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Path Choice of New Countryside Construction in Western Region of China under the Perspective of Ecological Environment

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Abstract General situation of ecological environment in western region is introduced, as well as its relationship with new countryside construction. Result shows that ecological conditions of western region not only play an important role in the achievement of new countryside construction in western region, but also directly affect the ecological safety of eastern region and the sustainable development of China. Problems in new countryside construction in western region are analyzed under the perspective of ecological environment, which are the weak concept of ecological protection, the ecological environment which needs to be improved, the difficulty in agriculture development, and the backward plan for human settlement. According to these problems, path of new countryside construction in western China is pointed out under the perspective of ecological environment, such as promoting ecological economy, developing competitive industries, speeding up spatial planning, optimizing the living environment, changing the traditional concept into scientific and rational development, and restoring the ecological environment by making use of agricultural support.

Key words Ecological environment, New countryside construction, Western region, Path choice, China

The Fifth Plenary Session of the Sixteenth Central Committee of the Chinese Communist Party points out that we should steadily and safely promote the socialist new rural construction according to the requirements of "production development, wealthy life, rural civilization, rural cleanness, democratic governing". This objective is a great historical task of China's modernization process and reflects the requirements of comprehensive rural development. Realizing the primary objective of "production development of agriculture, wealthy life of peasants, rural civilization" in the new countryside construction in western region of China, as well as solving the "Three Agricultural Problems", has a tight connection with the ecological restoration of western region. A fairly good ecological environment is an important content of new countryside construction, as well as a rigidity index of realizing the rural economy modernization in western region. Therefore, it is of great significance to find out a path for new countryside construction in western region of China under the perspective of ecological environment. We introduce the general situation of ecological environment and new countryside construction in western region, analyze the problems in new countryside construction in western region, and point out a path for new countryside construction in western region of China under the perspective of ecological environment.

1 General situation of ecological environment in western region and its relationship with new countryside construction

1.1 General situation of ecological environment in western region Western region of China includes a total of 12 provinces, autonomous regions and municipalities, such as

Chongqing, Sichuan, Guizhou, Yunnan, Tibet, Shaanxi, Gansu, Qinghai, Ningxia, Xinjiang, Guangxi and Inner Mongolia, accounting for 68.8% of the total area of China. Since the West Development in the year 2000, western region has achieved remarkable success in ecological restoration. The overall objective of West Development during the "Eleventh Five-Year" period is as follows: sound and rapid economic growth, continued and stable improvement of people's living standards, new breakthrough in infrastructure and ecological environment construction, new level of key areas and key industries, progress in equalization of basic public services, and steady pace in building a socialist harmonious society. One of the important contents for West Development is "beautiful environment", "realizing new breakthrough in ecological construction" and "strengthening ecological construction and environmental protection"; while "basically controlling ecological environment aggravation" becomes an important target. Therefore, China has made huge investment in a series of construction projects, such as returning farmland to forest, returning husbandry to grassland, natural forest protection, dust storms sources control in Beijing and Tianjin, returning farmland to grassland and other ecological construction projects. However, the ecological situation of "partial improvement and overall deterioration" is hard to be improved, and even becomes more and more serious in western region^[1].

1.2 Relationship between ecological environment in western region and new countryside construction Ecological environment is a collection of natural and man-made elements bearing human survival and development. Natural resource is an essential component of the ecological environment. Resource environment is not the determinants of economic development, but it is the precondition of ecological development, especially

the sustainable development. A virtuous circle will be realized if the socio-economic development can be established based on the optimization of environment and the rational use of natural resources. Improvement of the carrying capacity of natural resources and the status of ecological environment should serve the economic development; while economic development should further improve the carrying capacity of natural resources through increasing capital input and scientific and technological progress, so as to realize the coordinated development of economy, society, resource and environment. Otherwise, we will take the consequences of a vicious cycle ultimately, if economic development is established based on environmental damage, resource exhaustion, and depriving the development capacity of future generations. Ecological damage and environmental pollution restrict the speed and quality of economic development; and economic backwardness leads to the inadequate investment in the ecological environment, causing the further deterioration of ecological resources.

