

Review Sustainable Development in China (2008)

—Agriculture, Rural Development, Land, Drought and Desertification

**The Office of the Leading Group for Promoting the Sustainable Development
Strategy, P.R.China**

April, 2008

Foreword

The 16th Session of the Commission on Sustainable Development of the United Nations will be held on May 5-6 2008 at the Headquarters of the United Nations in New York. It will review the implementation of six major thematic issues: agriculture, rural development, land, drought, desertification and Africa, and follow up with the progress on water and sanitary. At the request of the CSD session, Chinese Government has prepared *the Review of China's Sustainable Development Strategy (2008) – agriculture, rural development, land, drought and desertification* and *the National Report on Sustainable Development of the People's Republic of China*, as official documents to the Session.

The National Development and Reform Commission, the host agency of the Office of the National Leading Group for the Promotion of Sustainable Development, took the lead in preparing the report, which was jointly drafted by Ministry of Foreign Affairs, Ministry of Science and Technology, Ministry of Finance, Ministry of Land and Resources, Ministry of Environmental Protection, Ministry of Water Resources, Ministry of Agriculture, State Administration of Forestry, the State Council Leading Group Office of Poverty Alleviation and Development, China Meteorological Administration and other relevant departments. The report is presented in the name of the Office of the National Leading Group for the Promotion of Sustainable Development.

The report focuses on the latest development in agriculture, rural development, land, drought and desertification, in the process of China's implementation of sustainable development in recent years. It also identifies the obstacles and challenges and proposes on future countermeasures. The report consists of ten chapters covering food security and food safety, agricultural industrialized operations, quality, safety and competitiveness of agricultural products, building a new socialist countryside, poverty reduction in rural areas, development of township and village enterprises, protection of rural ecological environment, land resources management, response to the impact of drought and desertification control. Each chapter is elaborated under six parts, namely goals and tasks, latest development, means of implementation, obstacles and challenges, countermeasures and case study.

The Office of the Leading Group for Promoting
the Sustainable Development Strategy, P.R.China
(Department of Regional Economy National Development and Reform Commission)
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Abstract

China is a developing country with 1.3 billion population and faces many problems and difficulties such as vulnerable agricultural foundation, shortage of farmland and water resources, severe desertification in dry-land areas, heavy pressure on eco-system and the prolonged problem of absolute poverty in some areas. The Government of China has unswervingly given priority to issues related to agriculture, rural areas and farmers since reform and opening up and issued a series of policies in support of agriculture and farmers. Tangible benefits have been shared by hundreds of millions of farmers, the overall agricultural productivity has been continuously improved and tremendous achievements have been made in agricultural and rural development. China successfully feeds 21% of the world population by only 9% of the world farmland, thus making great contribution to world food security.

I. Achievements

1. Steadily increased production of grain and other major farm products with progressively improved structure

The total grain output went up from 430.7 million tons in 2003 to 501.5 million tons in 2007, satisfying domestic grain consumption by and large. The total meat production in 2007 was 68.31 million tons, dairy products 35.1 million tons, eggs 25.26 million tons and aquatic products 47.37 million tons, safeguarding effective supply of food to domestic market. The mix of agricultural production has been continuously improved. The proportion of crop farming was 52.3% in 2006, decreasing by 2.2 percentage points when compared to data in 2002 while the share of forestry and animal farming was up by 0.1 and 2.2 percentage points to 3.9% and 33.1% respectively. Efforts have been made to consolidate regional distribution of crop production with competitive advantages. In 2006, the acreage of competitive products such as rice, wheat, maize and soybean amounted to 97.9%, 88.3%, 63% and 52.4% of the national total respectively.

2. Increasingly improved quality and safety of agricultural products with substantially upgraded competitiveness

The current compliance rate of pesticide residue in vegetables is above 93% and the compliance rate of major inspection indicators for animal and aquatic products has been maintained at above 97% for more than 4 consecutive years. We have progressively improved the quality inspection system for agricultural products and established the standard system for agriculture which is dominated by national and

sectoral standards, supported by local standards and complemented by enterprise standards. Efforts have been made to establish more than 800 national standards on agriculture, 2,235 sectoral standards and more than 8,000 local standards. The standardized production and the establishment of quality inspection system has raised the quality of agricultural products and greatly improved the international competitiveness of China's farm products. In 2006, the total export value of China's agricultural products went up to 31.415 billion US dollars.

3. Rapid progress of agricultural industrialization and the ever-expanding farmers' specialized cooperative organizations

We have initially set up the legal and institutional system for the establishment and development of farmers' specialized cooperatives and gradually improved the benefit-sharing mechanism for agricultural industrialization. The operation of cross-regional industrialization has taken shape and played an increasingly important role in leading the development of modern agriculture. Compared to data in 2005, there were altogether 154,800 organizations engaged in agricultural industrialization in the country by the end of 2006, up by 14.1%, with the participation of 90.98 million farming households, up by 4.3%. Each engaged farming household increased the income by 1,486 yuan in average, with a year-on-year increase of 11.2%. There are now more than 150 thousand farmers' specialized cooperatives nationwide with 38.78 million members, among which 34.86 million are farmer members.

