Study on Ecological Impact of Environmental Policy in China's Western Development--A Case study of Converting the Land for Forestry and Pasture

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Abstract

This paper introduces the policy making background and the implementation of Converting the Land for Forestry and Pasture (Grain for Green Project) in China's Western Development. The ecological impact of the policy was analyzed. It points out that the practice of Grain for Green Project has greatly improved the ecologic conditions of some local areas, promoted readjustment of rural industrial structure, increased farmers' income and enhanced the environmental awareness of the nation. At present, the following problems still exist: improper selection of cultivated land to be converted to forest and pasture resulted from projects done by officials for making achievements in their post, overemphasis on forest and underemphasis on grassland, too large proportion of cash trees reduced ecologic benefits, insufficient attention paid by some areas to the further development after the implementation of the project, incomplete accompanying guarantee measures to the implementation of Grain for Green Project and so on. Finally, four policy recommendations were put forth: (1). the need to follow the principle of converting farmland to forest and pasture according to real circumstances; (2). shift of priority from returning farmland to both returning farmland and protection the returned forest and pasture; (3). the need to combine Grain for Green with poverty elimination and wealth creation; (4). Establishment of ecologic compensation mechanism.

***Key wards**: Converting the Land for Forestry and Pasture, Ecological impact, China's Western Development*

1. NATURAL CONDITION OF CHINA'S WESTERN REGION

According to the "Circular of the State Council on the Implementation of Several Policies and Measures in China's Western Development" issued in 2000, China's Western region herein refers to the region between E73° 25'-126°04' and N20°54'-53°23', including Chongqing, Sichuan Province, Guizhou Province, Yunnan Province, Tibet Autonomous Region, Shaanxi Province, Gansu Province, Qinghai Province, Ningxia Hui Autonomous Region, Xinjiang Uygur Autonomous Region, Inner Mongolia Autonomous Region, and Guangxi Zhuang Autonomous Region.

China's Western region covers a vast territory with an area of 6.6083 million km^2, or 68.83% of the whole area of China. It is an under-populated region with 355 million people in 2000, or 27.41% of the total population of China. The agricultural acreage in the region

is 49.6633 million hm^2, or 38.19% of the total agricultural acreage in China, but of the total agricultural acreage in West China, only 7.34% is cultivated land. Forest area in this region is 118.593 million hm^2, 52.11% of the total forest area in China but the forest area of Xinjiang, Qinghai and Ningxia in Northwest China has the lowest percentage of forest coverage in China with 1.57%, 2.65% and 4.2% respectively. Grassland available here is about 260.4781 million hm^2, 97.83% of the total grassland available in China, which is to say, West China nearly holds all the pasturing area of China

2. BACKGROUND FOR THE IMPLEMENTATION OF GRAIN FOR GREEN POLICY

The severe environmental situation is already threatening the environmental safety of China. At present, the area of soil erosion amounts to 3.67million km^2 in China, of which 80% occurs in the western region, and of the total of 2.622 million km^2 deserted land area in China, 90% lies in the western region. Severe soil erosion has resulted in the loss of soil nutrients, reservoir silting, navigation channel sedimentation and increased poverty-stricken population. The expansion of deserted land has also created frequent sand storms in Northwest China bringing huge economic losses. According to an investigation, the economic losses resulted from sand storms have increased from RMB 11.844 million yuan in the 1950s to RMB 113.6 million yuan in the 1990s in Inner Mongolia Autonomous Region (The Department of Natural and Ecological Protection of SEPA, 2002). Considering the fact that the Yangtze River, Yellow River and many other great rivers all originate from Western region, the deteriorating ecological condition not only directly constrains and impacts the economic and social development of the China's Western Region but also constitutes a serious threaten to the existence and development of the Chinese nation. In order to speed up ecological restoration, converting the land for forestry and pasture is a fundamental and foremost approach in the implementation of China's Western Development strategy.