Since there is no solution for ecological environment deterioration in short term and the agricultural natural resource is declining, it becomes more and more difficult for western region to establish new socialist countryside or to realize the overall construction of a well-off society. However, establishing the new socialist countryside means to carry out modernization of the rural economy, to follow the scientific concept of development, to promote the agricultural development, and to change the growth pattern of agriculture according to the comprehensive, coordinated and sustainable development. The traditional development road of agriculture can be changed, which mainly relies on expansion and increasing resource input, by modern business ideas and means. Thus, constraints of natural resources and ecological environment on new countryside construction in western region will be more prominent. Ecological conditions of western region, which is at an advantageous position, not only play an important role in the achievement of new countryside construction in western region, but also directly affect the ecological safety of eastern region and the sustainable development of China. Therefore, protecting the ecological environment of western region has even greater strategic significance than the simple economic development in this region.

2 Problems in new countryside construction in western region under the perspective of ecological environment

In recent years, during the economic development in western region, plunder of eco-environmental resources has caused serious consequences. Economic development in western region has difficulty in taking a step and there are more difficulties in new rural construction, due to the fragile ecological environment, unscientific production and way of life, land salinization and desertification, water and soil loss, water resources shortage, forest vegetation destruction, frequent dust storms, drought, mudslides and other natural disasters.

2.1 Weak concept of ecological protection The rural way of life is traditional and backward. Affected by the small-peasants consciousness, the vast western rural region has little peo-

ple, small individual pollution, and relatively good ecological environment in community. However, due to the traditional way of life for thousands of years, peasants' concept of ecological utilization and protection is weak in western region. In daily life, problems of burning mountain, forest and garbage are all around. At the same time, the random piled-up mud, wood and feces, the spilled sewage, litter, and other customs have caused the poor environment in summer in western region. Moreover, the untreated livestock manure and domestic garbage are directly exposed in air, which pollutes and damages the ecological environment of western region, and leads to the poor environment in most rural areas of western region. Since many large-scale farms have no pollution control facilities, a large amount of waste and sewage are directly discharged into water without treatment, causing serious environmental pollution. Cattle, sheep and pig in housing farm release a large amount of methane, which have become major dischargers of greenhouse gases and seriously polluted the atmosphere. Thus, in the recent 30 years, rural areas of western region have suffered a series of problems that developed countries have faced for decades or even a century during industrialization. These problems have greatly affected and restricted the improvement of ecological environment in western region. Therefore, western region has become an extremely fragile ecological zone in China (Fig.1)^[2].

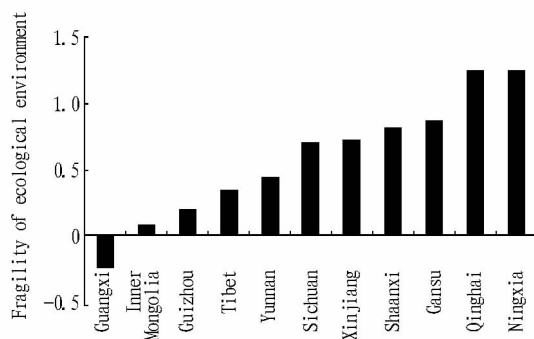


Fig.1 Fragility of ecological environment in western region of China

2.2 Ecological environment which needs to be improved

Due to the poor natural conditions and weak economic foundation, development of western region still faces more adverse environment. Firstly, land desertification further expands. Data show that desertification has further expanded and has reached 24 million hectares in western area. Secondly, vegetation is seriously damaged. Due to deforestation, forest in Xinjiang Plain has reduced by more than a half. Shrub in Junggar Basin has reduced by at least 70%. The original natural *Populus Euphratica* forest there was about 530 thousand hectares, and now the area is only less than 200 thousand hectares. Thirdly, the situation of water and soil loss has not been fundamentally changed. Water and soil loss in western region mainly includes the Loess Plateau in northern Shaanxi, Ningnan County, eastern Gansu, and central Gansu, with the overall area of about 220 thousand square kilometers. Fourthly, land fertility generally declines and salinization aggregates. Farmland in most areas

of western China is overused without proper attention to the maintenance of its fertility. There is even predatory production in some areas due to the extensive cultivation and management. Therefore, the land fertility generally declines. Plough horizon affected by salinization has accumulated a lot of salt, with the maximum salt content being more than 30% in soil, which has seriously affected the agricultural production. Fifthly, environmental pollution is serious. Industrial and township enterprises are irrationally distributed, poorly equipped, and technologically backward in most western regions with a general up-trend in Three Wastes emission and the uncontrolled use of pesticides, fertilizers and plastic film. These lead to the serious pollution of ecological environment in western region, and directly or indirectly affect the sustainable development of agriculture^[3]. Dust storms, soil erosion and a series of serious environmental problems have already alarmed that it is urgent and imperative to reduce the deterioration of ecological environment.

