
<td>24</td>
</tr>
<tr>
<td>Leather</td>
<td>23</td>
</tr>
<tr>
<td>All Manufacturing</td>
<td>815</td>
</tr>
</tbody>
</table>


The growth of total factor productivity and labor productivity between 1820 and 1860 is more than that between 1869 and 1909. It has been believed that the U.S. manufacturing started to grow during the Civil War for the accompanying military needs. In fact, the manufacturing had grown before the war. From the Civil War to the World War I, the manufacturing experienced a significant growth. From 1869 to 1899, the portion of manufacturing output in GNP rose from 24% to 33%. From 1860 to 1910, the percentage of manufacturing workers increased from 14% to 22%. The new growth model was adopted in different manufacturing sectors and the productivity growth was found in general rather than in particular cases. Companies grew bigger and people were more aware of the importance of manufacturing of durable goods. As native population grew, immigrants poured in, and the purchasing power improved, the domestic market for consumer goods expanded, which in turn increased the demand for intermediate products. The manufacturing also reshaped itself geographically. As people moved westwards, manufacturers relocated their works from the Northeast to the Midwest. Illinois and Indiana became new manufacturing bases. With the expansion of manufacturing capacity, the prices for manufactured goods dropped significantly. Considering the rapidly growing demand in the same period, lower prices indicated a downward
movement of the supply curve, which meant the reduction of production costs. The manufacturing also changed internally, shifting its main focus from consumer products to metallurgical products and vehicles. The manufacturing output increased as a result of increasing factor inputs. And the total factor productivity increased too.

Table 8: The Growth (%) of the U.S. Manufacturing Output, Input and Total Factor Productivity

<table>
<thead>
<tr>
<th>Year</th>
<th>Output Growth</th>
<th>Total Input Growth</th>
<th>Total Factor Productivity Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1869-1879</td>
<td>3.7</td>
<td>2.9</td>
<td>0.9</td>
</tr>
<tr>
<td>1879-1889</td>
<td>6.0</td>
<td>4.0</td>
<td>2.0</td>
</tr>
<tr>
<td>1889-1899</td>
<td>4.2</td>
<td>3.0</td>
<td>1.1</td>
</tr>
<tr>
<td>1899-1909</td>
<td>4.7</td>
<td>3.9</td>
<td>0.7</td>
</tr>
<tr>
<td>1909-1919</td>
<td>3.5</td>
<td>3.2</td>
<td>0.3</td>
</tr>
<tr>
<td>1869-1919</td>
<td>4.4</td>
<td>3.4</td>
<td>1.0</td>
</tr>
</tbody>
</table>


In the second half of the 19th century, capital investment increased significantly, and capital intensity increased. Capital investment changed structurally. More capital was put in machinery rather than plants. There was fundamental change of the power for manufacturing. Steam power (produced by coal-fired boilers) replaced manpower, horsepower and waterpower; and later at the end of the 19th century, electricity (generated by coal-fired power plants or hydropower plants) replaced steam power. Such change also transformed fundamentally manufacturing equipment and production process. The banking industry brought a substantial change to manufacturing finance. Companies that once relied on self accumulation could tap into the stock market for external funds.

During this period, the workforce in manufacturing also changed greatly. Child labor and women were employed more than ever, especially in the cotton sector. This became a social problem to be tackled. A large number of immigrants joined the workforce in manufacturing, providing cheap source in the labor market. Immigrants often started with low skilled jobs. This formed a segmentation in the labor market.

In terms of technological innovation, the market coming into existence during industrial development caught the attention of many independent inventors, among whom was the most famous Thomas Edison, and of many businessmen, such as John Rockefeller and Andrew Carnegie, who, in pursuit of profit, kept trying innovations regarding the organization of production and circulation, as well as the manufacturing technology.

By means of legislation and others, the Government promoted the manufacturing and the economy. There were laws that guaranteed on a reasonable basis the ownership and security of private property, and ensured a market of soundness and certainty, which reduced the risk and cost of transactions. Different from the UK’s, the U.S. patent regulations protected the rights and interests of inventors and encouraged creation. The tariff act also protected to some extent the relatively weak U.S. manufacturing. Finally, the anti-trust law that came into existence in the late 19th century addressed the irregularity of large
corporations and guaranteed fair play.

### 4.3 Urbanization

In the 19th century, more convenient transportation helped people land at new farms and create new towns in new territories. The Manifest Destiny did the magic. The number of settlements, industrial bases, and business centers multiplied. The prospects in the west attracted money and migrants from the east. Transportation was facilitated firstly by the construction of canals in the 1920's and 1930's, and then by the construction of railways, which, interrupted by the Civil War, peaked in 1841 and 1856. People moved to the new frontiers. Railways accelerated the transfer of people and the agricultural industrialization. New York and Philadelphia exchanged in the ranking as the result of the completion of the Erie Canal. During this period, almost all the major cities were located by the Ocean, the Great Lakes and major rivers.

The Civil War caused a pause to the U.S. economic growth. The post-war development could be divided into 2 periods: from 1867 to 1873, and the late 19th century. Industrialization continued to reshape the economy structurally. From 1879 to 1899, capital intensity which is measured by the ratio of renewable capital in the net output rose from 2.83 to 3.36. From 1869 to 1878 and from 1884 to 1893, the portion of capital in the construction sector in the total capital increased, and the portion of capital in the manufacturing of durable goods dropped. This indicated that the two waves of industrialization were driven by the railway and the technological change in manufacturing respectively. In the first phase of development, the product mix shifted its main content from consumer goods to means of production; whereas, in the second phase, the railway helped change agriculture and expand the market, meanwhile the capital market developed after the Civil War.

As population grew, urbanization evolved. New towns replaced old ones. New towns in the west reflected the westward movement of migrants. In the early 19th century, only 5% of the American population lived in cities. Urban population increased by 4 times in 1860, and doubled the 1860 figure in 1900, and accounted for 57% of the total population in 1940.

<table>
<thead>
<tr>
<th>Year</th>
<th>Population (in millions)</th>
<th>Population per Square Mile</th>
<th>Percentage of Urban Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1800</td>
<td>5.3</td>
<td>6.1</td>
<td>5.6</td>
</tr>
<tr>
<td>1820</td>
<td>9.6</td>
<td>5.5</td>
<td>7.3</td>
</tr>
<tr>
<td>1840</td>
<td>17.1</td>
<td>9.7</td>
<td>10.5</td>
</tr>
<tr>
<td>1860</td>
<td>31.4</td>
<td>10.6</td>
<td>19.7</td>
</tr>
<tr>
<td>1880</td>
<td>50.2</td>
<td>16.9</td>
<td>28.1</td>
</tr>
<tr>
<td>1900</td>
<td>76.0</td>
<td>25.6</td>
<td>39.7</td>
</tr>
<tr>
<td>1920</td>
<td>105.7</td>
<td>35.5</td>
<td>51.3</td>
</tr>
<tr>
<td>1940</td>
<td>131.7</td>
<td>44.5</td>
<td>56.5</td>
</tr>
</tbody>
</table>

Troops stationed overseas not included.


It is the externalities that make urbanization happen, and that bring about the effect of agglomeration in cities. Every business in the cities can have access to advantages. Such advantages are important factors.
for businesses to reduce cost. Cities also attract customers from around and therefore expand the market. Urban development depends on products and services from areas around. The construction of urban infrastructure, which in turn promote the industry.

Industrialization gives birth to urbanization. As Paul Mantoux, the French historian, once commented on the industrial revolution in the Great Britain, the industry sowed the land with the seeds that grew into cities (Hughes 155).

4.4 Conclusion and Lessons

Case illustrates the early American industrialization, in the take-off stage of economic development, in order to overcome the enormous obstacles to achieve take-off, must have sufficient strength of the input, the first capital and labor inputs. Otherwise it is difficult to achieve this thrilling jump.

This case also shows that industrialization is an important reason for urbanization. Agglomeration economies that come along with industrialization reduce production costs and make cities hold appeal to companies, workers, capital and equipment. Such agglomeration is self-reinforcing, which makes cities expand rapidly. In this sense, industrialization gives birth to urbanization.
5. The U.S. Defense Procurement System and Its Role in Economic Development

This case is about the U.S. defense procurement system and its role in economic development. It illustrates that some policy arrangement and regulations system can make the military industry a positive factor for promoting regional economic development, and can integrate the military industry into the regional economy. It could be a reference for Guizhou Province regarding how military contractors can promote regional economic development.

There is a big portion of the U.S. arms and supplies that are produced by private contractors. The U.S. defense industry comprises government and commercial industry in research, development, production, and service of military materials, equipment and facilities (http://en.wikipedia.org/wiki/Defense_industry). Private contractors are an integral part of the U.S. defense industry.

In Guizhou Province, there are many businesses in the military industry that are in general independent of local economy. The Government is faced with a question how to work out some policy and regulations system that would make such businesses work for local economy and bring along some benefits to local civilian businesses. To answer that, the U.S. defense procurement system may be a good reference.

5.1 Government Procurement and Its Drive for the Economy

The U.S. government acquires military supplies from private corporations via government procurement. Business organizations or individuals that provide products or services to the Department of Defense are referred to as defense contractors. Usually, they provide military aircrafts, warships, vehicles, weapons systems, and technical support and training.

Among the largest defense contractors are specialized suppliers who mostly supply military materials, such as military aircraft manufacturers Lockheed Martin and Northrop Grumman, and general suppliers who provide military and civilian supplies, such as the Boeing Aircraft Company.

<table>
<thead>
<tr>
<th>Corporation</th>
<th>2008 Arms Sales (in million dollars)</th>
<th>Arms Sales as Share of the Company’s in Total Sales (%), 2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>BEA Systems</td>
<td>32420</td>
<td>95</td>
</tr>
<tr>
<td>Lockheed Martin</td>
<td>29880</td>
<td>70</td>
</tr>
<tr>
<td>Boeing</td>
<td>29200</td>
<td>48</td>
</tr>
<tr>
<td>Northrop Grumman</td>
<td>26090</td>
<td>77</td>
</tr>
<tr>
<td>General Dynamics</td>
<td>22780</td>
<td>78</td>
</tr>
</tbody>
</table>


5.2 Federal Acquisition Regulations System

The U.S. Federal Acquisition Regulations System (https://www.acquisition.gov/far/loadmainre.html, http://en.wikipedia.org/wiki/Federal_Acquisition_Regulation) sets the basic rules the U.S. Federal Government must follow in procurement of goods and services. It is designed to help the Government obtain the best products and services while cut down administrative costs and help private suppliers have open access to and fair treatment as to government contracts, so as to keep the Government trustworthy. Every government procurement must comply with the public policy. Federal Acquisition Regulations require the Federal Government must make public each procurement plan in designated publications and handle the process in an open and transparent manner. Open competition is necessary and the approval of the Federal Office of Management and Budget (OMB) is required.

The Regulations provide the eligibility of contractors. An eligible contractor must be financially and technically capable to produce the required products; must have a satisfactory history and a good reputation as supplier, and necessary organization, experience, accounting system, production control and technology.

The Regulations have strict requirements of the procurement team: the eligibility of a member, the authorities and responsibilities of the team.

The Regulations define improper business practices and the government employees’ personal conflicts of interest.

The Regulations provide the procurement process and specify the invitation to bids, public announcement, bidding procedures, the evaluation of bidding documents, and the selection of contractors.

In order to avoid personal conflicts of interest, the Regulations set high requirements for government employees. They are not allowed to take any kind of gift of monetary value directly or indirectly from a company who wants to obtain a government procurement contract.

5.3 Special Assistance to Small Businesses

The U.S. Department of Defense provides special assistance to small businesses, particularly women-owned or veteran-owned small businesses, as participants in government procurement. The Federal Acquisition Regulations specify the definition and functions of small businesses.

The Regulations require all procurement-related government agencies to establish small business services, helping small businesses and handling related affairs. Such agencies are required to provide small businesses with technical support and consulting services delivered by technical experts. The Regulations provide that small businesses and large corporations are considered equally as potential suppliers for a government procurement contract. If a single small business cannot complete a particular contract, several small businesses can enter into the contract as joint partners. The Regulations encourage large corporation contractors to subcontract small businesses; and also provide that the contract should be awarded to the small business if a small business and a large corporation offer the same lowest price.

The U.S. government provides great information and services to businesses that would like to obtain
government procurement contracts. Businesses can find detailed information about government procurement opportunities at the Federal Business Opportunities website.

The above-mentioned provisions could help small businesses (including local small businesses) to obtain government contracts, thus promoting local economic development.

5.4 The Defense Industry’s Contribution to the Local Economy

The U.S. defense industry is a huge drive for local economy. This is particularly important when the manufacturing declines in general while the military manufacturing remains vibrant.

A recent UMASS study shows that in 2009, the defense industry in Massachusetts created revenue 26 billion U.S. dollars and supported more than 100,000 jobs. The rapid increase in defense orders makes the defense industry an important industrial sector in the state. Despite the overall decline in the U.S. economy, the defense industry becomes a stable and reliable source of income for regional economy.

The growth of defense contract manufacturing stimulates via input-output multiplier effect re-contract, support services, and even the economy and employment in general. Of many renowned universities, the State of Massachusetts is a high-tech development center that could satisfy the demanding technical requirements of defense contracts which return the State immediate economic benefits.

In the U.S., the bills for professional, scientific and technical services are rapidly increasing in defense spending. From 2005 to 2009, the proportion increased from 30% to 40%, while the proportion of manufacturing bills declined in the same period.

Increasing defense contracts also increased regional employment opportunities. In 2009, there were 50,000 jobs directly related with the defense industry, and 65,000 jobs in supporting industries, which were indirectly related to the local economy.

In 2009, the defense industry paid one billion U.S. dollars in taxes to local revenue, compared with 400 million U.S. dollars in 2001.

5.5 Conclusion and Lessons

This case shows that we need to change the system to promote the economy and fight against poverty. Basically, the past three decades since the PRC launched its economic reform and adopted the opening-up policy is a changing process of the system. During the economic reform and opening, local governments have changed the system to fit it to particular circumstances and conditions. Such change is the best resort for a less developed area to catch up with developed areas when the overall economic dynamics need a push.

There are many large businesses in the military industry in Guizhou Province. It would benefit local development in the long run if the Government can use some policy arrangement or regulations system to make such businesses work for local economy.