Some of the major reasons for the severe soil erosion and desertification in West China are disforestation, turning grassland into farmland, farming in steep slopes and hillsides and so on. Scarcity of cultivated land has always remained a problem in Southwest China due to the existence of mountainous terrain. Along with the sharp population expansion, land cultivation for farming on the slopes and hillsides has been done for a long time. For instance, in Sichuan Province, the reclamation rate in the hilly regions has increased from 20% - 30% in the 1950s to over 50% in the 1990s. In some counties, this figure has even risen up to 60% and more. The reclamation rate in the mountainous area has also risen from 4%-5% to 15-25% and nearly half of the agricultural acreage is hillside-cultivated land. In the Three Gorges region, 610,000hm^2 hillside cultivated land exists at a slope of over 15^o, occupying 56.7% of the total cultivated area, of which 200,000hm^2 hillside cultivated land exists at a slope of over 25^o or 15.5% of the total cultivated area (Ma Yijie and Dong Yuanhua, 1999). According to surveys on the soil erosion, the cultivated land, which occupies 22.5% of the total reservoir region area, has an annual erosion of 94.5 million tons and 18.9 million tons of annual sediment into the reservoir, respectively contributing 60% of the total annual soil erosion and 41.16% of the total inflowing sediment (Du Rongheng et al.1994). During 1986-1996, Inner Mongolia, Gansu and Xinjiang altogether produced 1.74 million hm^2 of land from deforestation and reclamation of grassland, of which 49.2% has been deserted leaving behind a severe situation of land desertification, which has intensified the frequency and intensity of sand storms in this region.

3. CONTENTS AND EFFECTS OF GRAIN FOR GREEN POLICY

3.1 Primary Coverage of the Policy

The Grain for Green policy has been mentioned in the following documents:" Circular of the State Council on the Implementation of Several Policies and Measures in China's Western Development (2000)", "Proposals of the State Council on Further Improvement of Policies and Measures for Returning farmland to Forest and Pasture" and "Regulation of Returning Farmland to Forest (2002)". The specific content of the policies can be generalized as " returning farmland to forest (or pasture), closing hillsides for afforestation, substituting grain for relief and individual contracting". The first is to provide grain to households that return the grain farmland free of expenses. The grain thus provided is 2250 kg (raw grain) per hectare of returned grain plots in the upper reaches of Yangtze River and 1500 kg (raw grain) in the upper and middle reaches of the Yellow River. The expenses subsidizing the grain is to be financed by the central government at RMB 1.4 yuan per kilogram of raw grain and the transportation and distribution costs are to be financed by the local governments. The term of subsidy is 5 years for cash forest, 8 years for ecologic forest and 2 years for pasture. The second is to provide proper subsidy to the households that return the grain farmland by the nation. The subsidy standard is at RMB 300 yuan per hectare of returned grain plot each year to be financed by the central government. The state will provide subsidy of seeds and seedlings to the households that return the grain farmland. The subsidy standard is RMB 750 yuan per hectare of farmland returned to forests and pastures and of barren hillsides and wasteland reclaimed for forests and pastures. The third is to implement individual contracting. The practice of "benefiting those who afforest (plant grass), who care for the forests and pastures". The term of contract for the cultivated land and barren hillsides and wasteland reclaimed for forests and pastures contracted by the farmers will be prolonged to 50 years. Lawful inheritance and transfer are allowed and expired contracts are renewable according to relevant laws and regulations. The forth is when the local fiscal revenues are impacted negatively due to implementation of returning farmland to forests and pastures, proper subsidies are to be financed by the central government in a given period. The fifth is to exempt the agricultural specialty tax for the agricultural specialty income obtained from forests (with at least 80% of ecologic forests) and pastures returned from grain farmland to protect ecologic environment for 10 years from the year in which the farmers begin to receive such income.