2.3 Difficulty in agriculture development Drought at the end of the year 2009 has affected the life of rural residents in southwest China; and the construction of agriculture and rural ecological environment has lasted for more than half a year. Judging by appearance, it is the drought that affects the agriculture development, peasants' income increase, and environmental degradation in rural areas of western China. But in fact, agriculture in China has been dependent on the weather for thousands of years. This traditional development mode of agricultural production has a high requirement for ecological environment. Western regions have complex geological features, frequent natural disasters, harsh living environment, and fragile ecological environment, which have significantly restricted the agricultural development and seriously affected the yield increase of agriculture. Affected by the natural conditions, during the rapid development of agriculture in the western region, ability of ecological environment to withstand natural disasters reduces. Low efficiency of agricultural production has seriously hindered the development of agriculture. At the same time, agriculture in an industry type has caused the pollution and destruction of agricultural production environment to a certain degree. Agriculture in an industry type is a kind of modern agriculture mainly depending on mechanization and agricultural chemicals. It has the characteristics of specialized production, scale operation and highly intensive capital. This development mode of agriculture leads to the pollution and damage of ecological environment. For instance, residues of fertilizers, pesticides and agricultural plastic films remain in the soil, enter into the atmosphere through the circulation, cause pollution and damage of soil, atmosphere, and water body, and reduce the potential productivity. Even the inputs in labor force and capital are the same as areas with better natural conditions, this land gains far less. According to the researches of relevant departments, actual level of grain yield per unit in western region is much more less than that in western region of China (Table 1)^[4].

2.4 Backward plan for human settlement Most areas in western region belong to arid or semi-arid zone with scattered population and poor infrastructures. At the same time, people

there pay attention to the use of land and other natural ecological resources but neglect their protection. The scattered population in western region has greatly prevented the formation of an effective division of labor, can not promote the industry cluster, and is a serious impediment to the development of rural economy and society. For many years, control of human settlement in western villages is virtually nonexistent due to the scattered population and the lack of scientific and rational planning. Most villages have no plan for house sites; there exists the expansion of village, the extensive land use, the damage of arable land, and the waste of land resources. Construction of villages ignores the threats of flood, debris blow and other natural disasters. Peasants can not afford the financial arrangements and technical requirements of housing plan which protects the ecological environment construction and is suitable for their own. Moreover, the backward protection concept of land and natural ecological resources leads to the deterioration of human settlement in rural areas of western China.

Table 1 Comparison among the yields per unit of main grain crops in western region and other regions of China

Region	kg/667 m ²			
	Rice	Wheat	Corn	Potato
Western China	339	179.65	204.7	174
Whole China	356	203.00	247.0	195
Jiangsu Province	469	276.00	334.0	322
Shandong Province	394	247.00	295.0	346

3 Path of new countryside construction in western China under the perspective of ecological environment

The harsh ecological environment in western China has become an important factor affecting the sustainable development of agriculture, restricted the income increase of peasants in western region, become one of major bottlenecks for building a moderately prosperous society in an all-around way in China, and badly affected the new socialist countryside construction in western China. Only by developing ecological agriculture and agricultural circular economy and exploring the path for new countryside construction from the perspective of ecological environment, can we fundamentally change the status of agricultural production in the western region, increase the income of peasants, improve the environment in rural areas, and realize the new countryside construction in western region.