4. Rapid development of non-farm industries in rural areas with steady progress of industrialization and urbanization

With regard to the added value of rural areas in 2006, the proportion of the primary industry was 29.6%, down by 0.9 percentage points as compared with that in 2002 while the share of the secondary industry was 54.8%, up by 1.9 percentage points. In 2006, the total business income of township and village enterprises was 24.681 trillion yuan, 90.2% higher than that in 2002 while the total profit was 1.4735 trillion yuan, 95.0% higher than that in 2002. Agricultural processing industry has become an important and distinctive industry for township and village enterprises. In 2006, the total added value created by large-scale township and village enterprises for agricultural processing came up to 956.4 billion yuan, with a year-on-year increase of 16.75%. The development of non-farm industries, especially township and village enterprises, has facilitated the process of industrialization and urbanization. In 2006, the total employees working with township and village enterprises nationwide came up to 146.8 million, which was 30.5% of the total rural labors in the country. The industrialization in rural areas has given an impetus to the urbanization process in rural areas, which was increased from 39.1% in 2002 to 43.9% in 2006.

5. Rapid growth of farmers' income with substantially improved life quality of farmers

Farmers' per capita net income came up to 3,587 yuan in 2006, an increase of 7.4% in real terms after allowing for price factors. This figure reached 4,140 yuan, an increase of 9.5% in real terms and the growth rate of farmers' income has been well above 6% for 4 years in a row. The per capita living expenses for rural residents increased from 1,834 yuan in 2002 to 2,829 yuan in 2006 and the consumption structure of rural residents keeps upgrading, which is reflected in the following aspects: first, the consumption structure of rural residents has been increasingly improved with the Engle's coefficient decreasing from 46.2% in 2002 to 43.0% in 2006; secondly, development-oriented expenditure has increased rapidly and the expenditure on culture, education and recreation, medical care as well as transportation and communication for rural residents went up to 305 yuan, 192 yuan and 289 yuan, increasing by 45.2%, 84.6% and 124.0% respectively; thirdly, rural households have accelerated access to communication equipment. Almost all the rural households have access to radio and TV and the share of rural households having consumer durables including refrigerators goes up steadily. The popularization rate of communication equipment, such as telephone set, mobile phone and computers, has picked up speed in rural areas.

6. Continuously strengthened rural infrastructure with substantially improved production and living conditions

The total mileage of highway in rural areas came up to 3.02 million km in 2006. 98.27% of towns and 60.39% of administrative villages in the country have access to highway made of tarmac or cement. In 2007, 423 thousand km of rural highway was newly built or renovated. In 2006, all counties nationwide had access to electricity and the proportion of towns, villages and households having access to electricity went up to 99.9%, 99.8% and 99.4% respectively. In 2007, the level of mechanized tillage, planting and harvesting was up to 41%. By the end of 2006, through the national integrated development program of agriculture, 496.376 million mu of low-yielding land has been transformed into high-standard farmland with high and stable yields despite drought or excessive rain. The total number of bio-gas digesters for rural households was 22 million at the end of 2006 and 5,000 large and medium-sized bio-gas engineering projects in commercial animal and poultry farms. Efforts have been made to accelerate the work relate to rural drinking water safety. From 2000 to 2007, the number of rural population suffering from inadequate and/or unsafe drinking water fell from 379 million to 252 million.

7. Continuously reduced rural poverty with accelerated development of social programs

Poverty reduction in rural areas in China has made encouraging progress. From 2000 to 2007, the rural population in absolute poverty dropped from 32.09 million to 14.79 million, a decrease of 17.3 million or 53.9%; and the rural low-income population dropped from 62.13 million to 28.41 million, a decrease of 33.72 million or 54.3%. In key counties for the national development-oriented poverty reduction, the rural net income per capita increased from 1,277 yuan to 2,200 yuan. The social programs continued to be developed and the low birth rate remained stable. In 2007, compulsory education was made available to all rural students, 34.519 million rural residents were covered by the system of basic cost of living allowance, the rural three-level health care system was improved markedly, the infant mortality rate and the maternal mortality rate fell sharply, and the new type of rural cooperative medical care system was expanded to 86% of the total counties with coverage of 730 million farmers.

8. Attention paid to rural environmental protection and initial progress made in environmental improvement

In recent years, the system of relevant laws, regulations and standards on rural environmental protection in China has been gradually improved. A great number of rural township and village enterprises causing serious pollution and not complying with industrial policies have been closed or suspended and the regulation on safe use of pesticides and fertilizers strengthened. Efforts have been made to implement the program of developing eco-friendly production practices and lifestyle to increase farmers' income and improve their living conditions, the trial and demonstration on clean countryside and the demonstration on control of pollution from livestock and poultry farming in key river basins and areas. The investigation on nationwide soil pollution and sources of agricultural pollution were launched for the first time. An agricultural and rural environment management and technical service system has been established at the national, provincial, municipal and county levels by setting up an agricultural and rural environment management and technical service network composed of one national agricultural environment monitoring station, 34 provincial stations and more than 800 county stations. By the end of 2007, 320 counties or areas won the title of National-level Ecosystem Demonstration Area and 425 towns attained the title of Towns with Finest Environment at the National Level.

9. Improved capacity for drought-preparedness with remarkable achievement in desertification control

In 2007, the irrigation area against drought reached 27 million ha, the loss of grain production was reduced by over 45 billion kg and the temporary difficulty in drinking water supply for over 31 million urban and rural residents was mitigated. By the end

of 2007, the national-level pilot areas for the program of building a water-efficient society increased to 42 and the provincial-level ones over 100. The water consumption per 10,000 yuan of GDP and the water consumption per 10,000 yuan added value from industry decreased by 7.6% and 8.9% respectively in 2006 over 2005. The work on drought monitoring and early warning, impact evaluation and information release was further enhanced. The monitoring and early warning against drought in agriculture played a positive role in ensuring successful agricultural production and yielded good results. In recent years, the control of water and soil erosion has been constantly accelerated and remarkable results have been achieved in desertification control. The trend of water and soil erosion caused by human activities has been effectively contained. The trend of desertification expansion has been preliminarily curbed. The total land area under desertification has witnessed a net reduction, changing from expanding by nearly 10,000 km² annually at the end of the last century to reducing by 7,585 km² annually at present.