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( http://www.boston.com/business/ticker/2010/12/study_defense_i.html )
( http://www.boston.com/business/ticker/2010/12/study_defense_i.html )

279
6. Conclusion and Lessons

This report contains several economic development cases in different countries and in different periods, which, believed to be suitable as reference for the development of Guizhou Province, the PRC, are about sustainable growth, industrialization, urbanization, specific industrial sectors, and mountain development in particular.

The economic development around the world, especially in a less developed country or region, is a very complex economic process. The change from the less developed state to the developed state is the effect of sufficient factors functioning altogether. General experience of international economic development works only in a particular environment where conditions are fit. The input in factors of production and the choice of a technical route must correspond to the natural resources, economic status, and political, social and cultural systems of a country or region. In this sense, particular experience is merely reference. When defining the development strategy for Guizhou Province, decision-makers are expected to understand, compare, and adopt the experience of other countries and/or regions.

Based on the cases and the above-mentioned gist, a preliminary conclusion and some lessons go as follows:

The development of remote mountain areas must depend on local resources and comparative advantages; and the right development strategy must be based on local characteristics. This is of decisive significance for local economic development. Comparative advantages change in the dynamic process. As developed areas have rapid economic growth at the cost of natural resources, the unspoiled nature in less developed areas may become a comparative advantage. By making use of such an advantage, less developed areas may surpass developed areas in some aspects.

The development of mountain areas must rely on joint effort of residents, investors, government and NGOs. The enthusiasm and creativity of local residents are necessary elements for the development of less developed mountain areas. The Government is expected to make necessary incentive policy, release necessary information, and offer help and support. Good incentives are important to stimulate the enthusiasm of all the parties.

Mountain areas must be open to the outside world. The linkages with other areas, especially trade ties, must be strengthened. Transportation is the basic means for trade development. The construction of transport infrastructure can help reduce transportation costs, shorten the economic distance between the places of origin of raw materials, manufacturers and the market, and promote the economy in mountain areas.

The development of less developed areas must rely on the bottom-up initiative of local residents and communities. As basic units of production and social life, communities are important to economic development and dynamics. The bottom-up influence of communities cannot be completely replaced by the functions of the executive agencies. Community development must be carefully nurtured and protected.
Industrialization and urbanization are complementary. The effect of agglomeration in cities results in lower production costs, helping promote industrial development. Urban development provides market labor and capital for the industry. The wealth created by industrial development lays the material basis of modern urban development. Urbanization also demands further industrial development.

Government and NGOs must provide residents with (1) financial and technical support, (2) information services and consulting structures. This is the core means for the development of less developed rural areas. One-on-one contact directly between experts and farmers can help farmers obtain production and management of information, technology and means.

The military industry together with government acquisition system can promote local economy. Such a system must be transparent and subject to supervision. Some policy arrangement and regulations system can make the military industry contribute to local economy on a long-term stable basis.

To sum up, the economic development of less developed areas must rely on a correct understanding and evaluation of local comparative advantages, and build on the dynamic balance of resources around the country. Sufficient labor, capital and land are necessary factors for an economic take-off. Change of the system would be also necessary to remove all the obstacles. More, best efforts should be made to the protection of the environment and natural resources as well as economic development.
References


Sub-report 7:

International Case Studies for Guizhou Provincial Development Strategy

Shi Tian, Policy Analyst of PIRSA Forestry, South Australia

1. Overview on International Theory

1.1 Sustainable development and natural resource management

The publication of Silent Spring in 1962 marked the beginning of a new era of worldwide attention to environmental problems. Since then, an intensive debate on the relationships between socioeconomic development and ecological-environmental conservation has arisen. Fundamental to the debate is the conflict or compatibility between economic development and environmental protection. In the 1970s, the pessimistic opinion of the Club of Rome dominated the debate with a perspective that the basic behaviour mode of the world system is exponential growth of population and capital, followed by resource depletion and collapse (Meadows et al., 1972). Since the publication of the Brundtland Report Our Common Future in 1987, the concept of sustainable development has inspired more heated debates around the world. Consequently, the focus of the larger debate has shifted from the limits to growth to the notion that economic growth and environmental integrity are not mutually exclusive. As the necessity to accommodate the competing demands of economic development and environmental protection becomes increasingly obvious and urgent, more and more countries have been incorporating the ideology of sustainable development into their policy statements and development agendas.

1.2 Ecological economics

Neoclassical economics is based on a particular view of economic-ecological interactions that puts too much emphasis on inclusive, unlimited growth. In the 1980s, a new field of research—ecological economics—emerged to provide forums for alternative scientific endeavours outside the domains of the traditional disciplines (e.g., ecology and economics). This indicated an increasing recognition of the need for transdisciplinary work to integrate disciplinary frameworks. The roots of ecological economics can be traced back to the work of the 1960s and 1970s—for example, spaceship earth (Boulding, 1966), laws of thermodynamics (Georgescu-Roegen, 1971), and steady-state economics (Daly, 1973). However, its contemporary rise was launched in the late 1980s by a group of concerned scholars (e.g., Robert Costanza, Herman Daly, and Richard Norgaard) who attempted to address the problems of sustainability that were not being adequately addressed by the existing approaches. Ecological economics grew out of the criticism that traditional ecology does not embrace human dimensions and that conventional economics overlooks the consequences of unrestrained economic growth (Costanza, 1991). This alternative interpretation goes
Sub-report 7: International Case Studies for Guizhou Provincial Development Strategy

beyond the perspective of neoclassical economics to view the economy and humanity as subsystems of ecosystems. In theory, the major objectives of ecological economics are to fill the gap between ecology and economics and to advocate a transdisciplinary framework that encourages productive dialogue and synthesis across a broad range of disciplines and approaches. In practice, ecological economics calls for control mechanisms for keeping economic systems in balance with ecosystems (Shi, 2010).

1.4 Sustainable agricultural development

Sustainable agricultural development has become one of the most active research topics around the world in recent decades. Its primary goal is to develop farming systems that simultaneously promote three key areas—farm profits, agroecosystems, and local communities—rather than just one, which means it has to consider trade-offs among them (Chapman, 1999). This alternative perspective has challenged conventional agriculture’s core values of economic growth and the domination of nature. A fundamental contribution of the sustainable agriculture agenda has been the explicit recognition of the linkages of agricultural production to the environment and society (D’Souza and Gebremedhin, 1998). As sustainable agricultural development has increasingly become an international trend in recent years, a focus on the analysis and operationalisation of its practical dimensions is imperative. As looking for ways to achieve agricultural sustainability is now a focus point for agricultural researchers, government leaders, and policy makers, it has been given top priority status on most countries’ research and policy agendas.

1.5 Putting ecological economics into sustainable agricultural practice

Ecological agriculture is a comprehensive agricultural, ecological, economic, and social system based on a multitiered and multipurposed intensive resource management system and the successful application of traditional agricultural practices. This system is designed and managed in accordance with ecological economic principles and a systematic engineering methodology, armed with advanced science and technology. Ecological agricultural development is more complex than has been assumed. It consists not only of the biophysical aspects that are the fundamental bases of agricultural production but also of the sociocultural, economic, and political dimensions that continuously influence—and are influenced by—agricultural practices. In this regard, ecological agricultural research and practice need to be carried out with a holistic approach. In other words, only when considered from a comprehensive ecological, sociocultural, economic, and political perspective can ecological agriculture be managed and developed in a sustainable way. Therefore, appropriate methodologies are required to support the systematic incorporation of these related dimensions in order to consider ecological agriculture as an integrated whole.

As the macro goal of ecological economics is the sustainability of the combined ecological economic system, it emphasises the two-way interdependencies between the micro and macro levels. In ecological economics, social organisation and cultural institutions at higher levels of the space/time hierarchy ameliorate the conflicts produced by the myopic pursuit of micro goals at lower levels, and vice versa (Costanza, 1991). Although the questions about ecological agricultural research arise from the local level, their answers may lie at higher levels within the realm of the political economy. Thus, agricultural policy formulation requires substantial research on the links between local production systems and the larger national economy, political structures, and decision-making processes, as well as on the roles and the limitations of the national and local authorities in policy development and implementation (Shi, 2010).
1.6 Summary

The Guizhou Government has consistently paid special attention to the development of agriculture and rural areas, and has made substantial headway in ensuring food self-sufficiency and development of the rural economy. However, the Guizhou Government is well aware of the great challenges confronting province’s agriculture: large population, agricultural resources scarcity on a per capita basis, and outdated agricultural infrastructure. The development of ecological agriculture is not only an important component of Guizhou's overall sustainable development strategy, but also a major task for Guizhou to ensure its food security, social stability and environmental sustainability.

Agricultural sustainability is now a central focus for agricultural researchers, government leaders and policy makers throughout the world. Many of them have criticised modern conventional agriculture, which is based on high use of chemical and technological inputs and oriented to maximising returns and profits, as often being detrimental and nonviable when considered from social and ecological perspectives. In order to meet increased demands created by growing populations and rising incomes, sustainable agricultural development emphasises the need to enhance agricultural productivity in a manner that provides affordable, efficient and healthy diets to all at the lowest environmental cost. This approach represents not only a new way of thinking about agricultural production, but also a potential alternative to conventional resource management.

As the evolution of an agricultural system is a biophysical phenomenon and socio-cultural construct, no single blueprint of sustainability will be found, as economic and social systems and ecological conditions differ widely among countries or regions. Each nation or region will have to work out its own concrete development strategies and policy implications. As Guizhou’s agriculture is increasingly challenged by the constraints of population, resources and environment emerging from its modern development, it is imperative to explore a sustainable agricultural paradigm that could accommodate economic and socio-cultural needs within an already stressed natural resource base.
2. Ecological Economics as a Policy Science

2.1 The hard core of ecological economics

2.1.1 An alternative perspective on environment-economy interactions
Ecological economics has provided an alternative perspective on the relationship between human economic systems and larger dynamic, but normally slower-changing ecological systems. It has defined economic growth in terms of the physical dimensions of throughput and acknowledged that, in the long run, social and economic sustainability is not possible without ecological or environmental sustainability. Ecological economics differs from conventional economics in terms of the breadth of its perception of the problem, and the importance it attaches to environment-economy interactions (see Table 1).

<table>
<thead>
<tr>
<th>Aspects</th>
<th>Conventional Economics</th>
<th>Ecological Economics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic worldview</td>
<td>Anthropo-centric</td>
<td>Eco-centric</td>
</tr>
<tr>
<td>Primary goal</td>
<td>Economic growth oriented</td>
<td>Steady-state oriented</td>
</tr>
<tr>
<td>Assumptions about technological progress</td>
<td>Technological optimism</td>
<td>Technological pessimism</td>
</tr>
<tr>
<td>Countermeasures</td>
<td>Technological measures</td>
<td>Institutional measures</td>
</tr>
<tr>
<td>Desired objective</td>
<td>Welfare optima</td>
<td>Sustainable development</td>
</tr>
</tbody>
</table>

2.1.2 A trans-disciplinary analytical framework
As an effective framework for policy, ecological economics is multidisciplinary and works closely with other disciplines. Ecological economics can be viewed as a trans-disciplinary process of combining, interpreting, and communicating knowledge from diverse scientific disciplines. It is a field of study that is increasingly being involved in the important endeavor of addressing and achieving sustainability. Ecological economics promotes a trans-disciplinary analytical framework that goes beyond the narrow boundaries of conventional disciplines to develop an alternative perspective on human-natural interactions as the basis for effective policy-making to achieve sustainability.

2.1.3 A participatory process for policy formulation
Applying ecological economics to the problem of sustainability implies a science with changed roles to include community and political decisions regarding the redistribution of economic opportunity and access to environmental services within and between generations. This perspective recognizes multiple stakeholders who have different values and knowledge systems and use multiple paradigms. Since sustainable development is socially and discursively constructed, a central aspect of the policy process is that it should be communicative. An ecological economics approach thus explicitly investigates the ways in which ‘lay’ and ‘expert’ groups actively construct meanings around environmental and sustainability issues and within the policy process. In this way, the decision-making process is based on a more collectivist rather than individualist perspective.
2.2 Scientific knowledge and policy recommendation

Ecological economic issues are complicated by powerful social and political interests, which not only have high stakes associated with alternative policy outcomes but also employ scientific experts to support their positions. Thus, ecological economics needs to address the distinction between scientific findings and policy advice. In general, ecological economics attempts to make contributions to:

- Scientific issues (e.g., establishing an historical perspective on social-natural interactions; finding a common language and set of concepts for the analysis of economies and ecosystems; and offering an area of intersection between natural and social sciences); and
- Political and ethical issues (e.g., a forum and structuring for policy analysis; a framework for the ethical analysis of inter-temporal and interspecies choice; and the influence of decision-makers).

These efforts are particularly important as ecological economics is used not only to answer agreed questions between scientists, but also to influence people’s values and persuade policy-makers to believe a social, economic, and ecological sustainability standpoint.

2.3 Policy implications

2.3.1 Ideological relevant

It is important to recognize that conflicts between science and policy determination are ideologically invariant. Ideological and political concerns become not only objectives of study but also various inputs for theorizing in scientific research. This is also the case of ecological economics. The development of ecological economics not only responds to, but also inspires political objectives. Politics and science mutually influence each other. The dual tasks – scientific inquiry and political action – have determined the nature of ecological economics as ecological political economy. This means in addition to providing scientific insights, ecological economics serves as a political instrument for tackling problems introduced through policy debate.

2.3.2 Discursive nature of ecological economics in policy making

From a discursive ethics perspective, scientific reasoning is inseparably linked to and informed by the human experience of a social, cultural, and ecological life world. In order to enhance the attractiveness of a policy of sustainable development within the political process, ecological economics research should pay more attention to the inequitable power relations that generate current environmental problems and to the development of appropriate institutional arrangements for sustainable resource governance. It is crucial for ecological economists to be involved in participatory processes with decision-makers and other stakeholders in making scientific information useful for the process of decision-making (i.e., bridging the gap between the academy and public policy).

