

THE EXPERIENCES AND MODELS OF LAND RESOURCES USE IN CHINA

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ABSTRACT: This paper introduces the experiences and models of land resources use in China. They are: (1) to protect farmland is as the basic state policy; (2) to carry out land resources survey and land use planning; (3) establishing a resource-saving agricultural production system with land saving as its priority; (4) to develop agriculture in the whole territory and explore food resources; (5) improving eco-environment and protecting land resources; (6) population control and moderate consumption to release the pressure on land resources; (7) the integrated development and experiment of the typical regions.

KEY WORDS: land resources, land use, agricultural production

I. CHINA'S LAND RESOURCES: BACKGROUND

China has a large land area of 9.6 million km², which is 6.5% of the earth's total land surface, making the country the third largest in the world. China has a cultivated land area of 139.20 million hectares, ranking the fourth in size in the world, its grassland area is 400 million hectares, the sixth largest in the world.

China is one of the countries in the world with the most complicated physical conditions and the most diversified types of land. It stretches across 49 degrees in latitude and six temperature zones (the frigid temperate zone, the temperate zone, and the warm temperate zone, the sub-tropical zone, the tropical zone and the equator zone). The country is mainly in the temperate zone, the warm temperate zone and the sub-tropical zone. It lies over 62 degrees in longitude. Influenced by monsoon climate, the country consists, from east to west, of humid, semi-humid, arid and semi-arid areas. Different areas have very different land productivity.

China's farm land resources are unevenly distributed. 90% of agricultural acreage is in the east and the south, 50% of forested land in the northeast and the southwest, and over 80% of grassland in the northwest.

China is also a mountainous country. About two thirds of the country is mountains, plateaus or hilly areas; the other one third is plains. This presents enormous restrictions to enlarging farm land acreage. In terms of topography the country is low in the east and high in the west with a marked altitude discrepancy. The Qinghai-Xizang (Tibet) Plateau, which accounts for about one fourth of the country's total area, is by and large over 4,000 m above sea level.

With a huge population, China is one of the countries enjoying low-level per-capita agricultural resources. In 1987 the country's per-capita farm land was 0.12 hectare, which was only one third of the world's average; per-capita forested land was 0.11 hectare, which amounted to only one sixth of the world's average, and per-capita grassland was 0.36 hectare, which was a half of the world's average.

The above-said characteristics of China's land resources have far-reaching influence on the country's economic development.

The huge amount of land resources is advantageous to China's agricultural development and represents a comparative large potential in comprehensive development and exploitation and a possibility of setting up an agricultural production system capable to feed more than one billion people, but irrational development and utilization will lead to extensive destruction of resources. Diversity in physical conditions may help form varied agricultural production types, facilitate diversified economy and improve structure of agricultural production, but uneven resources distribution has resulted in the unbalanced population distribution and regional development. In exploiting land resources people must provide guidance and adopt policies suitable to local conditions. Vast mountainous areas and great altitude difference in topography may facilitate comprehensive development of agriculture, forestry and animal-husbandry, but serious erosion may be also resulted in.

The little amount of China's per capita agricultural resources is disadvantageous to the country's agricultural development. In the forthcoming decades China is to be confronted with serious challenges: the population is expected to reach 1.3 billion (only so far as the mainland is concerned) in the year 2000 and 1.5 billion 20 years later, which will further decrease the per capita amount of agricultural resources. Per capita farm land is expected to drop, in the year 2000, to 0.097 hectare, and in 2020 to 0.073 hectare. The enormous population is exerting an ever-increasing pressure on the limited resources, and the load that the population brings to bear on land resources is over weighted.

In the light of the basic national conditions, China should not follow the model of the western life style with high standards of consumption, but can only encourage its people to wage a long and arduous struggle, persevere in the fine tradition of being hard-working and thrifty, adopt the production system of frugality in utilizing resources and a life style of

appropriate consumption, rely on the advanced science and technology, strive for the integration of economic and ecological effects and harmonious coexistence of man and nature, thus ensuring the sustained progress of the entire nation. With less than one third of the world's per capita amount of farm land, China must treasure, protect and very effectively exploit its land resources so as to enhance markedly population bearing capacity by per unit of resources.