3.2 Development of the Project

According to the program submitted by the department of forestry, the Grain for Green Project runs through the period of 2000-- 2010 and covers 25 provinces, cities and autonomous regions, which are much larger than the initial Western region. The project includes 14.6667 million hm^2 of forests from returned grain farmland, 17.3333 million hm^2 of forests by cultivating barren hillsides and wasteland, equivalent to a total investment of RMB340 billion Yuan. By the end of 2003, a total of 7.2193 million hm^2 of forests from returned grain farmland and 7.946 million hm^2 of forests by cultivating barren hillsides and wasteland, reaching half of the planned figure.

According to the examination and verification of the State Bureau of Forestry, general conservation of the afforestation was good with the rate of tree conservation reaching 89%, 90.3% and 89% respectively for the year 1999, 2000 and 2001 nationwide. But the survival rate of the newly planted trees was low in particular in aridity, semiarid regions with only

20%-30% in years with less rainfall and about 50% in years with enough rainfall. To obtain the compensation grain provided by the government, in general the farmers need to replant 2-3 times, some even 5-6 times. This has resulted in high cost and shortage of tree seeds and seedlings. The practice of planting tea, medical herbs and grass in the forests is welcome by the farmers as they can increase their income. However, problems exist such as over density of plantation, singularity in tree species, and lack of consideration of water resource conditions and so on.

3.3 Evaluation of Implementation Effect

On the whole, direct ecologic benefits are distinct in returning farmland to forest and pasture. This is shown in the fact that the ecologic condition has evidently improved in some local areas. In addition, indirect impacts are also quite evident. For instance, it has promoted readjustment of agricultural structures, increased farmers' income and enhanced the environmental awareness of the nation. All these indirect effects are of crucial importance to the improvement of the ecologic environment in West China. Returning farmland to forest and pasture is a long-term project due to the fact that it takes a certain number of years to realize the growth and crown closure of the vegetation cover of the forests and pastures, and about 5 years of time to see the results of grass (shrubs). It also takes about 5 years to see the initial effect and about 10 year to see the substantial effects of the forestry. Accordingly, only initial effect can be judged now for this project.

(1) Great Improvement of Ecologic Environment in Local Areas

The Grain for Green project has accumulated a total of new forests and grassland of about 6.4 million hm^2, and 3.1333 million hm^2 of forests returned from hillside cultivated land and cultivated land with desertification. Thus the situation of soil erosion and desertification has become less serious. According to the monitoring of the department of forestry, in Hongya county of Sichuan Province, which is an early pilot area, after the hillside cultivated land was returned to forests, soil erosion per hectare was reduced by 74.4 tons and 270 m3 of water was accumulated. As a result, the area with soil erosion is shrinking year by year, the frequency of natural disasters was also reduced year by year and the reduction of ravages and signs of droughts was especially evident. In 2001, the whole province suffered from an extremely severe arid and all the nearby counties were afflicted with a severe drought but Hongya county was basically not impacted. It has realized bumper harvests for several years running. In Wuqi county of Shaanxi Province, the percentage of woods and grass coverage reached 49.6% in 2001, an increase of 27.4% to that of 1997. The soil erosion modulus dropped to 8800 tons, a reduction of 42.5% compared with that of 1997. The former waste mountain and wasteland have been covered by thick vegetation. Some precious and unusual animals and plants have reappeared. The key areas under such administration have almost realized the goal of no water running down the hillsides, no mud rushing out of the valley. A favorable regional environment is being formed.

(2) Farmers' Income Increased and Poverty Elimination Sped Up

According to initial statistics, the Grain for Green Project has involved 13.33 million farm household, about 53 million farmers. On average, each household has returned 0.29 hm^2 grain farmland for forests. Only in the 3 years of pilot experiment period, a total of 410

farm households and over 16 million farmers have benefited from the project. On average, each household received 870 kg of grain and RMB 146 yuan of cash for compensation. Farmers implementing returning farmland to forests have not only secured a steady supply of grain but also spare more manpower to engage in diverse economic undertakings and sideline production and thus gain more income. One farmer in Luo Yuan township of Wu Qi county of Shaanxi Province, Bai Zhanxi has a family of 4 people and contracted 1.73 hm^2 of cultivated land. In 1999, he returned all the 1.33 hm^2 of hillside cultivated land to forests. Now he can get 2000 kg of grain and RMB 400 yuan for compensation annually. After returning the grain field, he kept 0.4 hm^2 of intensively cultivated valley land, plus the vegetables produced in the big shed and pig and sheep raising, in 2001, the gross income of his family reached RMB 20,000yuan with 5000 yuan per capita, which is 10 times of the family income before returning farmland to forests (Zhang Hongwen, 2002).