2.3.3 Actively involved in the policy-recommending process

In the real world, scientific inquiry is not wholly objective but is partly shaped by the socio-political context in which it is conducted. More attention therefore needs to be paid to the power structure and institutional arrangements for policy discourse because people are reluctant to alter their behavior without incentives compelling enough to bring about changes in their fundamental decision-making. In this regard, practitioners of ecological economics are increasingly encouraged to combine the ability to carry out creative scientific research as well as the skill to influence decision-makers in the policy-recommending process.
2.3.4 Addressing larger questions and broader issues

As a policy science, ecological economics cannot be validated as reliable by conventional discipline-bound norms; it must be sensitive to a much wider range of social implications. Ecological economics has more to contribute than just ‘the facts’. Sustainability requires clearly understanding the way people and their institutions interact with ecosystems. Ecosystem changes are generally the combined effects of natural dynamics and a multitude of economic decisions. Therefore, not only must the biophysical bases of economic activity be understood, but also must the sociological and political. Moreover, changing biophysical and social dimensions are posing a moving target for science and policy. In a wider sense, ecological economics is a science of social change dealing with the question of how to design institutional frameworks for evolving sustainable production and consumption patterns (Renner, 1999).

2.4 Summary

As an emerging research field, ecological economics directly inquires into the working properties of economic-environmental interactions, the dynamic relationships within which humans interact, and the processes that humans could affect towards a sustainable development future. The emphasis on the biophysical constraints distinguishes this research effort from conventional economics. The real challenge, however, is to identify which of the many neoclassical economics paradigms and principles are rigorous and which either should not be used or else seriously modified. Ecological economics is best interpreted as a re-emphasis, a revival and a re-discovery of basic elements of earlier intellectual traditions that have been set aside, neglected, and sometimes forgotten in the social sciences and social philosophy. Ecological economics provides an operational framework and process to share and disseminate information, to facilitate public access to decision-making, and to evaluate policies to assist decision-making.

However, ecological economics must be acknowledged to rest upon a pre-commitment to, or a faith in, human’s adaptive potential. It attempts to define a flexible and tractable approach to real-world problem solving. In other words, it tends to deal with policy issues not only in theory but also in practice. A key policy role of ecological economics is to provide the intellectual background of concepts, orientations and intellectual generalizations to inform policy and shed light on an initially ill-structured decision-making process. Although ecological economists still have a long way to go to achieve an impact on policy-making as significant as their neo-classical economics counterparts have, at least they can actively participate in the decision-recommending process to improve the quality of the decision-making process on sustainability policies.
3. Ecological Agriculture: From Theory to Practice

3.1 A comparison of Guizhou and world ecological agriculture

Given the different situations between Guizhou and Western countries, there will be differences in the recognition and practice of sustainable agricultural development according to their specific conditions. In Guizhou, agricultural systems must have high productivity without causing degradation of natural resources and environment, to fulfill the needs of a growing society. As a result, greater emphases are put on food security, rural industrial employment, and income-generation options compared with that of developed countries, which stress environmental protection and health aspects. In contrast, ecological agriculture in Western countries takes a radical position in environmental conservation and rejects the use of agrochemicals (see Table 2). Guizhou ecological agriculture takes advantage of a big population to overcome the disadvantage of relatively small resources per capita, and makes up for the deficit in scientific expertise and capital with the rich experience of traditional agriculture.

<table>
<thead>
<tr>
<th>Items</th>
<th>EA in Guizhou</th>
<th>EA in Developed Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Similarities</td>
<td>A definite holistic systems orientation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Long-term environmental sustainability and economic viability</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Crop rotation and other soil-building practices</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Humans as allies, rather than conquerors, of nature</td>
<td></td>
</tr>
<tr>
<td>Differences</td>
<td>Integration of raising yield and income, and improving ecological and social impacts</td>
<td>Protecting environment and maintaining resource base with acceptable yield of return</td>
</tr>
<tr>
<td>Emphasis of goals</td>
<td>Broad structural adjustment of agro-ecosystem and optimization of regional resource allocation</td>
<td>Environmental protection through specific projects, legislation, and market intervention</td>
</tr>
<tr>
<td>Strategic options</td>
<td>Integrated development of cropping, forestry processing, and environmental engineering</td>
<td>Cropping and breeding focusing on soil and water conservation, and protection</td>
</tr>
<tr>
<td>Industrial organization</td>
<td>A blend of modern techniques, chemical inputs, and traditional organic practices</td>
<td>Low external-input, self-maintaining system with much emphasis on reduced chemical use</td>
</tr>
<tr>
<td>Input use</td>
<td>Government initiates support and directly intervenes</td>
<td>Spontaneous and scattered activities of individual groups, limited promotion by government</td>
</tr>
</tbody>
</table>

3.2 Constraints and potential problems in the practice

3.2.1 Conventional development paradigm

Current practices imply a production-oriented local perception of agricultural sustainability. Since alternative practices are more management and information intensive than conventional practices, adopting sustainable systems may produce different stresses for families than do conventional farming
systems. As a result, ecological agricultural practices tend to be more successful in pilot or experimental sites than in other areas where conventional agriculture has long been practised. What decision-makers actually do in practice is to restrict themselves to one or a few objectives at a time, often initially disregarding social issues. At the early stages of development, the government offered incentives favoring maximum aggregate economic growth rather than balanced regional development. Because the present development paradigms are driven more by economic concerns than by environmental ones, ecological farmers would intend to reduce agrochemical use in the future while continuing to explore other economically viable alternative practices.

3.2.2 The inadequacy of institutional arrangements
Current constraints appear to be the lack of institutional arrangements and of the management capacity to implement ecological agriculture above farm or household level. Missing institutions typically result in open access systems and resource degradation. In recognition of the importance of capacity building and utilization in ecological agriculture development, more pilot projects have been set up to accumulate more experience in this regard. Within a market economy, ecological agriculture should maintain a significant level of collective organization of production and exchange. The development of new farming systems at the local level must take into account overall national objectives. The dispersed and small-scale land units, however, limit the creation of a rational economic structure and the public action necessary for resource conservation and ecological projects. Moreover, the uncertainty about land tenure has encouraged short-term profit maximization and exploitation of land at the expense of sustainable agricultural production, which is evident in the rapid conversion of agricultural land to residential and urban use. The separation of ownership and use-rights to land means many farmers are reluctant to make long-term investments.

3.2.3 Limits of the market economy
In a market economy, farmers are forced to make decisions based on existing economic realities rather than on ecological principles. Consequently, more and more small farmers will shift to specialty crops oriented to elite markets, as a way of exploiting economic opportunities, in order to survive in the market-oriented economy (Altieri, 1987). New market opportunities may lead, or force, farmers to seek short-term profits and pay less attention to keeping their agriculture in balance with the ecological conditions. In a market economy, especially where environmental and social costs remain external to the pricing system, individual decisions are most often made within the context of short-term economic profit. This provides a major argument against reliance on market mechanisms to ensure long-term agricultural sustainability. In this regard, governments have a particular responsibility to compensate for market deficiency.

3.2.4 Trade-offs between productivity and sustainability
Economic, social, and environmental trade-offs are common in agricultural production. Conway (1987) argues that traditional agricultural systems have high sustainability, while modern agricultural systems have high productivity. The simultaneous demands for high productivity and sustainability of agriculture are often regarded as an irreconcilable conflict between short-term and long-term aims, or between economic and ecological considerations. Since not all objectives can be simultaneously achieved as a rule, trade-offs are inescapable. Each decision-making process depends on a particular institutional context, given environmental and social conditions. At any given time, however, tradeoffs among the policy goals of productivity and sustainability are difficult to operationalize because the validity of the proposed trade-offs is likely to be contested by affected groups. A typical decision-making process will be
characterized by the search for acceptable compromise solutions. At this stage, however, environmental protection activities will be adopted only if they make economic sense to farmers. The temporary loss of production during a transition period to ecological agriculture may seem even less tolerable.

3.3 Bridging the gap between theory and practice

Ecological agriculture has provided a kind of integrated agricultural development pattern targeted at the goals of economic development, environmental protection, and rural development. However, until ecological agriculture has a much more immediate and widespread adoption, the possibility of contributing significantly to sustainable agricultural development is fairly bleak. In this regard, the government would play a crucial role in the formulation of ecological agricultural policy and the adoption of this sustainability enhancing production system through its political economic mechanism. The logic of ecological agriculture is that market-oriented agricultural production must link with conservation practices to ensure land productivity over the long term.

3.3.1 Consistency with social, economics, and ecological settings

No matter how technically feasible and potentially ecologically beneficial a new agricultural practice might be, it will not be adopted if it does not fit into existing political relations and promise tangible economic rewards. The first requirement for sustainability must be a promise of material advance. Ecological agriculture can be seen as a vehicle for the transition of the rural economy from subsistence and local self-sufficiency to a more diversified and market-oriented system tied more closely to regional and national objectives. The ecological agriculture movement has to adequately address the need to feed rapidly growing populations in order to prevent both human and ecological disaster, although it represents a change from focusing on producing more food to a concern for the ecological consequences of doing so.

3.3.2 Mitigating the pressure of labor migration

The current size of most farms is too small to provide full employment for an average farmer household. The competition for off-farm jobs and non-farm livelihood opportunities is becoming more obvious in the diversification of agricultural production and the establishment of rural industries. In a competitive market economy, low productivity and low income earnings often lead small farms to a long-run situation of disinvestments and eventual relocation into other off-farm economic activities (D’Souza and Gebremedhin, 1998). The development of ecological agriculture with its attendant biological recycling of materials, biogas generation, milk and meat production, and food and food by-product processing industrial activity, offers special promise for absorbing growing labor force. An important effect of ecological agriculture is that more labor can be absorbed, provided that labor is substituted for capital to sustain the economic dimension.

3.3.3 Needing bottom-up policy initiatives to complement national policy

National agricultural planning and policy usually has failed to take into account diversity and serious environmental problems, mainly because of political and institutional constraints. Those plans and policies usually addressed the need for more large-scale agricultural production and less emphasis on small-scale family operations. It needs special policies to encourage farmers to adopt ecological agriculture. The proposal for bottom-up policy initiatives suggests that local control and empowerment can be enhanced within a market context through collective organization of production. The strength of ecological agriculture relies on the participation of farmers who are the appropriate people to develop new management practices and to experiment with changes in farming systems. The proposal recognizes the importance of integrating local and micro-level objectives with macro-level concerns.
3.3.4 Challenging the dominant position of conventional agriculture

Developing ecological agriculture is essentially a process of altering, where necessary, current mainstream agricultural practices. The success of ecological agriculture has been achieved by the application of labor and management rather than by large amounts of un-renewable energy. Ecological agricultural systems reduce the use of chemicals by integrating organic and conventional production methods. Nevertheless, ecological agriculture has challenged conventional agriculture by identifying policies (e.g., eco-labeling products of ecological agriculture to reward farmers for adopting this pro-environmental practice) that facilitate an actual transition towards sustainable agricultural development. Such a transition is not immediate, and the implementation of pro-sustainability policies involves an iterative procedure with necessary economic, technological, institutional, and ecological changes over time. During this process, indigenous cultural heritage and traditional farming knowledge need to be increasingly emphasized despite the dominant conventional economic and political interests.

3.3.5 Reconciling the conflicts between economic and ecological objectives

From an ecological economic perspective, environmental sustainability and economic development are complementary rather than conflicting goals. Ecological agriculture should be a mosaic of planned diversity on different scales, which provides products for local consumption as well as for the market. A particular merit of ecological agriculture is to intensify grain production systems and at the same time expand livestock and other farm-related enterprises. Ecological agriculture seeks to balance the long-term costs of farm production against the short-term profits of goods sold at market. This approach is able to contribute to income generation at the farm household level as well as to food security and ecological objectives at the national or regional level. In order for the practice to be socio-economically viable, the economic and social needs of the farmers must be articulated and met.

3.4 Summary

Sustainable agricultural practices provide profitable alternatives to farmers who are increasingly asked by society to reduce externalities. Although it is much too early to predict whether the alternative agricultural paradigm will significantly modify or even replace the conventional paradigm, it represents the first stage of a ‘paradigm shift’ occurring within agriculture. The key theme is the development of ecological agriculture in concert with the principles of ecological economics. Based on a core of traditional agriculture and supported by advances in modern science and technology, this approach is consistent with the international trend of exploration on agricultural sustainability and attempts to avoid the resource and environmental problems caused by petrochemical-based agricultural development. Methods, techniques, and materials used in ecological agricultural development must be tailored to the specific conditions and resources available. Therefore, ecological agriculture applies to specific sites, and is a management-intensive, resource-conserving process that considers both productivity and sustainability. It values the local empirical knowledge of farmers, and the sharing and application of this knowledge to the common goal of sustainability.
4. International Case Study 1: Industry Development – Experience of Mining Industry Development in Australia

4.1 Introduction

Australia had the world’s largest economic demonstrated resources of lead, mineral sands (alluvial ilmenite, rutile and zircon), tantalum, uranium, silver and zinc. It also ranked in the top six countries for economic resources of black and brown coal, bauxite, copper, cobalt, diamonds, gold, iron ore, manganese ore and nickel. There were more than 400 medium- to large-sized mines in Australia, including mines in world-class deposits of most major mineral commodities.

The mining industry has been a major contributor to Australia’s economy and infrastructure. It has provided the nation’s basic industrial requirements – construction materials, fuel, and industrial raw materials, and been a major earner of export income. It has been a major factor in decentralisation of both population and industry, as towns, railways and ports were established to serve the mines and smelters. And it has encouraged technological advancement, both in its own and other fields (ABS, 2000).

This case study was derived from Australian Bureau of Statistics’ 2000 report – Australian Mining Industry, 1998-1999.

4.2 Historical overview

The history of the Australian mining industry began at the end of the 18th century with the discovery of coal. At the time of Federation in 1901, the mining industry was well established in Australia. Petroleum (which includes crude oil and natural gas) had been sought for many decades, but it was a latecomer to the mineral production scene in Australia. In the late 1930s the mining industry played only a minor role in the Australian economy. The need for new ore reserves of many minerals was the major concern of the industry in the early 1940s.

Mineral explorers were able to search more efficiently by using geological maps and theories on the origin of mineral deposits to target specific areas for exploration. The better understanding showed that Australia had a high potential for the discovery of many styles of mineral deposits. This realisation, together with Australia’s political stability, led in the early 1960s to an influx of major overseas mining companies bringing with them new expertise and ideas, in addition to increasing exploration expenditure.

In the 1950s the mainstays of the industry were lead, zinc, copper, gold and coal, of which only the first four were exported in any quantity. In the mid-1960s, the Australian mining industry began to expand, with growth in both production and exports combined with a change in relative importance of the various commodities – gold and base metals declined, while coal, iron ore and other minerals increased in relative terms.