II. Approaches

1. Establishing a comprehensive system of laws and regulations

In recent years, a number of laws have been successively issued, including the Law on Rural Land Contracting, the Law on Promotion of Agricultural Mechanization, the Law on Animal Husbandry, the Law on Quality and Safety of Agricultural Products, the Law on Specialized Farmer Cooperatives and the Law on Prevention and Control of Desertification. A number of laws have been amended, including the Agriculture Law, the Seed Law, the Grassland Law, the Forest Law, the Water Law, the Law on Water Pollution Prevention and Control, the Law on Water and Soil Conservation, the Fisheries Law and the Law on Land Management; meanwhile, a number of regulations have been formulated, including the Regulations on Management of Water Abstraction Licensing and Levy of Water Resources Charges, the Methods for Management of the License for Rural Land Contracting Operation Right and the Methods for Management of Land Reserve.

2. Formulating scientific development plans

Proper and feasible medium and long-term plans are the important instruments for agricultural and rural development. On the basis of the national agricultural and rural economic development plan, the Chinese government formulated the grain production plan and the five-year development plan involving crop production, animal production, feed, animal health, fisheries and some other sectors respectively. According to the development needs, it worked out the development plans for specialized programs in the field of improved varieties for crop production, crop protection, animal disease control, biogas and rural ecosystem protection. It also set

down the National Plan for Rural Safe Drinking Water Project during the 11th Five-Year Plan Period, the Plan for Building a Water-efficient Society during the 11th Five-Year Plan Period and the National Plan for Desertification Prevention and Control. It revised the National Program for Overall Land Use Planning, set the total area of the newly increased land for non-agricultural purposes during the period under this Program, capped the area of farmland occupied for non-agricultural purposes and made scientific and reasonable arrangements of land use for non-agricultural purposes, which effectively protected the farmland resources.

3. Improving policy system to strengthen and benefit agriculture

Firstly, in response to mobilizing farmers' initiatives and realizing stable development of agriculture, policies to directly benefit agriculture were unveiled including the abolishing of agricultural tax, livestock tax and taxes on special agricultural products, and direct subsidies for grain producers, subsidies for quality crop varieties, subsidies for the purchase of agricultural machinery and tools, and general subsidies for agricultural production supplies. Compared with pre-reform taxes and administrative charges, the total financial burden on farmers was reduced by 125 billion yuan, with reduced amount of some 140 yuan per capita. In 2007, the total amount of the four subsidies reached 51.36 billion yuan, of which 27.60 billion yuan went to agricultural production supplies, 2 billion yuan to purchase of agricultural machinery and tools, 6.66 billion yuan to quality crop varieties, and 15.10 billion yuan to grain producers nationwide. Secondly, policies were adopted to regulate the minimum purchase prices for major grains; support policies to accelerate production of pig, dairy and oil seeds; and policies were reinforced to provide incentives to major grain-producing counties and subsidies to counties and townships with serious financial difficulties. And thirdly, policies were issued to support the development of agricultural and rural infrastructure, and improved policies to promote rural social programs.

4. Facilitating rural restructuring and institutional reform

Firstly, adhere to the rural contracted responsibility system. We have upheld the basic system for rural operations that is characterized by the household-based contract system as well as the system for unified management combined with independent management; and improved the market for transferring land contract and management rights in accordance with the law and on a voluntary and compensatory basis. Secondly, continue to deepen reform the system for grain purchase and marketing. We have lifted control of grain purchase and sale as well as grain prices; instituted the minimum purchase prices for major grains; opened the "green passage" for fresh agricultural products; gradually developed distribution network for rural areas in which the purchase and sale of grain are market based and multiple operators are

dominant. By doing so, we have protected the interests of both producers and consumers and stimulated rural economy. Thirdly, carry out trial in reforming the system of collective forest rights in rural areas. We have introduced to most provinces, municipalities and autonomous regions the successful experience obtained in Jiangxi and Fujian provinces of “clarifying the property rights, liberalizing operations and standardizing transfer”. Fourthly, actively promote reform of rural banking. A total of 30 provinces, municipalities and autonomous regions have carried out reform of rural credit cooperatives. And 25 joint credit cooperative organizations at provincial level have been put into place, and the access requirements for village/township banks, loan companies and financial mutual cooperative organizations at village-level have been relaxed. And fifthly, we have reformed and improved the system for farmland acquisition, and put into place a mechanism for ensuring long-term development of those farmers whose farmland has been requisitioned.

5. Increasing budgetary funding

From 2005 to 2007, the central government allocated 297.50 billion yuan, 339.70 billion yuan and 431.80 billion yuan, respectively, to the development of agriculture, rural areas and farmers, with an annual average increase of over 20 percent. By the end of 2007, in order to ensure quality and safety of agricultural products, investment was made to build a total of 300 quality inspection centers at state and ministerial levels, 1,780 testing and inspection institutions at provincial, prefecture and county levels. A total of over 10 billion yuan was allocated to protect rural biological system. In 2006, the central government allocated 6 billion yuan and the local governments and rural residents invested over 5.50 billion yuan to provide safe drinking water for 28.97 million rural population. In 2007, the central government allocated 6.40 billion plus 6.636 billion yuan from local governments and rural residents to provide safe drinking water for 31.52 million rural residents.