(3) Promotion of Rural Industrial Restructuring

Implementation of the Grain for Green Project has changed the long-term traditional practice of extensive planting with poor harvest and effectively adjusted the irrational structure of land utilization. After that, governments at all levels took many measures to speed up rural development such as farmland construction, stock breeding, green food, forest tourism, green industry and so on. Such activities have focused on the feature economy of the rural area, succeeded in the transition from the agricultural production with predominant plant production to that with tree planting and fruit production, animal husbandry and the second and tertiary industries. All these have promoted the rural industrial restructuring and the shift of rural work force. In Xiakou Village of Guyuan County of the Ningxia Hui Autonomous Region, of the 380 hm^2 of sloping farmland, 273hm^2 has been returned to forests. Now with less farm work to do, over 600 able farmers have gone to find temporary work in the cities to earn money and the remaining manpower at home is also engaged in livestock breeding and vegetable growth in green sheds. Thus reduction in grain farmland did not result in reduced production. Meanwhile, the project has promoted inflow of large funds and advanced technologies to the mountainous districts as some companies and individuals are making use of the vast land and rich work force to cooperate with the farmers. They lease land for afforestation, offer seed and seedling, breeding sheep and technology to the farmers. They provide part of the funds and purchase the products produced by the farmers. In this way a partnership of company plus production basis and farmer household is formed which greatly promoted the level of agricultural industrialization and land output.

(4) Improvement of the Environmental Awareness of the Whole Nation

The extensive propaganda and implementation of the project have made the cadres and masses realize the significance of the government's decision to offer grain in exchange for ecologic environment as well as the importance of the Grain for Green Policy. As a result, people's enthusiasm to participate in the returning farmland to forests project and other ecological projects has risen up. The consensus has been reached to speed up ecological environment protection and construction, restrain soil erosion and sand storm hazards. The farmers have changed from "being asked to return grain farmland" to "willing to return the grain farmland". They have become the main entity in the implementation of returning farmland to forest. Yulin District of Shaanxi Province has suffered many natural disasters

in successive years. This has caused them to realize that the root of their poverty is the bad ecologic environment. So they put forward the slogan of "expanding scope of returning farmland to forest and pasture in exchange for grain" instead of the former "annual disaster relief and grain for save life". According to a questionnaire survey conducted in Datong Hui and Tu Autonomous County of Qinghai Province, 99.5% of the cadres and 82.2% of the farmers are in favor of the policy, of whom 85.1% of the cadres and 58.1% of the farmers chose the reason for their favourable answer as this policy is beneficial for conservation of both moisture and soil, water sources cultivation, sand storm and sand flowing prevention, reduction of water logging disaster in the downstream and so on. This has demonstrated that the ecological awareness of the farmers has achieved a qualitative leap forward.

4. PROBLEMS IN THE GRAIN FOR GREEN POLICY

(1) Irrational Cultivated Land Selection Resulted from Project for Achievement in One's Post by the Officials

According to investigations, in many cases, grain farmland near highways tends to be chosen as returned one. This practice is even more serious in Southwest China where over 70% of the farm households live near highways. In the returned grain land, quite a part of it is not steep land as should have been chosen according to the program. In Northwest China, steep land is specified as land with over 15 degrees of slope and in Southwest China it is with over 25 degrees of slope. In some areas, the cultivated land returned is mostly hillside cultivated land while the farm households that returned grain farmland have kept quite a number of steep land plots. This selection of land reflects two problems: overemphasis on concentrated and connected grain farmland; plot selection influenced by non-ecologic factors. The main reason for this is the implementation of projects for the sake of making achievement in one's post of the local government officials because it is convenient for the superior leaders to inspect and check the returned farmland near the highways.