In the late 1970s the rate of growth of the mining industry in Australia began to slow. The industry was largely dependent on exports and had to compete for sales with an increasing number of mines in other countries. Australian production increased largely because of capacity increases at existing mines to
achieve economies of scale.

By the mid-1980s one of the few bright spots in the Australian mining industry was gold. Australian gold production multiplied from 18 tonnes in 1981 to 57 tonnes in 1985. The 1980s also saw increased vertical integration in the mining industry, most notably the processing of Australian bauxite to alumina and aluminium. Petroleum exploration in the 1980s resulted in the discovery of large resources of natural gas. In 1985, 96% of Australia’s crude oil requirement was met by domestic production. Since then, however, oil self sufficiency has been declining slowly as demand has increased.

The 1990s were another period of change for the mining industry – a period of consolidation with considerable focus on further improving efficiency and safety of operations and movement towards globalisation. Despite far-reaching changes in world mineral production and consumption patterns and the financial crisis in Asia, the mineral industry was able to retain its role as a major source of export income for the Australian economy.

At the end of the 20th century Australia had become a major world producer and exporter of minerals. Minerals and energy were the largest commodity export by value in 1998-99 at $39.2 billion, exceeding agriculture ($22.4 billion). Mining-related intellectual property was worth $1.2 billion in 1998-99 and was Australia's fifth biggest mineral export, behind coal, gold, aluminium and iron ore. This intellectual property includes geophysical and mining instrumentation, software and processing chemistry, mine site rehabilitation, engineering, and other world-class Australian technologies.

4.3 Economic importance

The economic importance of Australia’s mining industry at the end of the 20th century is reflected in the following statistics for 1998-99:

- 8.8% of GDP (minerals and petroleum);
- Exports (unprocessed and processed minerals and petroleum) amounted to $38.8 billion (35% of total exports of goods and services; 61% of commodity; and 45% of merchandise exports);
- 80,000 employed directly in minerals and petroleum extraction (1% of national employment), in addition 325,000 manufacturing jobs (3.8% of total employment);
- Investment of $12.7 billion (28% of total New Capital Expenditure); and
- Expenditure on exploration $1.7 billion (minerals and petroleum).

4.4 Regional development

Apart from the mining industries’ importance to Australia’s economy, they are also particularly important in providing jobs and infrastructure development in regional Australia. Since 1967 these industries have built at least 25 new towns, 12 new ports, 20 airfields and 1,900 kilometers of rail line within Australia. Mining and directly associated manufacturing employ over 400,000 Australians.

Mining operations are not typically labour intensive once in production, but during construction they provide employment for a great many skilled workers. Downstream processing projects can provide hundreds of jobs to local communities, not only in areas associated directly with construction and operation, but also indirectly through local service industries such as catering, cleaning, maintenance and entertainment. These projects often result in improved local infrastructure including roads, schools and community leisure and health facilities.
4.5 Environmental protection

Through the 1990s, the mining industry realised major and continuing improvements in its environmental performance, and is now exporting this expertise. There was a progressive trend to co-regulation of mining, involving an appropriate mix of command and control regulation, incentives and penalties. This creates efficiencies in regulatory systems by placing greater importance on achieving desired outcomes than on enforcing compliance with standards. All relevant issues are considered in a coordinated and effective manner before a mining project is approved. Governments set the general conditions for individual projects, based on environmental impact assessment and community consultation processes, and companies have flexibility as to how they meet the conditions or guidelines. Environmental management plans developed and approved before mining commences. Rehabilitation arrangements are considered at the development proposal stage and form an integral part of environmental management throughout the mining cycle. The “polluter pays” principle applies.

This cooperation between government and industry is generally proving effective in achieving economic, environmental and social outcomes that are acceptable to most people. There has been increasing coordination between all relevant government agencies and processes in reaching decisions on desired outcomes. If particular mines or plants are not performing acceptably, action can be taken, ranging from financial penalties to closure, with company directors being held accountable in serious cases. Most modern Australian mines have no significant off-site emissions to water or land.

4.6 Major experience

4.6.1 Federal government commitment to the mining industry

In 1998, the Federal government released a Resources Policy Statement that provided a strategic framework for Australia’s minerals and petroleum sectors to set world standards of performance to maximise investment and competitiveness. The government’s vision is for a highly competitive, innovative and growing minerals and petroleum sectors which contribute strongly to rising national prosperity, employment and regional development. The statement sets out principles for government action and a detailed forward agenda based on pursuit of five key objectives:

- High levels of certainty to investors and other stakeholders (rights, responsibilities and the processes of public decision-making);
- Highly competitive operation environment, in an economic sense;
- Support for the industry’s efforts to achieve sustained wealth generation through growth, innovation and enhancement of the value of its output before export;
- Protection of the environment and the interests of the workforce and broader community (pursuit of ecologically sustainable development and world best practice in environmental, health and safety management); and
- An industry able to respond confidently to international challenges and seize international trade and investment opportunities.

4.6.2 Favourable investment environment

Australia is a country with very rich mineral resources. At the same time, it is a multi-cultural society with relatively stable economic and policy systems, so in political and legal terms Australia is preferred for foreign investors, especially in mining area. The cost in Australia and other developed countries is relatively low. Australian government welcomed foreign investment, and has established various laws and regulations to protect the interests of foreign investors.
4.6.3 Governments and geo-science information
Australian is arguably the world’s most advanced nation in terms of the extent and detail of its national and State geoscientific mapping coverage. The National Geoscience Mapping Accord (a joint Federal and State/Northern Territory program) has provided a new generation of geoscientific maps and datasets of strategically important areas. In addition to this mapping initiative, jurisdictions have undertaken individual exploration mapping programs and made significant improvements to on-line access via the Internet to information including tenement (lease) holdings, geoscientific data, and open file reports of past company exploration results. The availability of this data has an important influence over the exploration process as it provides a background that allows all participants in the industry equal access to information to properly assess the potential of available exploration areas.

4.6.4 Safety and health
In 1998, the Minerals Council of Australia identified safety and health as the number one priority of Australian mining industry. With a vision of an industry free of fatalities, injuries or diseases going into the 21st century, the Council in partnership with its State and Northern Territory counterparts is taking a lead on industry and safety health issues and pursuing a number of initiatives to realise this vision. In parallel, Federal, State, Northern Territory and New Zealand governments, through the Australian and New Zealand Minerals and Energy Council, are developing with industry a national strategic framework for improving safety and health performance in the mining industry.

4.6.5 E-commerce
The minerals industry in Australia has always been a leader in applying innovation and knowledge. Australia’s minerals industry at the beginning of the 21st century is world class, not least because it is very much a part of the knowledge-based economy, and is very adept at using, gathering, interpreting, transforming and transmitting data and information using state-of-the-art technologies.

The mining industry has a very high level of business PCs and Internet use. This is placing the minerals industry in a good position to take up E-commerce. For example, in August 1999 the Australian company WMC moved its cobalt and nickel marketing on the Internet in what is a world first for trading in these commodities. The $100,000 Internet initiative paid for itself in the first month. The website is changing the way cobalt and nickel are being traded internationally. The move has benefited WMC, which notes that it has doubled its international customer base and improved its premiums, and brought transparency particularly to the cobalt market. WMC also notes that Internet-sourced sales have cut transaction times down to about one minute because availability, pricing and shipping details that were formerly negotiated over the phone are now posted on-line.

4.7 Summary
Since 1901, the minerals industry has been important to Australia, both for development of regional Australia and for the income from its export earnings. Notwithstanding this, discoveries have continued apace and, over the last 50 years, Australia has developed into one of the world’s leading mining nations. The mining industry has created wealth for the nation and its people through the discovery and mining of mineral deposits and processing the ore. The annual value of production for individual commodities is of the order of $9 billion in the case of coal and petroleum, and $4 billion in the case of gold, iron ore and bauxite.
The search for a variety of minerals in diverse geological conditions has developed a highly experienced mineral exploration industry which is now exporting its skills to other parts of the world. At the start of the 21st century, Australia’s mining industry is global in its outlook, innovative and highly successful. It has also become recognised for its commitment and skills to sustain and improve the practice of mining in an environmentally responsible manner. But it is under pressure from low commodity prices and plentiful world supply, and the restructuring continues in an effort to cut costs.
5. International Case Study 2: Globalisation and Sustainability – Recreation, Tourism and Sustainable Mountain Development in Canada

5.1 Background

The Whistler-Squamish corridor is often referred to as the Sea to Sky Corridor. It is famous amongst Canadian holiday spots for its spectacular mountains that meet the ocean inlets on the coastline to create a dramatic and beautiful skyline. But the Whistler-Squamish corridor is home to communities, and is not just a series of tourist spots. The towns of Squamish, Whistler, and Pemberton are located in Canada's western province, British Columbia, 1 to 3 hours drive north of the metropolitan Vancouver area. A number of Aboriginal communities live in this region.

This case study was derived from Learning through Case Studies: Exploring sustainable development in communities around the world, at http://casestudies.lead.org/

5.1.1 Whistler

Developed as a resort since 1975, the physical community of Whistler has expanded in size to include "Whistler Village", many other residential subdivisions, and some small commercial areas. In 2000 a new record was set with 2 million tourist visits to the region. A core group of 8700 residents in Whistler include long-time community members who live in the residential areas of the municipality. There is much more to Whistler than the Village area, which is the main commercial zone. The core 'resident population' also consists of transient, short-term residents who stay from 1 month to 1 year for work, and part-time residents who live in the Whistler area for only 3-6 months for holiday purposes but have their primary homes elsewhere (eg, people who come to relax and fish at the lakes etc.). A few residents pre-date the tourism boom and used to work in the forestry industry in the region. Residents make a living from the local service or real estate industry, own boutiques in the fashionable Village, or work outside Whistler altogether.

5.1.2 Squamish

The town of Squamish is located at the mouth of a major river system - the Squamish River. Squamish has a population of 16,000, nearly double the size of Whistler's residential core. Economically, the community is in a stage of change due to recent instabilities in the forestry industry, upon which the town was built. Traditional employment in forestry and logging is decreasing, and the community is experiencing an influx of residents who commute to Whistler and Vancouver for work, due to its location mid-way between the two cities. It is also the gateway to Whistler, so it enjoys access to the constant traffic and buying power that makes its way to Whistler during all four seasons.

5.1.3 Squamish Nation

Squamish Nation is a highly economically and politically proactive Aboriginal group with a total population of 3000 in Lower Mainland BC and elsewhere. The population is young and well-educated; many lawyers, consultants, technicians and accountants have left to gain experience outside the community, and many return to work within. Above all, cooperation with industry and other governments
is desirable to Squamish Nation, but Squamish Nation vehemently defends what are seen as its rights to have input and guide development in its community. Having been for the most part left out of the tourism developments in Whistler, the community has looked towards good real-estate investments and international economic development initiatives to spur on the development of their community.

5.1.4 Pemberton
The Village of Pemberton is 20 minutes north of Whistler, and has changed its economic base significantly in the last 10 years. The community has a tradition of agriculture and forestry but the province-wide decrease in forestry activities means that many well paying jobs have been lost and long time residents have had to leave for work elsewhere. Despite this, its population has grown from 426 to 1300 since 1986 due to new opportunities in the tourism industry, recreation, and the district's ongoing support of agricultural projects in this ecologically rich valley. A unique agricultural business of producing virus free seed potatoes for an international market has grown into a viable way of life for many farmers in this valley. Pemberton's proximity to Whistler and relatively economical real estate has attracted significant numbers of seasonal employees and full time residents from the neighbouring community. The resulting building boom and subsequent influx of commuting residents has caused noticeable stress on the Pemberton's infrastructure and socio-economic climate.

5.1.5 Mount Currie
The Mount Currie Aboriginal Band is located at the base of impressive Mount Currie in a village just a few minutes east of Pemberton. The community prides itself in taking a proactive stance on development that encourages the protection and promotion of cultural and natural resources. The community governs its own traditional territories and is in opposition to certain aspects of the Provincial treaty land claims process that occasionally exchanges resource development rights for cash. Its current population is 1720 and is expected to grow to 3500 by the year 2010. It has an estimated 85% rate of unemployment. The province-wide income security reform process is expected to alter the rate of unemployment. The process discourages reliance on social welfare program. Another proposed development is a heritage Village that would be a tourism point of interest. Cultural tourism and traditional menus would be available to customers visiting the community.

5.2 Tourism and development in Whistler
The mountains surrounding the Whistler Village that attract so many international tourists are intrinsic to the resort's existence and present state of development. With the increased frequency of international tourism, the communities of Squamish and Pemberton have also experienced the influences of a global and mobile population who come to holiday in the Village. International tourists seek out recreation in skiing, snow-boarding, hiking, mountain-biking, camping, and water activities on the lakes, just to name a few. A very important and significant type of visitor is the non-resident homeowner who stays for about two weeks during the year, but does not necessarily rent or share the home with anyone else for the rest of that period. Many of these homes outside the Village are owned nationally and internationally by wealthy individuals and account for a large number of the homes developed outside the Village itself. Whistler is perceived as a good investment so some of these homes are also investment properties which are rented out to local or seasonal users; people from Vancouver and Seattle account for a large share of this market.

The mountains of Whistler are rated the most popular resort in all of North America and as a result, 2 million tourists, or 30,000 visitors a day, spend time there annually. They rent private property in the
Village or stay in a hotel room, paying anywhere from $160 to $1500 dollars a night for lodging. Given the varied composition of the 'resident population' in the Whistler area, the term 'bed unit' is more often used than 'population'. Bed units represent the number of pillows available in the community to accommodate people overnight. A cap of 52,500 bed units was set by the Resort Municipality of Whistler. Present development in the Whistler area is quickly approaching the original limit of 52,500.

5.3 Tourism Whistler and other agencies

The properties available to tourists within the Village are owned both by local residents, private companies and others as investments or for part time use, but all pay fees to 'Tourism Whistler'. Tourism Whistler is not financially linked to the Intrawest Corporation, and is an incorporated association of 4,500 land owners in the Whistler area. Tourism Whistler is funded by these fees and a portion of a Hotel Tax that the Resort Municipality of Whistler (RMOW) collects. In general, any land that can legally be rented on a nightly basis is termed 'resort land' and is subject to Tourism Whistler's fees. Commercial businesses in the Village are also subject to fees.