6. Reinforcing the support from science, technology and education

Firstly, we have strengthened the development of innovation systems for agricultural science and technology, and increased input into agricultural research by a big margin. Secondly, we have actively promoted introduction of agricultural technical know-how to farm households, and set up networks for disseminating technical know-how by taking technical advisers as the links and demonstration households as the core to link other farm households around. We have reinforced the development of agricultural extension systems at grass-root levels; improved mechanisms to ensure expenditures for functions for public welfare; bettered conditions for extension work and improved quality of extension workers; and promoted integration of agricultural education with research. Thirdly, 3.5 billion yuan of central budgetary funding has been allocated to build 1482 county vocational centers and demonstration vocational schools to

strengthen capability of rural vocational education basis. Fourthly, we have carried out the second national survey of land resources and the surveillance by remote sensing of land resources; implemented the Golden Land Project; and promoted the development of IT application in land resources. Fifthly, we have prepared the comprehensive planning of water resources nationwide, and increased the capability of regulating water resources. Sixthly, we have set up nearly 30 experimental bases for water-saving dry-land farming and field observation stations; established a number of laboratories for water, soil and fertility testing; and built more than 600 points for monitoring soil moisture and droughts. And seventhly, we have developed nearly 40 comprehensive demonstration areas for preventing and controlling desertification; and popularized over 100 sets of such technical models on the basis of summarizing experience.

7. Enhance conservation of farming resources and rural ecology

a). Enforce a stringent arable land conservation system, put construction-use arable land under strict scrutiny, press for field restoration and reclamation, and establish targeted arable land responsibility mechanisms. B). Strengthen protection of public drinking water resources in rural areas, control industrial and mining pollution, promote integrated use of livestock wastes, enhance environment protection in aquatics practices, intensify rubbish collection and treatment as well as household sewage treatment, promote organic farming and eco-farming, and conduct non-point pollution control trials in selective areas. c). Explore eco-payment mechanisms in accordance with the principle of ‘He who utilizes protects; he who damages restores; he who benefits pays’.

8. Strengthen drought and desertification control

The Notice on Strengthening Drought Combating Efforts was released, which put forward goals and tasks, and mapped out steps for combating droughts in the near future. The Decision on Strengthening Desertification Prevention and Control Efforts was implemented, which guided desertification control in the new era. The responsibility documents were signed between the Central Government and desertification-stricken provinces to ensure objectives achieved in control desertification for the 11th five-year-plan period. Since 1994, three rounds of desertification monitoring were conducted with success at a frequency of once in five years. A Central-Government-led investment mechanism was applied in desertification control programmes, including implementing key ecological programmes such as Jing-Jin Wind and Sand Sources Control Programme, Three-North Wind Break Forests Development Programme, Grain for Green and Graze-stopping for Grass-recovering Programmes, Natural Forest Protection Programme, Soil and Water Conservancy Programme in Loess Plateau etc. The

National Plan of Action for Combating Desertification was drafted and implemented based on UN Convention on Combating Desertification. Drought surveillance network was improved, which now consists over 1000 soil and moisture surveillance stations. The national standard of Meteorological Drought Categories was enacted, based on which monitoring and early warning mechanism for possible droughts in farming was put to place to release information about drought through the metrology channel.

9. Raise awareness and intensify training

All possible ways have been explored to disseminate encouraging achievements, outcomes and experience about agriculture, rural development, land use, and drought and desertification combating in order to attract more and more actors to contribute to the development. a. The programme of Farming Technology to Households was implemented by which 250,000 households for technological demonstration were cultivated nationwide who leveraged about 5 million other households in applying modern farming technologies. b. The Sunshine Programme was invested by central and local governments which targeted at the vocational training of rural labors to help them seek off-land jobs. From 2006 to 2007, the Central budget earmarked about RMB 1.5 billion in this regard, which helped to train about 8.8 million rural labors and over 85% of them became employed. c. Efforts have been made to raise awareness about desertification detriments, its prevention and control and ecological conservation to raise the initiatives and mindsets of people, especially those in desertification areas. Those agencies or individuals who have been outstanding in combating desertification were praised and awarded.

III. Challenges

1. Agriculture, as the foundation of the economy, is still weak

Agriculture is faced with increasing intensified constraints from resources and the environment as it develops, for the sharp contradiction of a huge population and limited land will prolong, the tendency of arable land depletion, fresh water shortage and population growth will not change in the near future, while cases of extreme natural disasters are increasing. In general, agricultural productivity is not high, vertical integration and agribusiness management capacity is low, physical and technical equipment is limited and disaster preparedness in agriculture is weak, which make it lagging behind the needs in accommodating the sustained fast growth of social and economic growth.

2. Difficulties mount in ensuring food security and supply-demand balance of major agri-products

Good harvest for four straight years though, grain production only maintains a recovery growth, and will meet increased difficulties to achieve the continual rise of output. Pressure will mount in ensuring food security. Agriculture is faced with new issues to address as there are not only needs to ensure supply in terms of volume but also needs to upgrade the production mix to ensure supply in terms of types, given the rise of consumption level such as the demand for diversified and quality products.

3. The task of sustaining farmers' income rise remains arduous

There are more and more farmers seeking off-farm employment, however, there is no fundamental change in the surplus of labor. The low comparative value of agriculture, few job opportunity and other difficulties are hampering factors over farmers' income rise, thus the possibility of a fast widening urban-rural income disparity. How to achieve and sustain farmers' rapid income rise in the following years to narrow the gap is one of the most difficult issues in three agriculture-related issues.

4. The task in improving rural infrastructure and public service remains daunting

Rural infrastructure and public service, though better now, still can't meet the needs in developing a socialist countryside, and remains far behind those in cities. How to speed up its development to gradually achieve coordination between rural and urban areas is a big and demanding issue affecting farmer welfare and modernization of China at large.