II. BASIC STRATEGY AND EXPERIENCE

Scarcity of China's land resources, especially farm land resources, has resulted from many reasons, and only comprehensive management can solve the problem. A large population versus a shortage in farm land is both a heavy burden of historical heritage and an irreversible trend in the following decades. To solve the problem is an extremely heavy task, which demands long and arduous efforts of the Chinese people. In the face of the acute contradiction between population and land, China has adopted comparatively effective strategies in ensuring the existence and development of the entire nation and has accumulated many valuable experiences.

1. The Enactment of "The Land Management Law"

The State has enacted "The Land Management Law", which stipulates the basic state policy "to extremely treasure and rationally utilize every inch of land, and effectively protect farm land". (The three basic state policies of the Chinese Government are: family planning or birth control, land protection and environment protection.)

In March 1986 the government promulgated "The Circular on Strengthening Land Management and Halting Abuse of Cultivated Land", and at the same time set up the State Bureau of Land Management which is direct under the leadership of the State Council and which supervises land management of the whole country. In June the same year the Standing Committee of the National People's Congress passed "The Land Management Law of the People's Republic of China", providing law basis for development and management of land resources. Various regions set up their own land management departments, which administer the confirmation, transfer and registration of rights of land in the locality, the approval of land for construction sites, and the enforcement and supervision of policies, laws and regulations on land^[1].

The state has gradually set up the National Information System of Land Management to conduct statistics and dynamic monitoring of land resources and to help with land management and policy-making. The state is also taking steps to establish the National Information System of Land Resources to standardize and unify data collection, monitoring and appraisal and data types.

Use every conceivable measure to preserve cultivated land at the present level and keep the balance of the total farm land acreage.

The first measure is to strengthen education of the sense of land for the whole nation, to make every citizen understand the state policy and to heighten his sense of crisis and urgency concerning land so that people will conscientiously treasure and be economical of using land.

The second is to formulate an overall plan and strengthen the state's macro-control for land use. According to the overall plan, the State Bureau of Land Management works out the annual land use plan, coordinates demands from various departments, and adjusts the structure and distribution of land to be used, so as to utilize the country's limited land resources fully and rationally. Up to now, one third of the provinces and autonomous regions of the whole country have completed or are carrying on the overall planning for land use.

The third is to fix quotas for land to be used for construction sites, which provides unified standards and basis for the examination and approval of land for construction sites, and makes it convenient for various departments to use land economically and rationally. In accordance with the size of urban population and the scale of construction sites, land use in cities is controlled, standards of using land for transport are formulated, and regulations are made for using land for afforestation along the railways and highways. Vigorous control is exercised for land use for transport. Today, there are more than 3.94 million villages in China, taking up land of 13.33 million ha., which is the lion's share of non-agricultural land use. Now villages are beginning to rebuild themselves, the farmers are encouraged to replace single-storied houses with multi-storied buildings, and to put up buildings on waste and inferior land and slopes, in order to make more land ready for cultivation or to use less cultivated fields.

The fourth is to define reservation districts for basic farm land and set up a special management system of land protection. Absolute reservation areas of per capita cultivated land are fixed in different regions. Farm land reservation districts, in which non-agricultural construction is not allowed, are defined. Since 1989, experiments have been carried out in more than 280 counties in some 20 provinces.

The fifth is that the cultivated fields which are used to readjust agricultural structure amounts for about 60% of total annual reduction of cultivated land. The regulation now is that good farm land converted to other purposes must be reclaimed as such step by step to ensure the country's total area for grain production is not less than 0.107 billion hec.. With the above-mentioned measures the trend of sharp decreasing of cultivated land has been stopped effectively. From 1981 to 1987, the annual net mean reduction of cultivated land of the country was 0.524 million hec., and from 1988 to 1989, the figure dropped to 0.116 million hec..

Efforts are made to carry out the reform of land use system. In China, there is a short-

age of land resources, and on the other hand, there is serious waste of land. The main reason is that land has been used gratuitously and for indefinite periods of time. In recent years, the Chinese government has first begun to collect taxes on land use and on cultivated fields in urban areas and the right of use land can be transferred only upon consideration. The system of using land gratuitously and for indefinite periods of time is being replaced by using land non-gratuitously and for definite periods of time. At present, ways and methods of using cultivated land non-gratuitously, especially the land for construction sites and township enterprises, are being explored. The above major reforms of regulations will be instrumental in introducing self-control mechanisms of treasuring and utilizing land resources, and will effectively put an end to wasting land and illegally occupying, selling and buying land.