3.1 Changing the traditional concept into scientific and rational development Ecological environmental education should be carried out among peasants in western China, in order to establish their protection awareness of ecological environment, and to take the road of sustainable development of agriculture. In order to change the current modes of peasant life and rural economic development, local governments in western region should put forward a series of policies and measures, encourage peasants to change their traditional way of life and production, educate them to take care of both economic interests and ecological benefits, increase the income of

peasants during new countryside construction, make full use of the input increase in science and technology and in improving basic conditions of agriculture, and carry out reasonable and comprehensive development of eco-environmental resources. At the same time, through the adjustment of agricultural structure and the comprehensive restoration of ecological environment, ability of the sustainable development of the ecological environment should be enhanced when realizing the deep potential development of agro-ecological environmental resources. Governments should also establish a benign ecological environment system, ensure the sustainability of the ecological environment construction during developing economy and increasing peasants' income, find out the relationships between rational land use and vegetation construction, and realize the dialectical unification in new countryside construction in western China. According to the characteristics of natural environment in different regions, we should ensure the construction of basic farmland, adjust the structure of land use, explore alternative industries, increase employment opportunities, develop small townships, strengthen the education of ecological awareness, reasonably determine the appropriate scale of revegetation and basic farmland, establish the sound ecological environment and ecological agricultural systems in small river basins, and realize the virtuous circle of ecological environment and the sustainable development of social economy. In order to achieve this goal, vegetation construction should be carried out according to the local conditions, and test area and demonstration area should be established in different scales for extension^[5]. At the same time, governments at all levels of western China should change their development concepts, focus on the comprehensive, coordinated and sustainable development of agriculture, peasant and rural area in western China, make policies and measures for regional sustainable development, adopt policies promoting the development of agricultural circular economy and the ecological and environmental protection in rural areas, accelerate the transformation of production and management concept of rural economic subjects, and fully understand that protecting ecological environment is an objective requirement to the rural sustainable development of western region. Governments should also help the peasants in western region to establish a consumption idea suitable for environmental protection, form the atmosphere of green consumption in rural areas through advocacy and policy promotion, and promote healthy and civilized life and consumption patterns which are conducive to ecological resources conservation and environmental protection^[3].

3.2 Restoring the ecological environment by making use of agricultural support

Reconstruction of ecological environment is more than ecological restoration. It requires that ecological development should be realized during the new countryside construction in western region by improving the simulation level of artificial eco-economic system. It takes ecological development as the breakthrough point to solve the problems of ecological environment and rural development in western China. An efficient ecosystem is established based on ecological construction by the means of ecological technology, biotechnol-

ogy, chemical technology, engineering technology and economic technology. This system has the ecological conditions of maintaining human existence, can improve the living quality of peasants, has relatively high economic output accompanied by the significant and positive changes of economic structure and income structure, promotes the development of new rural industries and characteristic economy, and make full use of the natural resources, such as water, sunshine and soil, so as to stimulate the self-adjustment of rural development in western region. Ecological reconstruction in western region should focus on the protective forest system, forest system for water supply conservation, and forest system for water and soil conservation, so as to improve the microclimate and mesoclimate and to establish an environmental system for regional agro-ecosystem. Meanwhile, construction of economic forest, firewood forest, grass slope, and hills covered with grass should be also taken into account in order to improve the ecological conditions of agricultural production systems and to improve the economic benefits. Combining with the mutualistic symbiosis principle in biotic population, scientific allocation of agro-ecological population structure is carried out. As for the industries of farming, forestry, fishery, and animal husbandry, crop distribution should be arranged according to the ecological characteristics, spatial capacity, and mutualistic symbiosis principle^[6]. Agricultural facilities technology should be vigorously developed. Western region has unique geographical position, great differences in climate and temperature, and has the advantages in sunlight greenhouse utilization. Therefore, greenhouse applied in western region will greatly improve the utilization rates of land and sunlight. In the aspect of vegetable, flower, fruit tree and edible fungi planting, we should strengthen the researches on yield improvement, promote drip irrigation, decrease the humidity in greenhouse, reduce pest damage and infrastructure costs, apply more carbon dioxide, increase the photosynthetic efficiency, carry out intercropping according to the requirements of different crops to environmental conditions, and improve the enthusiasm of farmers to use the technology of agricultural facilities.