5. Rural pollution remains alarming

It is important task for the country to build rural infrastructure, transform farm production practices, improve environmental sanitation, deal with pollutions, and safeguard public health, in order to develop agriculture and rural economy in the new era. At present, the countryside is still faced with many problems to address, such as unsafe drinking water, insufficient reuse of domestic waste, wastewater and crop stalks, expanding animal waste pollution, as well as non-point pollution due to chemicals, pesticide and agricultural film.

6. Drought combating is challenging

With global warming in the recent years, drought disasters have occurred in a more frequently manner, exerting more severe impact on industrial and agricultural production, drinking water quality and on eco-environment, and thus bringing more losses. In that context, drought relief is expecting increasingly challenging situation

and tougher tasks.

7. The task to fight against desertification is heavy

Desertification hits large area of the Chinese land, bringing serious impact. Given the current economic strength, China is faced with mounting challenges in controlling desertification. First, inappropriate human conducts make desertification a still protruding issue, being reflected in excessive use of ecological resources, chaotic grazing and land reclamation, abusive use of water resources, to name a few; second, insufficient spending in desertification control exacerbates the alarming situation; third, policy mechanism for desertification control is yet to be fully effective; fourth, climate change brings more challenges to the control tasks.

IV. Countermeasures

1. Protect arable land and water resources

The country will further strengthen land management and protection, promote efficient use of land, transform economic growth mode; strictly control total use of land for construction purposes, improve coordinated planning and policy guidance for land use, effectively control land use and guide sustainable use of land resources; apply stringent farmland protection system, to ensure that grain-growing land area will be no smaller than 103.33 million ha by 2010; establish monitoring and early-warning system on farmland quality and quantify, firmly curb abusive use of farmland; enhance protection of water resources, prevent non-point pollution of agriculture; harmonize water demand by socio-economic development and by eco-environment protection, enhance integrated management of water resources, satisfy water demands from agriculture; build water-conserving society, facilitate irrigation for farmland, develop water-saving irrigation, speed up irrigation district renovation and supporting canal system construction; effectively renovate and upgrade large and medium sided drainage pump stations, build water conservation system for comprehensive agricultural development, enhance capacity in comprehensive agricultural production, disaster resistance and alleviation, and make efficient use of water resources.

2. Enhance food production capacity

a). Firmly stabilize the area sown to grain, guide the farmers to arrange an appropriate cropping structure, and raise the multiple crop indices. b). Make intensive efforts to increase the per unit yield of grain; strengthen agricultural comprehensive development, improvement of medium and low-yield farms and development of standard grain fields; strengthen the construction of farmland water conservancy

infrastructures; popularize improved varieties; extend advanced and applicable technologies; and improve production management. c). Vigorously promote agricultural mechanization. Further implement the policy on subsidies for purchase of agricultural machinery; and intensify research on and application of advanced agricultural machinery and related technologies. d). Transform animal farming models, and promote healthy animal farming and aquaculture. e). Strengthen efforts on agricultural standardization as well as quality and safety of agri-products to improve the quality and safety of agricultural products. f). Accelerate scientific research, and improve agricultural technology extension system.

3. Establish a long-term mechanism to increase farmers' income

a. Give full play to the market in resource distribution in agricultural production; take into account the interests of both producers and consumers, and use economic leverage to maintain the prices of agri-products at reasonable levels. b. Continue to strengthen policies to support agriculture and benefit farmers, and protect and enhance farmers' incentives for production under the frame work of WTO and following the principle of 'being suitable to national conditions, having long-term perspective, increasing step by step, and improving mechanism'. c. Further stabilize the prices of agricultural inputs, prevent the decrease of grain production and the too rapid increase of production cost of animal industry, and reduce the cost of factors of production through scientific and technological progress. d. Actively promote the development of township enterprises as well as the second and tertiary industries in rural areas. Encourage the deep and refined processing of agri-products, guide the transfer of rural laborers, and expand ways to increase farmers' income. e. Make intensive efforts to develop new farmers, and increase their capacity both in agricultural production and in increasing their income by taking up other jobs.

4. Promote healthy agribusiness growth

a). Continue to optimize the regionalization for different agri-products, assist the development of a number of leading enterprises that have great potential for future growth and can yield significant influence to farmers around. b). Encourage the leading enterprises to form stable the production and marketing relationship with farmers, and establish a mechanism that closely link the interest of farmers with the interests of the enterprises through a number of forms including contract farming, establishment of risk foundations, returning profit to farmers, shareholding by farmers and so forth. c). Provide strong support to farmers' cooperation organizations like farmers' cooperatives and farmers' associations, and enable them to play a full role in protecting farmers' rights and providing farmers with various services.

5. Step up the development of rural infrastructure and rural social service

Efforts will continue to be made to improve rural infrastructure, to speed up implementation of rural drinking water safety projects, to drive rural electrification and improvement of rural power grid, to enhance rural road construction, maintenance and management, to foster water and soil conservation and ecological projects. New impetus should be provided to improve village governance, to tame and control rivers and watersheds and to improve rural habitat environment. Equality in basic public service in urban and rural areas should be further promoted through enhancing the delivery of rural public goods. We shall continue to proceed in institutional reforms on fund provision for rural compulsory education and to spread and solidify rural compulsory education. New rural cooperative medicare systems and assistance mechanisms should be perfected to nurture service capacity of rural public healthcare and basic medicare. System of rural minimum living standard should be amended, carrying on pilot programme of rural pension arrangements and intensifying efforts on the improvement of rural social security systems. Rural public service in culture-related activities should be strengthened to meet farmers' cultural needs.