2. Rational Utilization and Development of Land Resources

To do a good job in making surveys and planning of land resources serves as a prerequisite and base for rational utilization and development of land resources. "1:1,000,000 Land Resources Map in China", "1:1,000,000 Land Use Map in China" and "Map of Land Types in China" compiled by the Chinese Academy of Sciences were listed as key projects of 1978-1985 national development plan in science and technology. This series of maps generally collated, studied and summed up the research results as well as the data from land resources surveys over the past 30 years. People used the materials of satellite images and aerial photos to indicate the spatial distributions of all types of land resources potential composition, calculate the qualities as well as quantities of all types of land resources in China and show the situation of land resources utilization and the development potential of farming, forestry and animal husbandry, provide scientific evidence and basic information to the state and all regions for setting up a long-term plan for rational utilization of land resources and agriculture development as well. Besides, tasks for large scale of soil surveys and land investigations throughout the country were accomplished, thus laying a fundamental base for the land evaluation and planning.

As "The Law of Land Management" says that "People's government at all levels should make an overall planning for land utilization, and implement macro-control of land use", the overall planning for land use is based on the land resources surveys and evaluations, prediction of land demand from all sectors and departments. According to the current situation of land resources and potential of latent resources in the area, the general balance of land demand and supply should be conducted with the consideration of social, economic and ecological effects^[2]. The whole country and all provinces as well also set up agricultural development schemes, based on the demands of social-economic development and characteristics and suitability of land types in all areas, to arrange land use for farming, forestry, animal husbandry, sideline occupation and fishery suited to the local conditions.

Developing latent resources of limited arable land in a planned way. At present, China has 33,930,000 hectares of latent arable land, of which 20,400,000 hectares of farm land can be reclaimed. According to the suitability as well as actual demand for local production development, fodder basis are mainly established in the grazing areas, economic forests and fruit forests are built in the hilly areas, and grain crops are developed in farming areas.

At present, large areas of arable land are destroyed by constructions in the country, the rate for restoration of such land is very low, only 2%. The potential for increasing the recovering rate of abandoned land is relative great. This is an important way for expanding the scale of arable land in China in the future.

3. Establishing a Resource-Saving Agricultural Production System with Land Saving as Its Priority

In regard to the development of arable land, emphasis should be placed on the increase of per unit productivity. The increase of grain production in China mainly depends on the increase of per unit yield. From 1957 to 1989, the grain production area in the whole country decreased 16%, but the total grain production increased 109%. The per unit yield of grain raised 147%. The great increase of land productivity in China and the increase of per unit yield of grain by doubles were mainly attributed to the introduction of new production techniques and vast investment. For instance, from 1952 to 1987, the state investment in agricultural infrastructure reached 102.5 billion yuan RMB. If it added the investment in departments of agricultural machinery, pesticides, chemical fertilizers, etc. the total state investment in agriculture was even bigger. Up to now, China has constructed 83,000 reservoirs, 5302 irrigation areas at the scales of over 700 hectares and 2,918,000 electrical wells to expand 24,417,000 hectares of irrigated area as well as more than 40,000,000 hectares of machine-plough land.

Farmland development is based on the methods of raising the potential of medium-yield land, transforming the low-yield land and protecting high-yield land. The percentage of arable land of high-yield, medium-yield and low-yield in China respectively accounts for 22.3%, 56.8% and 20.9%. Among them, medium-yield land has the biggest potential of production increase with the best investment returns. The low-yield land also has relative bigger potential of its productivity. There are two large plains in China: Northeast China and North China plains, the per capita cultivated land there is quite big, the area of medium- and low-yield land is vast. Those are major basis for the increase of grain production in the years coming. During the period of "the Seventh Five-Year Plan" and "the Eighth Five-Year Plan", China put the emphasis on the development of the above-mentioned plains and obtained remarkable economic effects.

Fully utilizing the advantage of light and heat resources in China and increasing multiple crop index, stabilizing the total area under crops. China belongs to the continental mon-

soon climate with rain and heat in the most of the areas. One crop a year in northeast China, three crops in two years, and two crops a year, in north China and central China, three crops a year in south China are all benefited by the monsoon. The increase of multiple crop index can save time (fully utilizing growing period), arable land, and energy (light energy). The increase of 1% of multiple crop index is equal to an increase of 1—1.33 million hectares of cultivated land. The multiple crop index in China was 131% in 1952, and reached 151% in 1989. At the same time, the area of the cultivated land decreased 12,260,000 hectares. Thanks to the increase of the multiple crop index, the area under crops increased about 5,300,000 hectares. The tendency of decreasing cultivated land is inevitable. In order to maintain the total existing area under crops, China should still create possible conditions to adopt such multiple crops systems as inter-cropping, interplanting of another crop, and to breed early ripening and high-yielding varieties, to popularize plastic film farming methods so as to obtain goals which the multiple crop index reach 155% in 2000 and 160% in 2025, equivalent to the increase of 5.3 million hectares and 12 million hectares of cultivated land respectively.