(2) Overemphasizing Forest, Underemphasizing Grassland Resulting in Over proportioned Cash Forest and Reduced Ecologic Benefits

In arid and semiarid desert steppes and regions with desertification and degeneration, grass planting is the best and only selection for ecologic maintenance and restoration. However, Since planting arbor and shrub can get 8 years of government subsidy while grass planting can only get 2 years of subsidy, During 1999- 2001, in the forests returned from grain farmland, arbor trees occupy a higher proportion with 87.7% - 76.9%, while grassland occupies very low proportion with 8.8% - 3.7%, shrub trees with 3.5% - 19.4%.

Besides, some areas implementing returning farmland to forestry still have the problems of over proportioned cash forests. In Shaanxi, Gansu and Sichuan provinces that have been chosen as pilot of Grain for Green Project, proportion of the cash forest area occupies 64.1% of the totally returned land area (Shao Wenjie, 2000). The function for water and soil conservation of the cash forest is not as effective as ecologic forest as the former need frequent care such as fertilizer application and soil turning. Too high proportion of economic forests will be hard to result in the improvement of the ecologic environment.

(3) Insufficient Attention Paid in Some Areas to the Further Development after Returning Farmland to Forest and Pasture

Some local governments only pay attention to the present quota of returning farmland to forest and the subsidy policy, but neglect the future life of the farmers 8 years after they return the grain farmland to forest and pasture. This is shown in the fact that there is a lack of general planning of returning farmland to forests, and the existence of separation of returning farmland to forests with basic farmland construction, rural energy development, ecological immigration, close hillsides for afforestation and prohibition of grazing, and other future industrial developments. The supply of food and firewood and the income increase of the farmers after the term of subsidy expires are not given proper attention. So there is the risk of "returning the forests to farms" upon expiration of the government subsidy. In this respect, we have had some profound lessons. For instance, from the 1980s, to solve the problem of severe soil erosion, large-scale ecological construction has been made. But due to insufficient consideration of the farmers' interest and the future development, all the projects ended in the return of the ecological construction to farmland by the farmers in the end (Xu Jintao, Cao Yiying, 2002).

(4) Incomplete Accompanying Guarantee Measures to the Implementation of Grain for Green Project

In the process of returning farmland to forest and pasture, there are some conflicts in terms of assignment of interests, capital input between the east and west, nation and region, ecologic environment constructor and ecologic benefit beneficiaries. How to fully consider the interest of the ecologic environment builders and protect the vital interest of the farmers, is an urgent problem to be solved. At present, China has already issued "Regulations on the Implementation of Returning Farmland to Forest". The Regulations specifies such vital issues to the interest of the farmers as the term of land contract, forest right ownership, protection and construction of the basic farmland, rural energy development, ecological immigration and so on. In particular, the Regulations stipulate the specific provisions on grain, seed and seedling, standard and terms of subsidy and other issues. However, is an annual subsidy in 5-8 years enough to compensate for the long-range value of a piece of land for the farmer? How well can the national finance bear such long term subsidy? To solve the above problems, complete accompanying safeguard mechanism should be set up to improve the policy of returning farmland to forests and pastures.

5. MAJOR POLICY PROPOSALS

(1) In the implementation of returning farmland to forest and pasture, the principle of adaptation to local conditions should be followed.