6、 Enhance protection of rural ecological environment

Efforts should be made to promote energy saving and emission reduction in rural areas. With fertilizer saving, pesticide saving, water saving and energy saving as the starting points, rural energy saving and emission reduction techniques such as utilization of straws and saving of major agricultural inputs should be actively extended to raise use efficiency. Farmers should be guided to make rational use of pesticides, fertilizers and film, avoiding non-point agricultural pollution. Household bio-gas should be extended in the rural areas and bio-gas projects should be promoted in animal farming communities and scale animal farms. Rural wastes and agricultural by-product resources should be recycled and treated and cycle agriculture be promoted.

7、 Capacity building in drought control and mitigation

Firstly, proper planning and projects to control drought shall be made ready to strengthen infrastructure. Emergency water sources shall be established, management and protection of drought control facilities and water sources reinforced and investment in drought control increased. Secondly, it is important to raise the capacity of land in resisting drought and keeping soil moisture and to promote improvement of medium- and low-yield land and land restoration and development. Thirdly, water saving mechanisms and arrangements shall be improved, with special attention given to water saving by certain sectors. Fourthly, legal system for drought control should be established. The Regulations on Drought Control should be promulgated in a

timely manner, with detailed rules and measures in place. Emergency response schemes for drought control should be promoted, developing and revising various schemes at different levels so as to establish a multilayer emergency response system. Fifthly, technological levels of drought control should be heightened, fostering service and organizational capacity in drought fighting and drought communications.

8、 Reinforce efforts to combat desertification

Law enforcement should be strengthened, based on the principle of ‘prevention first and law-based control’, to combat desertification and to explore control mechanisms best suited to China’s circumstances and consistent with the laws of market economy, in a bid to improve ecological compensation mechanism. More funds are to be invested to accelerate desertification control projects. Public awareness is to be raised on combating desertification and technological supports enhanced. Importance should be attached to the training and extension of practical techniques. Ecological improvement shall be combined with sector development, in order to help farmers and herdsmen generate income. Surveillance and early warning should be arranged and monitoring systems and capacities be perfected.

9、 Active engagement in international exchange and cooperation

Advanced international technologies and management know-hows shall be actively introduced and digested to raise the technological levels of sustainable development in agriculture and rural resources management. Exchange and cooperation shall be conducted with international certificating agencies for agricultural products and compliance with the United Nations Convention to Combat Desertification shall be pursued. We will appeal to the international community to create a desirable international economic environment, to understand the difficulties and reasonable requests of the developing countries and to provide substantial assistance according to their priorities. The developed countries should take the lead in changing unsustainable consumption and production patterns and fulfill their responsibility and pledges to provide effective and concrete assistance to developing countries in terms of financial support, technology transfer and capacity building.

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Chapter 1 Food Security and Food Safety

I. Objectives and Tasks

Grains and foods are special commodities with strategic significance and have a bearing on our national economy and people's livelihood. Food security and food safety are not only the foundation for our national economic development, but also an important component of our national safety strategy. *The World Summit on Sustainable Development Plan of Implementation* held in 2002 put forward the Millennium Development Goals of halving the proportion of the world's poor and hungry people by 2015; the Chinese government attaches great importance to it and brought forward the requirements of ensuring basic self-sufficiency of grain, stabilizing grain production and ensuring food security. During the Eleventh Five Year Plan period (2006-2010), the overall goal for the development of major grains and foods in China: the comprehensive grain production capacity reaches 500 million tons, with an annual growth rate of 0.65%. The production of meat, eggs, milk and aquatic products has also enjoyed steady growth.

II. Latest Development

(a) The output of grains and major foods grows continuously. China's grain output reached 497.48 million tons in 2006 and 501.5 million tons in 2007, and the grain comprehensive production capacity becomes stronger and stronger. In 2007, the meat production totaled 68.31 million tons, dairy products 35.10 million tons, poultry eggs 25.26 million tons, domestic demands are satisfied. Fishery production developed steadily, with a total production of 47.37 million tons in 2007. In general, grains and major foods are increasing their quantity and diversifying their varieties, and food security and safety is basically ensured.

(b) Agricultural structure and regional layout were optimized. In 2003, the Ministry of Agriculture (MOA) formulated and implemented *Plan for the Regional Layout of Competitive Agricultural Products (2003-2007)*. The plan identified 11 competitive agricultural products including grains and major foods that will be given a head start and competitive regional layout¹. With 5 years efforts, special structure, variety mix and quality structure were improved, the competitive industrial belts (areas) upgrade their scale and professional level, with their operation more market-oriented and industrialized. In 2006, the competitive areas sowed to rice, wheat, corn and soybean make up for 97.9%, 88.3%, 63%, and 52.4% of the total area sowed to this specific

¹ 11 categories of high quality products: wheat and maize of specific end-use, high-oil soybean, cotton, double-low rapeseed, high-yield and high-sucrose sugarcane, citrus, apple, beef cattle, mutton sheep, milk and aquatic products.

variety. Pork from the 13 major live pig producing provinces accounts for 76.8% of the country's total, beef from the beef cattle industrial belts in 8 provinces and autonomous regions 66.3%, mutton from mutton sheep industrial belts in 14 provinces and autonomous regions 80.5%, milk from the 7 major dairy product provinces 62.2%. Southeastern coastal areas, the Yellow sea and the Bohai sea and the middle and lower reaches of Yangtze River are the production areas of export-oriented aquatic products. The production of 6 competitive aquatic products, i.e. eel, prawn, crab, tilapia, marine mollusk and large yellow croaker totaled 7.234 million tons, 50.8% of total aquatic products, among which, the production of prawn, large yellow croaker, tilapia and eel are 80% of the total product. The building of competitive agricultural products production belts can play a crucial role in ensuring the effective supply of major agricultural products, increase farmers' income and strengthen agriculture as the function of national economy.