Establishing and developing eco-agriculture. China is a country with a long history of agriculture. Over thousands of years of land development, the Chinese people through practice created a traditional agriculture system suitable to its natural environment as well as established and developed an eco-agriculture. Eco-agriculture actually is a sustainable agriculture, that is, 1) constantly establish new man-made eco-systems which can fully and rationally utilize the resources and achieve high yield with good quality; 2) constantly develop grain production, meanwhile promote all around developments of farming, forestry, animal husbandry and fishery; 3) obtain the goal of low investment with high output. Its characteristics are as follows: 1) Intensive and meticulous cultivation with the combined method of cropping and fallowing land, fully utilizing the land with attention to actively fallowing land, and to fertilizing land with organic manure, adopting a series of methods of rotation of crops, adjusting the relation between water and fertilizer. 2) Diversified economy with the methods of inter-cropping. To make full use of space and time to adopt diversified economy by the means of planting crops between rows, rotation of crops, interplanting of another crop, and interplanting crops between trees, interplanting medical herbs between trees. 3) According to the relation between food chain and quantity, to establish a co-existence system of species with mutual assistance. Taking an example of the Mulberry-Dyke-Fish-Pond System developed in South China, fish pools are made in low-lying land, the clay dug out from the fish pools are used to build terraced land where mulberry is planted. Thus, the leaves of mulberry are used for silkworm breeding, the wastes of silk worms serve as fodder for fishes, the silt on the fish pond beds with rich organic materials is dug out to serve as manure for mulberry. It forms a sound eco-system with circulation. 4) Biological control. To utilize biological antagonistic principle and breed varieties which resist insect and diseases so as to reduce the quantity of insecticides to be used. 5) In-

crease the efficiency of the utilization of biological energy as well as its circulation of utilization. For instance, crop stems, tree leaves and grass, etc. are used to raise livestock, and the wastes of livestock serves as the material for making marsh gas, thus, the resources can not only be used by multiple times, but also provide energy.

4. Developing Agriculture in the Whole Territory and Exploring Food Resources.

For the development of the Chinese agriculture, attention should also be given to mountainous areas, hilly regions, grassland, woodland and tidelands in addition to the development and utilization of the existing arable land resources.

China is a mountainous country. Its mountainous areas cover 68% of the total territory, with 39% of the total population, 40% of the total arable land and 90% of the total wood reserve of the country, where there are vast areas of grassy hills and slopes suitable for diversified economy of agriculture, forestry, animal husbandry and sideline production, particularly in the southern hilly regions, where the climate is warm and rainy and organisms grow fast with short cycle and the potential for development is great. Long-term investigations and site experiments have been conducted by Chinese scientists in these areas and new production bases of timber forests, economic forests, fruits trees and herbivorous livestock established, which has opened up a new way for Chinese agricultural development.

There are vast stretches of grasslands in China's northern pasture land, but the grass yield is low. Great efforts should be made to cultivate grasslands and set up cultivated forage and fodder production base for animal husbandry. The herbivorous livestock will become the main meat source for the Chinese people in the future.

China has rich land resources suitable for afforestation and rich resources of forest plants. There are 42.31 million hectares of barren hills suitable for afforestation and 25.4 million hectares of sparse woods and bushlands to be improved from low-yield woodlands to high-yield ones. According to the local conditions, it is suitable for develop fast-growing and high-yield timber forests in the southern mountainous areas, shelter forests are under construction in the transitional belt between northern semi-arid and semi-humid areas, which has already involved an investment of 2.433 billion yuan and an input of 1.1 billion working days of manpower. 9.2 million hectares of tree planting have been completed, 228,000 hectares of mountainous area are closed for afforestation and 240,000 hectares of afforestation are done by aerial sowing; forest for water and soil conservation shall be developed in the upper reaches of the Huanghe River and the Changjiang River, shelter forest system along the coast and cultivation land protection forests in plain regions should also be developed. Great efforts should be made in developing economic forest and diversified forestry production and in protecting species and maintaining the biological diversity.