In West China, the natural conditions such as climate and topography are complicated and the natural vegetation is rich in diversity. There are forests, forest steppes (or prairies), steppes, desert steppes and deserts that belong to horizontally distributed vegetation systems and also forests, and alpine scrub prairies, alpine steppes and alpine deserts that belong to vertically distributed vegetation systems. Such vegetation distribution has its inevitability and rationality as it is formed after long-term adaptation and natural selection in the relatively humid, semi-humid, semiarid and arid climate belts. The aim of ecologic environment construction is to recover and restore the natural vegetation system damaged by human being not to force the change of its basic distribution pattern by man. The policy of adaptation to local conditions in returning farmland to forests and pastures should be

followed with restoration of the original vegetation ecosystem as the main target. It is wise not to implement return of the farmland to forestry in valleys and for hillside cultivated lands with favorable natural condition and high grain yield. For steep slopes and barren land with severe soil erosion, priority should be placed on planting bush vegetation not on the development of cash forests. For high altitude localities and pastures with severe degeneration, measures should be taken such as closing the hillsides for afforestation or closing the pastures for grass cultivation. In regions with desertification, arbor trees are not suitable for growth otherwise they will aggravate evaporation of the soil moisture. In aridity and semiarid regions, the main task to do is returning the farmland for pasture and restore the natural vegetation.

(2) For Practice, Priority Should Be Shifted from Just Returning Farmland to Both Return Farmland and Protection

The ecologic environment in West China is very vulnerable --easy to damage hard to control. The guideline for returning farmland to forests and pastures should be shifted from placing priority on returning the farmland to both returning and protecting the farmland. Although in the former ecologic construction practices in China, protection is also advocated, from guideline to concrete planning emphasis is placed more on control and advocacy for protection less on real measures for protection. As a result, it happens that annual forestation and grass cultivation fail to produce actual results. Ecologic construction is an important means for eco-protection and is beneficial for eco-protection but cannot substitute the latter. Adequate funds should be prepared for eco-protection in order to bring into real play of the ecologic benefits resulting from returning farmland to forests and pastures.

(3) Implementation of Returning Farmland to Forests and Pastures Should Be Combined With the Poverty Elimination and Wealth Creation for agriculture, countryside and farmers.

At present, there are still about 15 million poverty-stricken people in the countryside of West China. They mainly rely on consumption of natural resources, which is the major factor for the vicious circle of "the poorer you become, the more you reclaim and the more you reclaim the poorer you become". As West China is a traditional farming and stockbreeding area, farmers have a very close attachment to land. This characteristic dictates the adoption of agricultural structure adjustment and production mode transition as the key for the economic take-off of West China and the approach for ecologic construction. Measures should be adopted to take into consideration of the local circumstances and find a development pattern that combines and achieves both ecologic benefits and economic benefits. The first and foremost problem to be solved through ecologic environment construction is the supply of food and firewood for the farmers. The second step is create wealth for them through setting up marketable grain basis and adjusting the plant production structure in order to develop and produce famous brands for the local agricultural products such as cotton, sugar making materials, melon and fruits, flowers, medicinal materials and so on. Ecological construction should rely chiefly on returning farmland to forests and pastures. More energy should be spent on animal husbandry and tourism industry development. In this way, it is hoped that ecologic construction can become an important driving force for the economic development of West China.

(4) Establishment of Ecological Compensation Mechanism

The establishment of an ecological compensation mechanism calls for the proper economic compensation paid by the local enterprises and inhabitants in the process of economical development for their damage of ecology and environment. On the other hand, it means that environmental protection is not the task of merely one region. Especially for the middle and low reaches of Yangtze River and Yellow River that receive the benefit, they ought to shoulder part of the cost as the upstream of the river basins has made their contributions to the protection of ecologic environment and suffered losses. Only in this way, can we make the compensation for the cost of external ecologic environment construction and guarantee justice and protect the enthusiasm of the middle and upper reaches of the two river basins for returning farmland to forests and pastures. We should speed up the study of the theories, methods and policy issues of compensation mechanism for ecological construction in order to implement the results achieved from such studies. For instance, based on analysis of ecosystem production and its service functions, the scope of compensation for ecologic benefit and the main entity to receive such compensations can be determined. The channels and methods of compensation for ecological benefits can also be determined through studies from the angle of the development of relevant industrial departments and the relationship of ecologic benefit between forests and grassland. Then compensation can be made to West China to promote the harmonious development of its regional economy and ecologic environment through financial transfer, taxation and other economic policies.

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