(c) Agricultural infrastructure construction made headway. To promote grain and food production, Chinese government implemented demonstrations of water-saving alteration and water-saving irrigation for large scale irrigation areas, renovation and alteration of large scale pumping stations in central China, high quality grain industry project, large scale commercial grain bases, basic subsistence farming project in the Grain for Green project area in the west, improved variety and breed project for crop plantation and animal breeding, plant protection project, national animal epidemic prevention and control system and standardized large-scale animal community or farm project. More efforts were made in improved grain variety selection and breeding, major pest and disease prevention and control, building of standardized grain fields, modern agricultural equipment, improved varieties of livestock and aquatic animals and major animal epidemic prevention and control. All these efforts helped to improve production conditions, production efficiency, and capacity to prevent and reduce disasters. With well developed infrastructure, agriculture's foundation is consolidated. In 2006 and 2007, the comprehensive development project upgraded 3.47 million hectare of low and medium-yield farm lands, correspondingly, 2.75 million hectares of irrigation areas were added or improved, 1.06 million hectares of water-logging areas were improved, 1.23 million hectares of farm land and forest protection belts were newly built, 660 thousand hectares of mechanized farming areas were added. Efforts were made to add supporting infrastructure and facilities and build water-saving system for 310 large-scale irrigation areas and 68 medium-scale irrigation areas. Renovation and alteration projects were also conducted for 68 large scale pumping stations in mid-China.

(d) More agricultural scientific and technological innovations coming to the fore. New progress was made in agricultural basic research and high and new tech research; agricultural scientific and technological innovation and integration speed up; joint efforts to tackle major projects and scientific and technological extension were strengthened. Major breakthroughs were made in GM technology, super rice, dwarf male sterile wheat and avian influenza. 48% of agricultural growth can be attributed

to science and technology. In 2006, China successfully launched the first seed breeding satellite 'Practice No.8'; significant breakthrough was made in the research and development of fresh avian influenza vaccine, the areas sowed to super wheat expanded to 4.3 million hectares. Scientific and technological training to farmers and the training of agricultural professionals in the rural areas were strengthened; agricultural IT application shows initial results; education campaign including Green Certification, New Type of Farmers Training program, One Million Junior Professional Students Education program, all these efforts helped to improve farmer capacity to conduct science-based production.

(e) Agricultural policies and systems were gradually improved. Since 2004, the central government released five No.1 documents as the guidance of work related to agriculture and rural development, including *Suggestions on Policies to Increase Farmers' Income*, *Suggestions on Policies to Strengthen Rural Work and Increase the Agricultural Comprehensive Production Capacity*, *Suggestions on the Building of a New Socialist Countryside*, *Suggestions on Developing Modern Agriculture and Pressing Forward the Building of A New Socialist Countryside*, *Suggestions on Strengthening Agricultural Capital Construction*, *Promoting Agricultural Development and Increasing Farmers' Income*. These five documents made overall arrangement for the building of a new socialist countryside. To ensure the continuity and consistency of policies, a series of incentive policies, regulation policies, supporting policies, and fiscal guarantee policies were released to promote agricultural and rural development. These measures helped to boost farmer' enthusiasm and promote the steady increase of grain output.

III. Means of Implementation

(a) Law, regulation and policy guarantee. Strong policy and regulation support and guarantee are the essentials for modern agriculture. *Agriculture Law of the People's Republic of China*, *Law of Animal Epidemic Prevention of the People's Republic of China*, *Fisheries Law of the People's Republic of China*, *Agricultural Products Quality and Safety Law of the People's Republic of China* and the *Farmers Specialized Cooperative Law of the People's Republic of China* were promulgated and implemented, supporting rules, regulations and systems were gradually put in place. *Implementation Guidelines on Promoting Administration according to Law* issued by the Security Council were enforced to safeguard farmers' legitimate rights and interests and improve law-based administration. The central and local governments improved measures to ensure that the policies can be implemented in the earnest and support and strengthen agriculture.

(b) Planning and Implementation. The right and feasible mid to long term plan is an important guarantee of safe supply of grains and foods. In recent years, Chinese government strengthened planning related to grain and food. Based on the national plan on agriculture and rural economic development, the government formulated five

year plan for grain production, crop plantation, livestock industry, animal feeds, veterinary service and fishery; and planning relating to auxiliary and water-saving alteration for large scale irrigation areas, variety and breed improvement, plant protection, animal epidemic prevention were formulated to meet the demand. This body of planning coupled with laws and policies can greatly promote the stable grain and food production and ensure the basic supply of major agricultural products.

(c) Fiscal policy and capital input. In recent years, Chinese government intensified financial support to ensure the safe supply of grain and food. The financial agricultural input from the central government and local governments above the county level increases year on year, the growth rate is higher than that of the current input. Subsidies including direct subsidies for grain-growers, subsidies for improved crop varieties and animal breeds, subsidies for the purchase of agricultural machinery and tools, general subsidies for agricultural production supplies, spot-specific nutrients management, animal epidemic prevention, farmers' training and awards to the major grain producing counties were provided. Agricultural tax, livestock tax, and tax on special agricultural products slaughter tax were rescinded across China. All these policies greatly motivated farmers to engage in grain and food production.

(d) Farmers' organization and agricultural industrialization. In recent years, farmers become more and more organized and agriculture more and more industrialized; agricultural structure is optimized and industrial chain is extended, great efforts were made to promote agro-processing technological innovation and to improve the quality and safety of agricultural products. Various new types of farmers' specialized cooperatives and agricultural products industrial associations spearheaded the fast development of agro-processing, and played an important part in increasing agricultural efficiency, farmers' income and the competitiveness of agricultural products.