5. Improving Eco-Environment and Protecting Land Resources

Improving eco-environment and restoring and raising the productivity of land resources are essential not only for the development of agriculture and animal husbandry but also for a sustaining living environment of mankind.

Worsening of soil erosion has become a serious problem in some mountainous and hilly areas. Present experiences of small watershed management in China, such as vegetation restoration and terraced fields building, have been fairly successful. The crux of water-soil conservation lies in rational utilization of land and combination of biological control and engineering measures^[3].

Improvement of saline-alkali soil mainly relies on building up a good draining and irrigation system and applying scientific irrigation regulations, and advanced and practical irrigation techniques. For the lands which are easy to sub-salinization, precautions should be taken to prevent the water table from rising to the critical level. These measures have brought about good results in China, and the area of saline-alkali soil has evidently decreased.

Desertification is another serious problem. China has devoted great efforts to the exemplary experiment of desertification control and has made evident achievements by planting trees and grasses, and engineering measures.

Prevention and control of land pollution are very important. The following works should be done: prevention and control of urban and industrial waste water, gas and residues; scientific application of sewage irrigation in accordance with standards concerned; rational utilization of chemical fertilizers; application of pesticides with high efficiency, low toxicity and residue; biological control; applying comprehensive measures to prevent and control plant diseases and pests; control initiatives against industrial pollutants from township enterprises.

6. Population Control and Moderate Consumption to Release the Pressure on Land Resources

The most outstanding situation in China is its large with enormous consumption of grains, which imposes immense pressures on the limited land resources. Therefore, family planning and a moderate-consumption style of living will play pivotal role in the management and utilization of the land resources. China has made great achievements in population control since its adoption of family planning policy in the 1970s. As a result, the growth rate population dropped greatly. It is estimated that if the family planning policy has not been implemented, there could be an increase of about 200 million of population since 1971^[4].

Since 1980, along with the average income of the Chinese people developing from the low-income level towards medium-income level, transiting from the stage of having

enough to eat and wear to the stage to be comfortably off, the food consumption (especially the grain consumption) of urban and rural residents has increased rapidly, the food structure has changed and especially the indirect consumption of grain (such as the consumption of meat and drinking liquor) has sharply increased, causing short supply of grain and also overload pressures on land resources. In this connection, the scientists of the Chinese Academy of Sciences proposed an appropriate consumption policy to the government, including: 1) Adjusting the food structure. The traditional food structure with vegetable food as the main part, should be added with proper increase of the proportion of meat from herbivorous livestock, and the quality of the food structure shall be continuously improved. In this way, the grains can be saved. 2) Development of fodder production. Cultivation industry should transfer from traditional binary structure (grains and cash crops) to ternary structure (grains, cash crops and fodder crops) to increase the proportion of fodder planting area. The fodder processing industry should be reformed to increase the recovery rate of fodder and the efforts shall be made to increase the yield of meat, egg and milk per concentrated feed unit. 3) Gradually raising the sale price of agricultural products and increasing market regulation range. This measure can decrease the government's food subsidies for urban residents and restrain their excessive demands of grain and other agricultural products so as to relieve the pressure on food supply.

III. THE INTEGRATED DEVELOPMENT AND EXPERIMENT OF TYPICAL REGIONS

1. The Integrated Control of Soil Erosion of the Loess Plateau

The Loess Plateau is the cradle of the Chinese nation and the origin of agriculture with a long history of land utilization. It is located in the middle reaches of the Huanghe River, covering an area of 620,000 square kilometres. For many years, human activities like the irrational use of the land, the damage of forests, wasteland reclamation and cultivation on steep slopes have led to serious soil erosion of the area, affecting a total of 450,000 square kilometres with the annual soil erosion as high as 2,000–20,000 tons per square kilometre. And the ecological environment has been deteriorating, soil fertility decreased and natural disasters become more frequent, hence the development of production has been very slow. Moreover, the silt content of the Huanghe River increased and the river bed lifted year by year, which have caused serious flood threat. Therefore, for several decades, the Loess Plateau has been a key region where efforts have been made in regard to the land use management and control.