Intrawest Corporation, the owner of the majority of lands and businesses in Whistler, is headquartered in Vancouver, British Columbia and its shares are listed on the New York Stock Exchange and the Toronto and Montreal exchanges. The Corporation's area of expertise is mountain resort development with villages at their base but have a mandate to diversify into other types of leisure markets. It is the largest mountain resort developer in North America. Its assets are in excess of CDN$2-billion employing 18,000 people on its resorts and golf courses (Intrawest Corporation, 2000).

The Resort Municipality of Whistler (RMOW) co-exists with Tourism Whistler and Intrawest. Tourism Whistler is funded by a levy on businesses local to the area. It manages facilities in the Village, such as the convention centre, and its main purpose is to market the "Whistler Experience" to the world by coordinating promotions and assistance to visitors.

In this role it attempts to manage the growth of the community by setting the previously mentioned growth-caps on residential and housing developments and by ensuring a high quality of recreational facilities. Managing the growth of the Village and residential areas helps to protect the habitats of indigenous plant and forest species such as bears and eagles and riparian habitat, as well as create high quality habitats for its human community members and visitors.

Housing oneself while in Whistler is the primary consideration of most visitors and local residents. For residents this is becoming increasingly costly as tourism drives up the value of housing. In the past ten years, the cost of all housing types has risen astronomically in comparison to other towns of its size. In 1998 the average sales price of a single family detached home was CDN$818,613, an increase of 26% from the previous year (RMOW, 1999).

The residential community of 8700 people have found these continually accelerating costs to be unacceptable and in 1996 initiated municipal legislation through the RMOW to establish an organisation called the Whistler Housing Authority (WHA). By collecting a tax on all developed properties in Whistler Village, the WHA can guarantee a fixed cost on residential housing to those who can prove they live year-round in Whistler. The tax is collected from businesses that rent out their property in the Village area as well as the hotels, and is used towards the cost of building employee housing.
The formation of the Whistler Housing Authority was the result of a number of ongoing issues in the community. A housing shortage had existed and continues to exist during the winter months. Construction workers, for example, who work throughout the summer and need to stay on into the winter season, compete for housing with tourist renters and wintertime seasonal workers in the ski industry. The WHA is able to acquire properties, manage their upkeep, and set a cap on the selling price when workers decide to move. Without a cap on property prices, it would be impossible for service industry employees to afford accommodation, making it less desirable to work in Whistler. The WHA helps Whistler employees, both full and part time, to locate affordable property in Whistler.

5.4 Community development and management

Community development and management is a long-time occupation of the Whistler community and is sensitive to the limitations of space at the mountains' base. The Resort Municipality of Whistler has placed restrictions on traffic; now all or most of the areas in the Village are pedestrian corridors. All facilities, hotels and apartments have underground parking, so very little surface area in the Village is used for parking lots.

Waste management during high tourist seasons pose a challenge for the Village. The visitor to Whistler will notice that the Village is kept immaculately free of litter and that recycling receptacles sit on every corner; aesthetics are a critical aspect for a tourist resort. The municipal sewer system has had to increase its capacity three times in the last twenty years in order to accommodate the community.

Whistler has comprehensive long-term plans for the sustainability of its community. The Whistler Environmental Strategy (WES) addresses all of the following issues:

- An ecosystem-based approach towards land use (including a protected area network; recreational "greenways" and compact, efficient urban design);
- Environmentally sustainable transportation (including a comprehensive strategy to discourage use of automobiles);
- Water supply and wastewater management, including a programme to minimise water use and wastewater production;
- Solid waste reduction and re-use;
- Energy conservation; and
- An implementation strategy that addresses community partnerships; local governments' role; local business practices; education and research; and an adaptive approach to monitoring and policy re-evaluation.

The Resort Municipality of Whistler takes measures to mitigate the consequences of the volume of people to pass through certain areas of the district primarily by setting limits on the total numbers of people allowed to settle for any period of time in the region. The major tool for doing this is the cap on bed units, set at 52,500. Through the eventual implementation of the Whistler Environmental Strategy, it is hoped that specific conservation areas can be set aside and numbers of visitors to those areas be limited.

Another example of the RMOW's agency to improve environmental stewardship in the community is both the social and industrial consideration of dealing with traffic. Large tour buses and trains shuttle people hourly to Whistler from Vancouver. The train system is very slow and runs infrequently, so many people
depend on automobiles and large buses for transportation to Whistler. The road to Whistler passes through the town of Squamish and on to the town of Pemberton. Traffic can be extremely congested at the weekends and at rush hours. As a result, the RMOW carefully monitors the numbers of vehicles per day that pass through the area, the number of days of traffic congestion and the current levels of public service transportation in the area. They have successfully implemented an efficient public transit system and encourage its use by imposing high parking fees for private automobiles.

5.5 Logging in the Squamish-Lillooet regional district

Whistler is only one community in a series of communities in the Squamish-Lillooet Regional District. Though not as immediately obvious to tourists that come to Whistler, the other major economy of the Regional District is forestry. The majority of logging occurs north and south of Whistler with Squamish as a large base for activities that include both small and large companies. International Forestry Products (Interfor) is the largest company still operating in the region. Interfor employs about 3,200 people through its operations. Logging and saw mill products are sold on the world market. Interfor's mandate is to replant 80% of its cut and allow the rest to regenerate independently. Interfor maintains that it harvests portions of old-growth forests in such a manner that does not disturb a balance of biological diversity in the forests.

Not only could more forests be set aside for recreation and lower impact tourism initiatives, but it would also allow community representatives more control over pricing on areas that could still be logged. Conservation or sustainable development of the forest is coupled with a push for better logging practices, alternative forestry products, eco-tourism, and the development of the non-skiing recreation industry. Recreation in the Squamish-Whistler corridor is more than just skiing and snowboarding. Golf, mountain biking, hiking, fishing, and a multitude of lake or river sports are significant recreation activities that bring people to the region and are why people want to live there. Conflicting use requirements, the impact these activities can have on the natural environment and the need for a voice in community-level decision-making are a few of the common issues faced by many of these user groups. In response, recreation groups have formed associations and societies to deal with multi-use issues, promotion and awareness, and ensure that their voice and needs are heard when decisions are made regarding the land used for these activities.

5.6 Environment

Black bears, Grizzly bears, and salmon are among the local wildlife that receive the most attention from environmental NGOs and other concerned residents. Encroachment on the terrain of the bears, and the occasional poor waste management practices of residents and visitors, means that bears come into contact with humans more frequently and are subsequently destroyed. Efforts to educate the public and enforce appropriate garbage storage practices are spear-headed by the Association of Whistler Area Resident for the Environment (AWARE) and other local environmentalists. The logging practice of clear-cutting is one factor that leads to soil erosion on the steep mountain slopes, which among many other things, affects water flow and the quality of salmon rearing habitats. The potential for these impacts is protested by local and national environmental organisations.

Both environmentalists and local peoples propose alternatives to logging that would capitalise on their communities' traditional knowledge of medicinal plants to be found on the floor and upper canopy of old growth forest. Official recognition of the importance of Aboriginal traditional knowledge by the Provincial...
Government has given these claims serious weight in the land claim negotiation process and hence in the development of forests and roads in and around their communities.

Whistler's growth as a tourism-based industry has ignored the role and impact of its developments on Aboriginal people in particular, partly because of Whistler's different notion of sustainability. For the Mount Currie Aboriginal Band, sustainability is deeply tied to historical, cultural, and spiritual values in tandem with managing deficits and real poverty. Now that Mount Currie has begun to identify itself as a player in the development process, particularly in the area of cultural and eco-tourism, and further highway construction through the community, their views will have to be more actively addressed by their neighbours to the south.

5.7 Summary

In the Whistler area, the needs of the communities are as diverse as the communities themselves, and the political strategies for achieving their goals to deal with increasing populations are interrelated. Whistler in particular has a complex system of development management outside the municipal government structure that includes major input from corporate investors in the tourism industry and support mechanisms for that industry such as Tourism Whistler. The local community continues to assert its wishes through regular municipal governance with the creation of bodies like the Whistler Housing Authority and as propertied individuals and business owners who form a significant part of the local economy.

In Squamish, Squamish Nation, Mount Currie and Pemberton, economic activities other than tourism are in force and communities work to benefit more from the increase in tourism to Whistler. They assert their intentions through municipal governments and Band Councils but also draw upon their own economic development organisations to further their interests. Overall attentions to environmental concerns are woven into a number of these bodies, especially the Aboriginal Band Councils and development groups, but this is primarily the domain of a network of highly active non-governmental organisations.

Tourism worldwide is a $444 billion industry, which exceeds the combined Gross National Product of the world's 53 poorest countries (Waldron et al., 1999). Tourist destinations in mountainous regions alone account for 13-20% of the industry and churn out US$70-90 billion a year. The tourism industry is not a producer of tangible goods, it is rather concerned with the purchase and sale of 'experiences', hence, the 'Whistler Experience'. As such, all of these communities must demonstrate foresight in their planning practices if their towns and environments are to contend with the powerful economic force that 2 million visitors a year bring to the region.
6. International Case Study 3: Poverty Alleviation and Community Development – Sustainable Community Development and Natural Resource Management in Pakistan

6.1 Background

Community development is the tool by which people empower themselves by increasing their ability to control their own lives in order to create a more fulfilling existence through mutual efforts to resolve shared problems (Maser, 1997).

In the early years of international development assistance, development initiatives were largely driven by a "top-to-bottom" approach. Projects were organised and executed by government's line departments, which often produced inappropriate solutions. For the past 20 years there has been a steady increase in new community development activities largely by non-governmental organisations (NGOs) and the voluntary and donor sectors. As a result, community development initiatives have been transformed to what is now known as the "bottom-up" approach. This approach is based on the principle that people living in a community are the best source of information and the best resource to manage their needs.

While communities may develop in different ways, community development is often identified with increasing the skills, knowledge and abilities of local residents. It also increases the ability of the community as a whole so that the acquired skills may be used to create strategies that take advantage of changing circumstances. Community development involves economic systems, local institutions, political leadership, social and cultural structures, and community spirit and participation.

This case study was derived from Learning through Case Studies: Exploring sustainable development in communities around the world, at http://casestudies.lead.org/

Often, residents of rural areas lack basic infrastructure, educational facilities and have less access to employment opportunities. Social conflicts, weak institutions and lack of participatory mechanisms have also prevented many rural areas from developing. Another notable difference is that rural communities are usually closer to the natural environment than urban dwellers. In fact, most rural residents depend in some way or another on local resources for their survival and development. However, years of over-exploitation and mismanagement by various stakeholders are taking its toll on natural resources.

This case study will establish a framework for understanding the emergence of complex rural community development. The Peshawar and Swat Valleys in Pakistan offer a variety of development initiatives that illustrate the challenges related to community development.

Peshawar and Swat Valleys are located in the North West Frontier Province (NWFP). It borders Afghanistan in the west and the PRC and Tajikistan in the north. NWFP is the smallest province in terms of area, covering 101,741 km². The province is divided into seven administrative civil divisions. Its 15.4 million inhabitants are mainly Muslim. Geographically, the province is divided into two regions: the
mountains and the valleys.

6.2 Community development

Community development generally encompasses initiatives that are aimed at improving three fundamental circumstances: (1) developing and strengthening of local organisations, (2) promoting women's development and (3) basic infrastructure development.

6.2.1 Institutions and community development

In the Swat and Peshawar Valleys, local community institutions have been organised in addressing social development and natural resource management for several decades. In recent years several institutional schemes for development have been launched in order to empower the existing local institutions. A key feature of these initiatives is the development and strengthening of community-based organisations (CBOs) and village-based organisations (VBOs). These local organisations are formed of local people and/or stakeholders whose role is to create a self-sustaining organisation through which community members can work together to manage local resources and reach higher standards of living. These organisations reinforce public participation and joint communal work, and provide the communities with sustainable solutions.

6.2.2 Integrated rural development project in Mardan

One development initiative that has achieved notable success in establishing VBOs is the Integrated Rural Development Project (IRDP) in Mardan. The Government of Pakistan and the German development agency, the GTZ, have been funding the initiative since 1984. The IRDP focuses on market orientation, product diversification and management of environmental issues through community residents and local organisations. It has allowed communities to make considerable progress in building their capacities and abilities to carry out development activities on their own. For example, communities and local organisations have implemented a variety of irrigation and drinking water schemes in the area.

In 1995, when local organisations realised that funding from the donor agencies would cease in December 2000, a Regional Council for Development was formed in order to ensure the area's ongoing development. As of today, 154 local village organisations and 63 women's organisations make up the regional council. By applying the "bottom-up" approach, residents and local organisations and institutions are all actively participating in community development.

6.2.3 Resource use and women's development

A woman's life in some of the small traditional villages of the Peshawar and Swat Valleys is influenced by a rigid code of tribal beliefs. Women and girls are actively involved in use and management of natural resources, however, this involvement varies from area to area and region to region. In northern parts of the NWFP, there is a relatively more conservative social environment that limits the mobility of women within and outside the villages. In southern parts of the NWFP, women generally enjoy less restriction and are also involved in most of the agricultural operations and livestock grazing. Women's development has been hindered by these multiple tasks, combined with the lack of mobility, poor or non-existent education facilities for women, and the low level of infrastructure development in some areas. In most areas female literacy rates are as low as 4 percent.

6.2.4 The social forestry project in Malakand

To improve women's status, a range of small-scale activities has been undertaken in the NWFP. The Social
Forestry Project in Malakand, for example, worked with rural women to enhance their productive capacity. This was done through capacity-building via integrated training on the use of new and appropriate technology transfer (such as the use of new fuel efficiency cook-stoves), techniques in improved farming methods for sustainable agriculture, and help in acquiring food preservation techniques. Women also took part in training sessions on health and hygiene, basic economics, social forestry and nursery management. These activities have helped women increase food production, food security and household incomes, and pursue the overall women's development of the community (Dohmen 1992).

Prior to these initiatives, women were rarely integrated as partners in the design, management and follow-up of community development programmes. The current initiatives have helped women develop and adopt sustainable methods for transferring eco-friendly knowledge and skills to the rural people living within the community, and therefore helped reduce expectation towards and over-dependence on outsiders. Local women feel that these development initiatives have contributed towards independence and sustainability of community-based rural women's groups and allowed them to be more confident in determining their future.