3.3 Promoting ecological economy; developing competitive industries

Western region should take new countryside construction as an opportunity, accelerate the forest planting, returning farmland to forest, and returning grazing land to grassland, and implement the combination of economic and fruit forest and ecological forest and the combination of efficiency and revenue. At the same time, the state should offer appropriate subsidies and support, completely change the ecological barrier in western region when carrying out infrastructure construction, maintain the ecological balance in western region during infrastructure construction, take into account the actual need of rural development and the improvement production and living environment for peasants, organically combine the resource exploitation and ecological construction, adhere to the path of sustainable development, and create a beautiful western village. Rural areas in western China should provide preferential policies for rural industries and agricultural products with little pollution and resources consumption, high technology con-

tent, and good economic benefit. A development mode of "Resources – Products – Consumer – Renewable Resources" circular agriculture should be established. Government should promote clean energy such as biogas, combine the income increase of peasants with ecological construction and living environment construction, guide, encourage and regulate the construction of rural ecological environment and living environment by relying on the mechanism of economic interests, accelerate the industrial structure adjustment of western rural areas, implement land circulation system, strengthen the management scale of agriculture, develop modern agriculture, promote organic food, green food and pollution-free agriculture products, establish industrial belt for characteristic agriculture, adopt advanced agricultural technology, and promote the efficiency of agricultural production. At the same time, government should also cultivate large peasant household, promote the development of agricultural industrialization, extend industry chain, improve value-added of agricultural products, enhance the self-accumulation and self-development capacity of western region, learn lessons from the impact of serious natural disasters on agriculture in the year 2010, and speed up the development of low-consumption agricultural technology. Agricultural product in western region has higher production costs than the national average level. Thus, western region is at a disadvantage in price competition. Accelerating the new countryside construction is to reduce the use of external input material of agricultural system in western region in order to reduce input cost and to increase the domestic and international competitiveness of products. Local governments should fully exert the comparative advantage in agricultural resources, develop characteristic agriculture, leisure agriculture and sightseeing agriculture in western region, make full use of the comparative advantage of resource, market and technology, and focus on the development of local competitive agricultural products. In the areas with beautiful natural landscape, particularly the rural outskirts, we should fully utilize the beautiful natural environment in rural areas and the changes in consumption structure of urban residents to attract urban tourists, to form agricultural leading products and pillar industries, and to increase peasants' income.

3.4 Speeding up spatial planning; optimizing the living environment Combining with the actual situation in the rural western region, new countryside construction should let the people transfer into areas with better conditions by financial-led migration with gradient scale, optimize the spatial structure of rural areas, reduce the cost of poverty alleviation, and effectively promote the rural economic development and urbanization process in western region. From an ecological sense, migration with gradient scale is the best way for human activities to exit from the ecologically fragile areas with awareness in order to ensure the restoration of fragile ecosystem through its own metabolism. Moderate accumulation of population is realized by the construction of small towns, so as to optimize the division within economic organization and the social division level among economic organizations, to greatly reduce the spatial distance and time interval of market exchange in western China, to promote the formation of labor division within the region and the upgrading of existing industry, and to accelerate the formation of the agglomeration of related industries. Thus, this process will cultivate growth pole in homogeneous space at low

level; while the absorption and radiation function of growth pole will provide power for the development of urbanization. At the same time, new countryside construction in western region should follow the general guideline of "unified planning, rational distribution, local characteristic, farmland protection, environment optimization, integrated development, supporting construction, clean environment, village beautification" [7]. New countryside construction should reflect the local characteristics, show the cultural content, and protect the ecological environment of the rural western region. Since western region is weakly radiated by modern industrial civilization, its traditional villages maintain relatively complete custom and layout. Therefore, during planning, government should consider to protect the local characteristics, improve the buildings which damage the feature of traditional village, and achieve a perfect combination of modern civilization and traditional civilization. Through the planned and systematic migration and improvement of rural environment, we can promote the new countryside construction in western region, improve the utilization ratio of infrastructure, enhance the human settlement, and achieve the harmony between human and environment.

4 Conclusion

In a word, the restoration of ecological environment plays an important role in solving the "Three Agricultural Problems" in new countryside construction in western region of China. In a certain sense, restoration of ecological environment means the adjustment, integration and upgrading of agricultural industrial structure in western China. Therefore, new countryside construction in western region should focus on the restoration of ecological environment, find out an agricultural eco-economic system with western characteristics, adapt to the adjustment of agricultural structure, develop industrial economy in rural areas, and follow the new countryside construction road with western characteristics in China.

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