For several decades, large scale survey and integrated control experiments have been conducted in the area, which include mainly: (1) planning of the land use, adjustment of the land use structure, retreating from steep slope cultivation and recovering the vegetation

through the investigation of slope resources and the evaluation of land suitability; (2) mass plantation of trees and grass, with grass and shrub preceding others and with grass plantation as the main effort, which has the advantage of less investment and quick returns; (3) taking the small river reaches as the basic unit, to conduct centralized and integrated control. To conduct an integrated control of ridges, slopes and gullies by planting trees and grass along the ridge and steep slopes, with terraced fields along the gentle slope, and with sectional arresters at the bottom of the gullies to guide the floods.

The following results have been achieved by the above-mentioned efforts:

- 1) Basic demand for food and clothing of the area has been met; with per capita grain reaching 330 kg / year and per capita income over 200 yuan / year.
- 2) One quarter of the land affected by soil erosion are now under control.
- 3) Since 1980, the silt discharge to the Huanghe River has been decreased by 200 million tons per year, taking up 16% of the total silt discharge.
- 4) A rational control policy is taking shape, which considers both economic and ecological benefits, with rational land use as the basis, combined with biological, engineering and cultivation measures.

2. Land Improvement and Integrated Control of the Huang-Huai-Hai Plain

The Huang-Huai-Hai Plain is a vast stretch of land located in the lower reaches of the Huanghe, Huaihe and Haihe rivers. The total area amounts to 350,000 square kilometres, with rich land resources and arable land totalling 20% of the country's total. However, the agricultural output and the development of the rural economy is rather slow because of drought, flood and saline-alkali soil. Nevertheless, the potential for development is evident due to the temperate climate and easy transport there. Therefore, the area is the key region for agricultural development and land improvement and utilization. During the Seventh Five Year Plan Period, 12 experimental areas for integrated control were established, which were mainly targeted for the integrated control of the low-and middle-yield land and its rational use and improvement. The following measures had been taken:

- 1) Developing water-saving agricultural techniques including water-saving irrigation techniques, cultivation measures and growing of drought-resistant varieties.
- 2) Improving saline-alkali soil by combining well-irrigation with ditch-irrigation, irrigation with drainage, and engineering approach with cultivation methods.
- 3) Rational application of fertilizer-increasing the utilization rate of nitrogenous fertilizer through improving soil properties, apply more phosphate fertilizer and apply trace elements according to actual soil conditions.
- 4) Practise interplanting of potato, sweet potato and wheat, which in effect raised the output and quality, and consumed less labor and water. This turned out to be an optimum model of agricultural three-dimensional structure.

5) The optimum intercropping structure of agroforestry—wheat fields are surrounded by paulownia trees. The experiment resulted in an net annual increase of timber of 24–36 cubic metres per hectare as well as an increase of wheat output by 1.5–8.2%. Hence, the land use rate is increased.

Years of efforts have brought forth good results. More than 60% of the saline–alkali land is now under control. In 1990, the grain yield reached 9750 kg/ ha and the per capita income reached 837 yuan in the experimental region, which are respectively 2.4 and 1.8 times as much as those in 1985. The cotton production had increased from less than 900 kg/ ha in 1985 to 1170 kg/ ha in 1990. The forest coverage had reached 14–20%. The ratio of animal husbandry had increased from less than 5% in 1985 to 8.5–12% in 1989. Both the land use rate and production rate have increased and soil nutrition has also been improved. At present, the experience obtained from those experimental regions are being disseminated to other regions.

3. The Integrated Development of the Red Soil Hilly Land in Southeast China

The red soil hilly land of the southeast part of China covers an area of 450,000 square kilometres. There is a high potential for biological production and good investment returns because of warm climate, rich natural resources, fast biological growth and short cycle of production. However, these potential have not been fully tapped due to the irrational development and inappropriate utilization. And the forest coverage has dropped drastically, resulting in the deforestation over one quarter of the hilly land, most red soil hilly land uncultivated, serious soil erosion and frequent drought and flood. A strategy for an integrated control development has been formulated through years of investigation and site experiment. The strategy includes:

1) By dint of the abundant natural resources in the locality, to develop varieties of tropical and subtropical economic crops, trees and fruits.

2) To establish China's largest timber production base of fast growing trees. The felling cycle is only 20 years for China fir.

3) To establish a production base with a whole streamline of subtropical forestry, grassland, livestock and poultry. An ideal structure is to grow trees and grass in the uncanopied young growth area, where the grass could be used as fodder for livestock. This kind of optimum land use is good for better income and water conservancy.

4) To build ponds and reservoirs based on the local topographical features so as to develop small-scale aquatic product industry.

5) To reclaim more agricultural fields in gently hilly regions.

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