**6.3 Rural infrastructure development**

Rural areas in Peshawar and Swat have low standards of living. Communities in these areas are faced with a diversity of problems: poor hygienic and living conditions, few solid roads or drainage systems, lack of drinking water, lack of educators, and inadequate educational facilities and health units.

**6.3.1 Project of Islampur**

One example of rural infrastructure development is the Community Infrastructure Project in the village of Islampur, funded by The World Bank and the Government of Pakistan. In this initiative, participation of community members in all phases of the project was a prerequisite, thus making them stakeholders who derived direct benefits. Their specific achievements include construction of a drainage system and a network of solid roads. In addition, various water schemes were undertaken (water taps and tanks) to provide the residents with drinking water. Although donors provided a large part of the investments required to undertake these initiatives, a principle for community members was to contribute a sum of money - no matter how small - to build local infrastructure and to take responsibility for its operation and maintenance. It is now part of community's policy for future development initiatives.

**6.3.2 Conclusion for rural infrastructure**

While these initiatives have improved the living conditions of community residents, rapid population growth is placing severe strain on the infrastructure. Some community members have taken it upon themselves to assume some responsibility for infrastructure development initiatives and the management of local resources. Most, however, say that educational and health services should remain the government's responsibility because it involves large sums of investments.

**6.4 Natural resource management**

Local communities are closely linked to natural resources, depending on them for income generation, food, fuel wood and fodder supply. The community's participation is crucial in the management of local resources. Forestry and agriculture/horticulture have been the region's central economic activities for many decades. However, natural resource management by local communities has been on the rise for the past 20 years.
While deforestation is a global environmental concern, the underlying causes vary across regions and countries. In Pakistan, the threat of deforestation comes primarily from commercial exploitation of forests, damaging logging practices, conversion of forested lands to agriculture, urbanisation, free and excessive grazing and lack of property rights and deliberate forest fires. Additionally, with the extensive development of irrigation channels, hundreds of thousands of forests have been cleared. This has lead to severe soil erosion, sedimentation, desertification, siltation of water channels and decline of watersheds. In the four provinces of Pakistan combined, some 26.5 million hectares (42 percent) of land, including areas of non-arable and non-rangeland, have some degree of degradation.

6.4.1 Master plan for forest sector development
Like other developing countries, the Government of Pakistan has always emphasised revenue-generation from forests. The issues of watershed management, social forestry and environmental protection have received secondary attention. However, some changes are underway to reverse the fate of Pakistan's forests. In 1985 the Government of Pakistan launched a 10-year social forestry programme in all of its provinces for long-term sustainability of its forests. Additionally, Pakistan published in 1992 a 25-year Master Plan for Forest Sector Development. This plan proposed strategies to manage forests and farmlands by encouraging farmers to plant trees.

6.4.2 Afforestation and the provincial forest department
In the recent past, efforts at afforestation did not keep pace with the increasing demand for timber and fuel wood in the country. The thrust of social forestry development projects in NWFP has been afforestation of denuded hills and farmlands. There are currently a number of grassroot development initiatives underway in the Peshawar and Swat Valleys that have achieved notable success. The Provincial Forest Department has provided training to local residents on the management of nurseries and other technical assistance. Community representatives confirm that this initiative has been quite successful and that members will continue with the plantation programme by using seedlings from their own nurseries.

6.4.3 Social forestry project in Amlookdara
One of the principal uses of NWFP's farmland is for livestock grazing. The uncontrolled grazing has hindered natural regeneration and ecological stability of the region. Due to the high financial investment required, controlled grazing is the most important and economical land management tool available. This is because it is applied at little cost, and it considerably improves the land condition.

The Social Forestry Project in the village of Amlookdara implemented a management plan and a variety of strategies to rehabilitate the natural environment. Among the activities, residents have started close-herding of livestock and limited grazing in certain areas. Planned routes for water needs and feeding stalls have also been included in the management plan. Many workshops and meetings had been held with community members for them to understand and learn how to apply the management plan.

6.5 Agriculture and horticulture
About one-half of Pakistan's population depends on the agricultural sector for employment. The agriculture and horticulture sectors account for approximately 25 percent of the country's gross national product and support 70 percent of the population's food needs. For many years, horticulture has been the driving force behind the NWFP's economic development.

Approximately 15 years ago, the horticulture sector in the NWFP was faced with many challenges and
fundamental development problems. The horticulture sector was threatened by poor management practices, lack of access to capital, no access to the latest technology, shortage of good quality seeds and plants and lack of information regarding fertilisers and pesticides. The lack of access to latest market requirements led farmers to grow products that were not in demand and consequently caused severe losses. In order to re-establish the region's prosperity in this sector many small development projects were undertaken.

6.5.1 Pak-Swiss Malakand fruit and vegetable development project

The Project aimed at undertaking a sustainable management plan to respond to the growing threats. It was Pakistan's first certified fruit plant production project. The plan focused on the production of true-type, high-yielding, disease- and virus-free fruit and vegetable seeds. As of today, the results from the development initiative are promising. The results show that for a price increase of only 2 percent to 10 percent for locally produced high quality seeds, there was a 20 percent to 30 percent increase in yields.

The use of chemicals such as pesticides and fertilisers has substantially increased in Pakistan's agriculture sector over the past 20 years. The evidence shows that reliance on chemicals has proven to be an unsustainable solution to manage pests and disease outbreaks. In order to address this growing concern, the Pak-Swiss Malakand Fruit and Vegetable Development Project introduced the concept of Integrated Crop Management (ICM) to local growers. By adopting ICM, growers are able to consolidate farming practices in an environmentally friendly and sustainable manner where ecological and economical factors are equally considered. However, the ICM concept has not been readily applied by growers. Growers initially felt that the economic benefits would not outweigh the ecological benefits. Nevertheless, after many workshops, training sessions and demonstration studies, some growers are slowly integrating the ICM into their operations.

6.6 Small-scale industries

A number of key small-scale industries are found in the NWFP, many of which rely on forestry products. The forests in Pakistan are considered an important source of revenue for the country's economy. In 1993, because of increasing pressures on the forests, the Government of Pakistan imposed a ban on large scale commercial harvesting. This enabled the Government to establish the National Conservation Strategy and take some pressure off the forests and the environment to re-establish some of its ecological balance. Although the ban is still in effect, some members of local villages confirm that trees are still being illegally cut due to the lack of enforcement from government authorities.

Despite the fact that these small-scale industries affect the natural resources it cannot be denied that they contribute substantially to the region's economy. Some of the raw material for these industries comes from farm forests where fast-growing, multi-purpose trees are raised by farmers. There is no doubt that farm forestry has not only contributed to farm income, it has reduced pressure on natural forests and added to region's economy and provided employment to people from local communities.

6.7 Summary

Numerous initiatives cited in this case study have shown that community development is taking place in the Peshawar and Swat Valleys. In most instances, local community organisations and institutions have been formed in order to ensure continuity in development. However, sustainable community organisation development is a long and difficult process that requires time and commitment. The most compelling challenges include acquiring a continuous flow of funds when donor agencies leave and ensuring that
awareness campaigns, community participation and improvement of capacities are pursued in new development initiatives.

Despite the remarkable changes that have occurred in community development and natural resource management, the education and health sectors remain extremely neglected. Since communities are reluctant to undertake the required investments for improving educational and health facilities, governmental bodies will need to engage in more valuable commitments in association with community members and organisations. Only collaborative efforts from respective stakeholders can bring about the needed transformation. To achieve this, a long-term commitment needs to be made towards establishing community organisations and institutions, and then nurturing them to the point where they can become financially and managerially self-sustaining and work in close collaboration with government bodies.

The examples in this case study suggest that there appears to be a link between the degradation of natural resources and community infrastructure. Weak community infrastructure is caused by a lack of social organisations and/or the use of weak institutions to manage them. Greater public participation is warranted for proper management of local natural resources. Widespread decentralisation of decision-making to the local level is needed. For this change to occur, increased public awareness of and participation in local issues (environmental, economic and social) will be essential.

The case study has also noted that although communities are ready to undertake development initiatives for natural resource management and infrastructure development, they still largely rely on the government for improving health and education facilities and services. In the future, local community organisations will need to be de-linked from specific projects and to work towards delivering services on a more permanent basis.
7. International Case Study 4: Strategy Development – Experience from the South Australia’s Strategic Plan

7.1 South Australia’s Strategic Plan and its objectives

South Australia’s Strategic Plan was launched by the Government of South Australia in March 2004. The strategic plan outlined a medium to long-term course for the whole of South Australia. It set out six interrelated objectives:

- Growing prosperity;
- Improving wellbeing;
- Attaining sustainability;
- Fostering creativity and innovation;
- Building communities; and
- Expanding opportunity.

Eighty-four targets, the majority with a 10-year or longer timeframe, were grouped under these six objectives. The strategic plan has two important, complementary roles:

- A means for tracking progress statewide, with the targets acting as points of reference that can be assessed periodically; and
- Provides a framework for the activities of the South Australian Government, business and the entire South Australian community.

Many of the targets are ambitious and beyond the reach of government acting alone. Achieving the targets requires a concerted effort not only from the State Government, but also from local government, regional groups, businesses and their associations, unions, community groups and individual South Australians. The strategic plan would be a living, dynamic plan which would evolve to meet changing circumstances.

7.2 Governance arrangement and community engagement

The involvement of State Government agencies, local government, regional development boards and individual South Australians was essential for undertaking this process. In early 2006 the Government set up a Strategic Plan Update Team, comprising 26 South Australian community leaders, and charged it with overseeing a community engagement program in relation to the strategic plan. The program was designed to improve understanding of what is in the strategic plan and to update the community about what has been done so far to make progress on the targets. It was also about fostering partnerships around achieving the targets. Lastly, the process was intended to obtain considered input from interest groups, community organisations and individuals around South Australia about what they would like to see reflected in this whole-of-state strategic plan.

The Update Team’s community engagement process had three stages:

- An initial round of community consultations from April to June. Meetings, at venues all across the
state, were attended by over 1600 South Australians. In addition, 45 written submissions were received from organisations; 164 web-based questionnaires were completed; and 160 other comments were made through email, SMS, hotline or post as part of the process;

- A Community Congress in July with around 400 attendees, which gave the Update Team an opportunity to test, and confirmed, its characterisation of what it had heard around South Australia; and

- Refining recommendations – covering both whole-of-plan issues and specific suggestions for changes to targets – from August to October. Over 200 participants from disparate sectors of the community, formed into eleven working groups, were involved in this stage. Ministerial advisers and state government officers were also involved in many of the working groups.

In November 2006 the Update Team provided a report to the Government with a number of recommendations for changes to targets and ongoing community engagement, including governance and regionalisation of the plan; articulating a vision statement; identifying key interactions across the plan; and increasing the profile of Aboriginal issues.

### 7.3 Update of the strategic plan

Ministers and State Government agencies, the Audit Committee and the community have made many good suggestions for building on and improving targets in the strategic plan. These have included recommendations to strengthen targets, broaden the scope of some, improve the focus of others, add targets to cover perceived gaps in the plan and remove targets that have been achieved or are no longer considered appropriate.

#### 7.3.1 New areas of focus

Targets for some significant new areas have been added. These include early childhood, a sustainable water supply, multiculturalism, cultural engagement, employment participation, work–life balance, and venture capital investment. The updated strategic plan also gives increased prominence to Aboriginal people. This reflects the unequivocal call from the South Australian community to address Aboriginal disadvantage in all areas of life. It also reflects the positive contribution that the Aboriginal community makes to South Australia by including new targets for attaining sustainability and fostering creativity. Only comprehensive and coordinated effort sustained over many years will begin to narrow the gap between conditions experienced by Aboriginal and non-Aboriginal South Australians. It requires policy and action to be informed by measurable results and community views, coordinated across all levels of government and monitored at the highest level.

#### 7.3.2 Local government and the regions

The original target for aligning state and local government plans, as well as targets for regional unemployment, regional crime rates and regional infrastructure, have been removed in favour of a more comprehensive process of ‘regionalising’ the strategic plan. This will mean developing coordinated regional approaches to pursuing those South Australia’s Strategic Plan targets that reflect priorities specific to each region. Regionalising the strategic plan has been supported by regional leaders, most of whom see it as an efficient way to address regional issues and concerns.

#### 7.3.3 Key interactions

Neither the objectives nor any individual targets stand alone – they are all part of a larger inter-related framework. Achieving one target should not come at the expense of another. Smart thinking about how we
do things can neutralise effects on other targets, or even turn them into positives. For example, population growth, if carefully managed with a good urban planning system, can lead to increased demand for public transport, more frequent services, and reduced reliance on private vehicles. The increased importance of energy and water issues can drive new green industries such as environmentally sustainable building design and technologies, with their own economic benefits, while reducing our ecological footprint.

7.4 Implications for Guizhou

7.4.1 Governance arrangements
It needs to establish a committee to oversee the implementation of the strategic plan throughout the Government and into the community. In particular, it concentrates on ensuring that Government agencies are pursuing strategic plan targets in a collaborative, focused and innovative way. The strategic plan is the main instrument for determining strategic priorities for agencies and is an important element of performance assessment for chief executives. However, the achievement of the strategic plan targets also requires a concerted effort from organisations external to Government – unions, the business sector, local government, community groups and social interest groups, and individual South Australians. To stimulate this effort, and build on the engagement process, a new body – the Community Engagement Board – needs to be established to serve as a conduit between Government and the community. The Community Engagement Committee will be made up of representatives from a number of government advisory boards and councils.

7.4.2 Regionalising the strategic plan
The majority of the strategic plan’s targets are at a whole-of-state level. It is expected that they will be complemented by the development, over time, of regional strategic plans that are aligned with the provincial strategic plan. This will not be a one-size-fits-all approach, as each region in Guizhou has its own priorities. Each region will develop their own approaches to pursuing the strategy targets which line up with local priorities. In some cases, this will mean defining a region’s portion of a provincial target (for example, population control) and developing their regional plan and actions for that. The first step in regionalising the strategic plan is to create a common set of regional boundaries and names.

7.4.3 Reporting on the progress and updating the strategic plan
The committee will continue to perform an independent monitoring function and produce a public report every two years on Guizhou’s overall progress towards the strategic plan targets. The committee may also produce ‘off-year’ reports – for example, on particular population groups, themes or objectives in the strategic plan. The strategic plan needs to be updated every five years. This will be preceded and informed by comprehensive community engagement across Guizhou to maximise community participation in developing and implementing the new version.

7.4.4 Developmental list
A developmental list needs to be developed that specifies areas that may warrant inclusion of a specific target in the strategic plan but where no appropriate data are currently available to measure progress. Those areas will be subject to further consideration to identify if a suitable, viable target should be developed for inclusion in a future version of the strategic plan.

8.1 Background

Rising incomes, urbanization, greater female participation in the workforce, wider media penetration—all are driving the demand for higher-value products, semi-processed and processed products, and convenience foods. They are also increasing consumer attention to food quality and safety. Diets are globalizing too, with local consumer preferences influenced by international tastes. These trends open new markets for a wide range of higher-value agricultural products and propel the evolution of the marketing system in many developing countries, with the entry and rapid growth of supermarket chains and the food processing and food service industries.

For many developing countries, the supermarket revolution began in the early to mid-1990s. By the early 2000s, retail food sales in supermarkets exceeded 50 percent of total retail food sales in many countries in Latin America and in major urban centers elsewhere. In developing countries, multinational supermarket chains are accelerating the expansion by significant foreign direct investment by either directly or through joint ventures with local firms.

Changing consumer demand is also driving the growth of the food processing and food service industries. Processed foods account for about 80 percent of global food sales, estimated at $3.2 trillion in 2002. Although spending on processed foods is still low in developing countries ($143 per capita per year in lower-middle income countries and $63 per capita in low-income countries), it is growing fastest in these countries—28 percent a year in lower-middle-income countries and 13 percent a year in low-income countries (World Bank, 2008). “Eating out” is also becoming popular. For example, spending on food services now accounts for 22 percent of food budgets in Brazil and Indonesia and 15 percent of urban food spending in the PRC.

This case study was derived from Chapter 5 (Bring agriculture to the market, pp. 124-128) of World Bank’s 2008 World Development Report: Agriculture for Development.

8.2 Infrastructure impediments

The perishability of most high-value agricultural products requires careful handling, special facilities (e.g., packhouses, cold storage, and refrigerated transport), and rapid delivery to consumers to maintain quality and reduce physical and nutritional losses. In many developing countries, the long supply chain, poor access to roads and electricity, and inadequate infrastructure and services in physical markets add to the transaction costs and cause quality deterioration and high spoilage losses. In India it is estimated that fruit and vegetable postharvest losses amount to about 40 percent of total annual production, equal to a year’s consumption in the United Kingdom.

Market infrastructure and facilities in developing countries are often limited and congested, increasing the
difficulty of trading perishable goods. A survey of wholesale markets handling fresh produce in four states in India found that 17 percent had no covered shops, about half did not have paved roads in the market yard, about 40 percent of the shops had no electricity, and only 6 percent of the markets had a cold storage facility. In Tamil Nadu, India, a related study found that wealthier farmers tend to capture a disproportionate share of the benefits of facilities in congested wholesale markets. Nonetheless, investments in market facilities would be pro-poor because sales by poorer farmers would increase proportionally more than those by the wealthy farmers.

8.3 Modern procurement systems

Supermarket growth in most countries follows similar diffusion patterns across space, consumer segments, and product categories. From a base in large cities, supermarkets initially spread to intermediate cities and towns, and later to small towns in rural areas—in response to market competition and saturation. They often first target the upper-income consumer (national and expatriate), followed by the middle class and later the urban lower income households.

Dominating the supermarket’s product selection in the early stages are processed foods (canned, dry, and packaged food items), motivated by economies of scale in procurement and direct relations with processed-food manufacturers. Product selection gradually expands to semi-processed foods (e.g., dairy, meat, and fruit products). The last category to be added is fresh fruits and vegetables, as consumer preference for fresh produce and the proximity and convenience of small produce shops and wet markets offer a competitive alternative. Fresh fruits and vegetables generally account for the lowest share in supermarket sales, and small shops and wet markets will likely remain important marketing channels for these products.

Significant inefficiencies in the traditional wholesale marketing systems and competition encourage supermarkets, food processors, and food service providers to use supply chains to reduce coordination costs, capture economies of scale, and increase food safety and quality. This is profoundly changing the structure of production and wholesale marketing in many developing countries. Recent studies show that procurement systems change earliest for processed foods, meat, and dairy products, eventually extending to fresh fruits and vegetables.

Procurement takes many forms, varying by supermarket chain, product, and country. It can involve centralized procurement, which shifts from fragmented per-store purchases to operating a distribution centre catering to a district (as in the PRC), the whole country (as in Mexico), or whole region (as in Central America). It can also involve shifting from purchases in traditional spot wholesale markets to relying on specialized or dedicated wholesalers and logistics firms (as in Central America and East Asia) or to direct contracting (as in East Asia and Eastern Europe)—to cut transaction, coordination, and search costs and ensure greater control over quality and consistency of supply. China Resources Enterprise estimates that it is saving 40 percent in distribution costs by combining modern logistics with centralized distribution in its two large new centers in southern China.

Modern procurement can also involve contracting with processors and farmers or using preferred-supplier lists. This is often done where farmers or processors are grouped or are individually large (as in the Philippines, Russia, and Thailand). The contracts are incentives for suppliers to stay with the buyer and
invest in assets that fit the retailer’s specifications for products. The arrangements may include direct or indirect assistance for farmers to invest in training, management, inputs, and basic equipment.

Modern procurement also often involves private standards and their enforcement—standards that serve two main functions. They help coordinate supply chains by standardizing product requirements for suppliers over many regions or countries, enhancing efficiency and lowering transaction costs. And they help ensure that public food-safety standards are met in all markets served by the retail chain or food-processing firm, distinguishing one’s products from competitors through signaling. As these private standards are more widely adopted, there is growing concern about the capacity of small farmers to meet them.

8.4 Impact on smallholders and retailers

The modernization of procurement systems affects farmers differently across countries and products. Some recent studies of selected commodities find that the modern procurement systems exclude asset-poor farmers. Supermarket buying agents prefer to source from large and medium-size farmers if they can (e.g., for tomatoes in Mexico and potatoes in Indonesia); if large and medium-size farmers have sufficient quantities, smallholders are not included. Where small farms are the dominant structure, supermarkets have no choice but to source their produce from them. Supermarkets may also rely on small farmers to satisfy consumers’ demand for specialty or niche products that only small farmers with abundant labor produce. Sometimes supermarkets need an advertising tool to promote sales with socially conscious consumers: “buying local, from smallholders.”

The most important determinant of small farmers’ participation is not always farm size. Instead, it can be access to physical, human, and social assets: to education, irrigation, transport, roads, and such other physical assets as wells, cold chains, greenhouses, good quality irrigation water (free of contaminants), vehicles, and packing sheds. An effective producer organization—another major asset—can also help small farmers enter the high-value supply chains.

Most farmers lacking these assets are excluded. In Guatemala, lettuce farmers participating in modern supply chains have twice the farm size (two hectares versus one) and 40 percent more education than non-participating farmers, and are nearly twice as likely to have irrigation, four times as likely to have a truck, and twice as likely to be close to paved roads and be in a farmer organization. Participating farmers use much more labor-intensive practices because of requirements for field practices, sorting, and packing. Because they are more likely to double-crop over the year, participating farmers hire 2.5 times more labor (typically from local asset-poor households). So even if small farmers do not participate directly, they can benefit through farm employment. Studies of tomato growers in Indonesia and kale growers in Kenya find similar results.

Participation in modern supply chains can increase farmer income by 10 to 100 percent (Guatemala, Indonesia, Kenya). Recent studies of contract farmers show that they have significantly higher incomes than other farmers. Because participating farmers tend to reap substantial benefits, the payoff from assisting farmers to make the necessary “threshold investments” can be high.

Some studies have found that smaller processing firms were left out of the supply chain, with medium-size
and large processors preferred for long-term contracts. The number of small retail stores often declined with rising market share for supermarkets— with implications for employment. In urban Argentina, from 1984 to 1993, the most intense period of supermarket takeoff, the number of small food shops declined from 209,000 to 145,000. But the competition is also driving some small retail stores and processors to grow and upgrade their services (as in India).

**Table 3: Public and private options for strengthening farmer links to the market**

<table>
<thead>
<tr>
<th>Issue</th>
<th>Public sector</th>
<th>Policy environment</th>
<th>Private sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of access to markets</td>
<td>Invest in education, rural infrastructure (roads, markets, electricity, irrigation); support formation of producer organizations</td>
<td>Libralize domestic trade; foster development of input and credit markets</td>
<td>Assist farmers in forming producer organizations</td>
</tr>
<tr>
<td>Weak technical capacity</td>
<td>Support market-oriented extension</td>
<td>Foster environment for private extension to emerge</td>
<td>Provide extension and key inputs to farmers</td>
</tr>
<tr>
<td>Meeting quality standards</td>
<td>Support farmer training on good agricultural practices for quality enhancement and food safety</td>
<td>Establish grades and standards</td>
<td>Supply inputs and train farmers on quality management and food safety</td>
</tr>
<tr>
<td>Meeting contract conditions</td>
<td>Train firms in contract design and management; train farmers on their rights and obligations</td>
<td>Foster institutions for dispute resolution; strengthen producer organizations</td>
<td>Foster trust; develop contracts that are self-enforcing</td>
</tr>
<tr>
<td>Farmer exposure to risk</td>
<td>Foster development of commodity and futures exchanges; train firms on use of market instruments to hedge risk</td>
<td>Create enabling environment for insurance market</td>
<td>Use contracts that share risk equally among parties; assist farmers to access insurance</td>
</tr>
</tbody>
</table>

Source: Adapted from World Bank 2007.

### 8.5 Helping smallholders keep up with the requirements

The government and the private sector can help smallholders expand and upgrade their range of assets and practices to meet the new requirements of supermarkets and other coordinated supply chains (Table 3). The options include public good investments to increase farmers’ productivity and connectivity to markets, policy changes to facilitate trade and market development, and public-private efforts to promote collective action and build the technical capacity of farmers to meet the new standards.

Some supermarkets and processors or their agents help farmers overcome their asset constraints and improve their business image by providing technical assistance, in some instances through public-private partnerships. Examples include joint extension by supermarket field staff and government extension officers, technical assistance to acquire inputs and obtain certification, and training to improve product quality and food safety.
Other supermarkets and processors enter into production contracts, which sometimes include the supply of inputs, credit, and extension services (e.g., in Madagascar and Slovakia). For many small farmers, these contracts are the only means to acquire inputs and use support services. By supplying inputs and providing assured markets and prices, contracting firms share production and marketing risks with farmers. Reducing these risks helps stabilize farmers’ incomes, critical in the absence of insurance markets. The technical assistance to farmers also generates indirect benefits, as farmers apply the improved farm practices for the contract crops to other crops, increasing their productivity.

Supermarkets also procure through preferred suppliers or wholesalers that contract with producer organizations or commercial farmer “leaders” that supplement their own production with that from individual small farmers. The producer organizations or farmer leaders provide technical assistance to ensure quality, quantity, and timing of delivery. In addition, the preferred supplier or wholesaler often expects the producer organizations or farmer leaders to assemble the products (washing, sorting, grading, packaging, and labelling), ready to be placed on supermarket shelves.

Many producer organizations do not have the capacity to provide their members with the technical assistance required for ensuring collective compliance with quality, quantities, and timing. Well-targeted technical and financial support from donors, governments, or nongovernmental organizations is often necessary for producer organizations to overcome these initial hurdles and become professional entrepreneurs. The support must be provided with a long-term commitment but with a clear phase-out strategy and a view to empower.
9. International Case Study 6: Infrastructure Development – Australia’s Infrastructure National Reporting

9.1 Background

This case study was derived from Australia’s Infrastructure National Overview Report, April 2007.

The purpose of infrastructure reporting is to provide a national overview of the current state of Australia’s infrastructure, the demands it faces, how it is performing and what investments are being, or may need to be, made, and the key challenges confronting it in the years ahead.

The report examines what is usually referred to as ‘economic infrastructure’ – that is, the facilities, equipment and services that provide key inputs into the production and delivery of goods and services. The major forms of economic infrastructure are roads, railways, airports and ports, electricity, gas, water and telecommunications (see Table 4).

| Table 4: Overview of Australia’s national infrastructure investment (A$ million) |
|-------------------------------------------------|-----------------|-----------------|-----------------|
| Sector                                          | 2003-04         | 2004-05         | 2005-06         |
| Roads & bridges                                 | 7895            | 9842            | 11191           |
| Railways                                        | 1508            | 2233            | 2261            |
| Ports & harbors                                 | 454             | 925             | 1087            |
| Electricity                                     | 3566            | 4615            | 5436            |
| Gas                                             | 1894            | 1685            | 3866            |
| Water supply & sewerage                         | 2234            | 2351            | 2544            |
| Telecommunications                              | 2996            | 2498            | 4706            |
| Total                                           | 20547           | 25149           | 31091           |
| GDP                                            | 840285          | 896658          | 965969          |
| Total as % of GDP                               | 2.4             | 2.8             | 3.2             |


Australia’s economic infrastructure is a fundamentally important national asset. It represents a large historical investment of both public and private sector resources. The condition and performance of the nation’s infrastructure critically influences the growth and international competitiveness of the Australian economy. The planning, operation and management of infrastructure affects environmental sustainability and everyday living standards.

At the national level, many factors have combined to shape the nature and quality of the current infrastructure stock. These have included:

- The size and distribution of Australia’s population including its heavy urban concentration;
- The nature of Australia’s economic and industrial base, including the services sector, and its exports;
- The availability of abundant reserves of mineral and natural energy sources; the location of many
of these reserves far from major population centers and export ports;

- The relative scarcity of water resources, their vulnerability to climatic variations and increasing demand from urban development; and
- The need to provide for adequate means of communications and social interaction across a very large continent.

Over the past two decades reforms to the Australian economy, the accelerated international flows of capital and information, and the trend towards greater trade liberalisation have combined to expose much of the Australian economy to greater competition. As a consequence, it has become increasingly important for both Australia’s export industries and import competing businesses to have access to infrastructure services that are reliable and competitive by world standards.

Investment and structural reforms in infrastructure services have been important in assisting the Australian economy to achieve consistent growth over the past fifteen years with an annual average increase in GDP of around 3.5 per cent.

Moving forward, there are likely to be a number of key factors influencing the provision of economic infrastructure over the period to 2020:

- Economic growth is forecast to continue with GDP increasing by a long term annual average of 2.7 per cent;
- World demand for most of Australia’s major exports is forecast to remain strong;
- The overall population will continue to grow steadily with above average growth in particular regions;
- Income levels will influence future consumer choices and demand;
- Climate change could result in reduced water availability in many parts of Australia with implications for water investment and management;
- Climate change issues are also likely to influence policy decisions in other infrastructure sectors; and
- Technological advances are likely to influence the options for infrastructure provision as well as assisting its more efficient management.

9.2 Infrastructure provision and management

Twenty years ago, most infrastructure services were directly provided by governments, typically through vertically integrated monopoly enterprises. The role of government now includes the facilitation and regulation of private infrastructure as well as the direct provision of infrastructure. Where infrastructure functions have been kept within governments, action has been taken to put in place commercial arrangements and disciplines as appropriate. There is now a much more diverse pattern of infrastructure ownership and operation arrangements.

The Commonwealth fully owns the Australian Rail Track Corporation, is a minority owner of Snowy Hydro and retains a passive minority interest in Telstra. It also retains the freehold title to major airports but its role is now effectively that of a landlord.

The States and Territories own and operate the major road networks, as well as overseeing arrangements
for privately owned and operated tollways. State and Territory bodies are the major regulators, owners and operators of water resources and infrastructure. Substantial elements of the infrastructure in the electricity, ports, urban rail and public transport sectors remain State and Territory owned, although with some variation among individual jurisdictions. Non-urban rail infrastructure is operated by a mix of public and private entities.

Local government owns and is responsible for the construction and maintenance of most of the local road system, a large number of regional airports and the treatment and reticulation of water.

The private sector now has significant involvement in the development and operation of toll roads, the operation of rail track and rail transport services, the provision of facilities and services within ports (e.g., bulk loaders), the development and operation of major airports, the production and delivery of gas, the distribution and retailing of electricity, and the provision of telecommunications infrastructure and services.

9.3 Role of government

It is important for governments to ensure that there are policy development and planning processes and regulatory arrangements which encourage timely investment in productive infrastructure and that there are incentives for its efficient and innovative use. It is also important for governments’ own infrastructure investment programs to be subject to rigorous assessment of economic, social and environmental costs and benefits.

9.4 Regulatory approaches

The structural and institutional changes in infrastructure provision that have occurred in recent years have been accompanied by fundamental changes in regulatory arrangements. These arrangements have been directed to ensuring that competition is able to occur in contestable markets and that both investor and user interests are properly recognised in sectors where service providers with substantial market power continue to operate. The aim is to achieve a simpler and more consistent approach to economic regulation of significant infrastructure.

9.5 Recommendations for Guizhou

Quality infrastructure is critical to a country or region’s economic and social development. The provision of adequate and efficient infrastructure is essential to maintaining a country or region’s economic prosperity and standard of living. To support future economic growth and maintain market competitiveness it is important that infrastructure provision keeps pace with demand and meets the requirements of industry. Industries depend on reliable and competitively priced energy, transport, water and other infrastructure services.

Development of a strategic approach to future infrastructure demands requires a number of inter-related elements:

- A stocktake of the physical infrastructure including good information on its performance;
- Effective management of the infrastructure and factors influencing user demand;
- A comprehensive planning framework which identifies future demands and challenges;
- A regulatory and pricing framework which encourages increasingly efficient use of infrastructure and timely investment in new and updated infrastructure, where this is the best option for
responding to particular needs; and

- Government’s ongoing support to identify emerging constraints and to implement action to ensure the economic infrastructure remains efficient and effective.
10. Conclusions and Recommendations for Guizhou

10.1 Summary of experience from case studies

10.1.1 Experience from case study 1 – Industry development
1. Production increased largely because of industry capacity increases and achieved economies of scale
2. Industry development focuses on further improving efficiency and safety of operations and movement towards globalisation
3. Mining operations are not typically labour intensive once in production, but during construction they provide employment for a great many skilled workers
4. Industry downstream processing projects often result in improved local infrastructure including roads, schools and community leisure and health facilities
5. It creates efficiencies in regulatory systems by placing greater importance on achieving desired outcomes than on enforcing compliance with standards
6. Governments set the general conditions for individual projects, and companies have flexibility as to how they meet the conditions
7. Environmental management plans developed and approved before mining commences
8. If particular mines or plants are not performing acceptably, action can be taken, ranging from financial penalties to closure
9. Governments release a policy statement to demonstrate commitment to the industry
10. Develop favourable investment environment and establish various laws and regulations to protect the interests of investors
11. Governments provide a new generation of geo-scientific maps and datasets of strategically important areas
12. Safety and health are identified as the number one priority of industry development
13. Industry becomes a part of the knowledge-based economy and is very adept at using state-of-the-art technologies, such as e-commerce and internet

10.1.2 Experience from case study 2 – Globalisation and sustainability
1. Protect ethnic groups’ rights to have input and guide development in their community
2. Developing unique agricultural producing business for an international market has grown into a viable way of life for many farmers
3. Community takes a proactive stance on development and encourages the protection and promotion of cultural and natural resources
4. Develop heritage villages as a tourism point of interest, and provide cultural tourism and traditional menus to customers visiting the community
5. Market the "Guizhou Experience" to the world by coordinating promotions and assistance to visitors
6. All facilities, hotels and apartments have underground parking, so very little surface area is used for parking lots
7. Communities have comprehensive long-term plans for their sustainable development
8. Encourage the use of an efficient public transit system by imposing high parking fees for private automobiles
9. Educating the public and enforcing appropriate garbage storage practices are spear-headed by local residents and other local environmentalists
10. Provincial government has officially recognised the importance of Aboriginal traditional knowledge and given serious weight in the development of forests and roads in and around their communities

11. Ethnic groups have different notion of sustainability

12. Sustainability is deeply tied to historical, cultural, and spiritual values in tandem with managing deficits and real poverty

13. The needs of the communities are as diverse as the communities themselves, and the political strategies for achieving their goals to deal with increasing populations are interrelated

14. Ethnic groups draw upon their own economic development organisations to further their interests

10.1.3 Experience from case study 3 – Poverty alleviation and community development

1. People living in a community are the best source of information and the best resource to manage their needs

2. While communities may develop in different ways, community development is often identified with increasing the skills, knowledge and abilities of local residents

3. Most rural residents depend in some way or another on local resources for their survival and development

4. The development and strengthening of community-based organisations and village-based organisations is essential

5. Integrated rural development focuses on market orientation, product diversification and management of environmental issues

6. Applying the "bottom-up" approach to enable residents and local organisations and institutions are all actively participating in community development

7. Community members participate in all phases of the rural infrastructure development, thus making them stakeholders who derived direct benefits

8. Adopting integrated crop management to consolidate farming practices in an environmentally friendly and sustainable manner where ecological and economical factors are equally considered

9. Strengthen effective law enforcement from government authorities

10. Sustainable community organisation development is a long and difficult process that requires time and commitment

11. The development of community organisations and institutions needs to become financially and managerially self-sustaining and work in close collaboration with government bodies

12. Only collaborative efforts from respective stakeholders can bring about the needed transformation

13. Increased public awareness of and participation in local environmental, economic and social issues will be essential

14. Governments must undertake the required investments for improving health and education facilities and services in communities

10.1.4 Experience from case study 4 – Strategy development

1. Strategic plan as a means for tracking progress, with the targets acting as points of reference that can be assessed periodically

2. Strategic plan provides a framework for the activities of the government, business and the entire community

3. Strategic plan is a living, dynamic plan which will evolve to meet changing circumstances

4. Government set up a Strategic Plan Update Team, and charged it with overseeing a community engagement program in relation to the strategic plan
5. Only comprehensive and coordinated effort sustained over many years will begin to narrow the gap between conditions experienced by ethnic and non-ethnic groups
6. Develop coordinated regional approaches to pursuing those strategic plan targets that reflect priorities specific to each region
7. Neither strategic objectives nor any individual targets stand alone, they are all part of a larger inter-related framework
8. Achieving one strategic target should not come at the expense of another
9. Developing new green industries such as environmentally sustainable building design and technologies, while reducing the ecological footprint
10. It needs to establish a committee to oversee the implementation of the strategic plan throughout the government and into the community
11. Built on the engagement process, a new body – the Community Engagement Committee – needs to be established to serve as a conduit between government and the community
12. The committee performs an independent monitoring function and produces a public report every two years on the overall progress towards the strategic plan targets
13. Strategic plan is the main instrument for determining strategic priorities for government agencies, and is an important element of performance assessment for chief executives
14. Each region needs to develop their own approaches to pursuing the strategy targets which line up with local priorities

10.1.5 Experience from case study 5 – Higher-value urban markets
1. Increase consumers’ attention to food quality and safety
2. Inadequate infrastructure and services in physical markets add to the transaction costs and cause quality deterioration and high spoilage losses
3. Investments in market facilities will be pro-poor because sales by poorer farmers will increase proportionally more than those by the wealthy farmers
4. Dominating the supermarket’s product selection are processed foods, gradually expands to semi-processed foods, and the last category is fresh produce
5. Use supply chains to reduce coordination costs, capture economies of scale, and increase food safety and quality
6. Coordinate supply chains by standardizing product requirements, enhancing efficiency and lowering transaction costs
7. Ensure public food-safety standards are met in all markets served by the retail chain or food-processing firm
8. Supermarket buying agents prefer to source from large and medium-size farmers
9. Supermarkets rely on small farmers to satisfy consumers’ demand for specialty or niche products
10. The most important determinant of small farmers’ participation is not always farm size
11. The number of small retail stores often declined with rising market share for supermarkets, with implications for employment
12. Invest in education, rural infrastructure, and support formation of producer organizations
13. Support farmer training on good agricultural practices for quality enhancement and food safety
14. Foster development of commodity and futures exchanges, and train firms on use of market instruments to hedge risk
10.1.6 Experience from case study 6 – Infrastructure development

1. The condition and performance of a nation or region’s infrastructure critically influences its growth and international competitiveness
2. The planning, operation and management of infrastructure affects environmental sustainability and everyday living standards
3. The accelerated international flows of capital and information, and the trend towards greater trade liberalisation have combined to expose much of the economy to greater competition
4. It is important for both export industries and import competing businesses to have access to infrastructure services that are reliable and competitive by world standards
5. Income levels will influence future consumer choices and demand
6. Climate change issues will influence policy decisions in infrastructure sectors
7. There is a much more diverse pattern of infrastructure ownership and operation arrangements
8. Governments ensure policy development, planning processes and regulatory arrangements, encourage timely investment in productive infrastructure, and there are incentives for its efficient and innovative use
9. Governments’ own infrastructure investment programs are subject to rigorous assessment of economic, social and environmental costs and benefits
10. Ensure competition is able to occur in markets, and both investor and user interests are properly recognised
11. Quality infrastructure is critical to a country or region’s economic and social development
12. Industry development depends on reliable and competitively priced energy, transport, water and other infrastructure services
13. Development of a strategic approach to future infrastructure demands needs a comprehensive planning framework to identify future demands and challenges
14. Need government’s ongoing support to identify emerging constraints and to implement action to ensure the economic infrastructure remains efficient and effective

10.2 Sustainable strategy development and guiding principles

Sustainable strategy development is a process involves situation analysis, formulation of policies and action plans, implementation, monitoring and regular review. It is a cyclical, interactive and adaptive process of planning, participation and actions in which the emphasis is on managing progress towards sustainable goals. Sustainable strategy development process should not intend to produce a ‘plan’ as an end result, but steering through short, medium and long-term action plans in order to achieve a vision of sustainable development (UNEP, 2003).

Sustainable strategy development provides a framework to institutionalize the processes for consultation, negotiation, mediation, and consensus building on priority social, economic and environmental issues. It can empower Guizhou government to address complex socio-economic problems such as poverty alleviation, population growth, and globalization through public participation and improved decision-making.

There is no single type of approach or method can be applied in preparation of sustainable development strategy. Guizhou provincial government should determine the best approach in sustainable development strategy preparations and implementation on the basis of the prevailing political, historical, cultural,
economic, and ecological situations. Emphasis must be given to apply principles for strategy development in formulation of policy and project.

10.2.1 Equity
- Use of a certain type of resources may benefit some community members more than others and consequently the fairness of this should be considered.
- Not only financial, but also social, including intergenerational and environmental equity.

10.2.2 Adaptability
- The developed strategy should have regard for the changing nature of situation.
- Provincial strategy must compliment and potentially add to the national strategy.
- An adaptable strategy allows for the timing, capacity and form of opportunities to be easily varied in response to changed circumstances.

10.2.3 Sustainability
- The new strategy must be more sustainable than the current strategy.
- Sustainability of a strategy includes environmental, economic and social aspects.
- Ensure that benefits are maximized without adversely burdening current or future generation.

10.2.4 Certainty
- Required to ensure that the adopted strategy is robust and can be embraced by the community.
- Refers to level of confidence regarding capacity and impacts of each opportunity on the environment, community and local economy.

10.2.5 Flexibility
- Necessary to accommodate the various different operational modes.
- Considers the shorter timeframe and transient issues.

10.3 Recommendations for Guizhou’s strategy development
- High-level government commitments and influential lead institutions – Such commitment is essential from Guizhou government on a long term basis with assured financial resources allocation;
- Comprehensive and integrated – Strategy should be developed integrating both the long-term and short-term economic, environmental, social and equitable objectives. Where full integration is not possible, trade-offs need to be negotiated;
- Based on comprehensive and reliable analysis – Priorities need to be set on the basis of a comprehensive analysis of the present situation and of forecasted trends and risks, examining the links between local, national and global challenges;
- People centered – Decisions and actions should provide for broad community involvement on issues affecting them, and ensure long-term beneficial impacts on disadvantaged and marginalized groups (protecting ethnic groups’ interests);
- Develop and build on existing capacity – At the outset of the strategy process, it is important to assess the political, institutional, human, scientific and financial capacity of Guizhou, and built on existing policies and projects; and
- Incorporate monitoring, learning and improvement – Indicators should be developed into strategies to monitor and evaluate the processes, track progress, and capture lessons and experience.
References


[21] World Bank Agriculture and Rural Development Sector Unit South Asia Region and Oxford
University Press.