(e) Closer cross-sectoral coordination. Acting in accordance with the overall arrangement of the State Council, relevant departments including, agriculture, industry, science and technology, education, finance, taxation work in synergy to strengthen coordination in ensuring the safe supply of grain and food and improve efficiency and returns. With the goal of national stability, social harmony and people's wellbeing in mind, we should follow the principle of industry support agriculture, urban areas support rural areas and giving more to, taking less from and loosening control over farmers, implement policies to support and benefit agriculture in the earnest, thus laying a solid foundation for the upgrading of comprehensive grain productivity and the safe food supply.

(f) The support of science, technology and education. Chinese government set great store by the role of agricultural science, technology and education in national food security and safety, and a range of effective measures were taken. First, strengthen the agricultural science and technology innovation system, increase input in agricultural

research to a large extent, strengthen the innovation capacity building of national bases and regional agricultural research institutes. Two, bring science and technology to rural households, explore effective mechanism and approach to bring science and technology to rural areas. A technology distribution network linking surrounding rural households is taking shape with technological staff as the nexus, the demonstration household as the core. We should strengthen agricultural extension system at the primary level, refine public functionary expenditures guarantee system, improve extension conditions and staff quality, and promote the integration of agriculture, science and education. Three, extend resource-saving agricultural technologies, develop and use various efficient agricultural technologies, improve the utilization rate of agricultural resources and inputs. These measures enhance farms' capacity for science-based production to a large extent.

IV. Obstacles and Challenges

(a) The continuous rigid growth of demand. With population growth, change of urban and rural population structure and people's dietary structure, China's grain demand is growing day by day. Compared with 10 years ago, China's population grew by 90.59 million, the per capita grain availability dropped from 412 kg in 1996 to 378 kg in 2006; the urbanization rate increased by 1.3 percentage points year on year, an accumulation of over 200 million urban population was increased. Especially, with the migration of a large amount of rural laborers, 210 million farmers came and worked in urban areas or the village and township enterprises. A large amount of agricultural product producers were transformed in to pure agricultural products consumers, thus increasing total consumption and commodity demand; Our national economy growth is in a high gear, income level of both urban and rural residents were increased, consumption structure is upgraded, per capita consumption standard is enhanced, demand for grain, meat, eggs, milk, vegetable oil, fruits and vegetables is growing.

(b) More resources constraints. It is China's basic condition to have a big population, less arable lands, and short water supply. With industrialization and urbanization quickening steps, agricultural resources scarcity has become a biggest bottleneck for the development of modern agriculture. Currently, China's per capita arable land is 0.09 hectare, 43% of the world average, and the decreasing trend is irreversible. Water resources are in short supply in China, the per capita availability of fresh water in China is less than 1/3 of the world average, and there is an uneven distribution in different seasons and regions.

(c) Weak infrastructure. The mid-to-high yield land accounts for 30% of the all arable lands in China, there are 80 million hectares of rain-fed land. Nearly 40% of the main structures of 402 large scale irrigation areas are at fault; 51% of the aqueducts and 50% of the structures of 1,505 key medium scale irrigation areas are at fault; and about 75% of the large scale pumping stations are in bad shape. Reconstruction is

urgently in need. The effective irrigation areas of farm land are less than 45%. In 2006, 24.63 hectares of crops were disaster-stricken. Mechanization level in China now is the same as developed countries' level in 1960s or 1970s. In the mean time, the utilization rate of chemical fertilizer and pesticides are low. Non-point agricultural pollution is serious, eco-environment in urban areas are jeopardized to varying extents. All these negatively affect China's food security and safety.

(d) Low comparative returns in grain and food production. Agriculture faces dual risks both from nature and from market. In China, small scale and scattered farming prevail. The low returns dampen the enthusiasm of farmers to expand grain reproduction. Meanwhile, the price of agricultural means of production jumped, and the production cost of crop plantation and animal breeding increase year on year, especially, the rising labor cost and production cost eat into agricultural returns.

V. Countermeasures

(a) Protect arable land and water resources. The *Agriculture Law* states that the most stringent arable land protection system should be put in place to further improve farm land and water conservancy facilities, save water and use water in a highly-efficient way. We should strengthen land use planning limits and land use control. We should curb unauthorized acquisition of land, establish and improve arable land quantity and quality monitoring, pre-warning and reporting system. We should improve pricing system for water used for agricultural purposes. We should guide public sector into the building of farm land water conservancy projects. And subsidy should be provided to farmers who volunteered their time and energy for the building of water conservancy projects and who purchased field water saving facilities.

(b) Increase the comprehensive production capacity of grain and food. We should stabilize grain production so as to ensure the self-sufficiency. First, we should stabilize the area sowed to grain further protect and boost the enthusiasm of farmers to grow grain and guide farmers to have a rational growing structure. We should increase multiple cropping index, plant enough and good grains. Secondly, we should increase the grain yield per unit. We should promote agricultural comprehensive development, enhance the quality of arable land, undergo alteration of large and medium scale irrigation areas and major pumping stations, intensify the construction of small-scale farm land and water conservancy projects, upgrade mid-to-high yield land and standardized grain field. We should extend improved varieties and breeds, popularize major applicable technologies, strengthen production management. Thirdly, strengthen disease and pest and disaster prevention and control, curb the major outbreak and spread of diseases and pests, minimize the damage incurred. Fourthly, we should develop agricultural mechanization. We should further implement subsidies for purchasing of agricultural machinery and tools and strengthen the development and utilization of advanced and applicable agricultural machineries and technologies. We should focus on the whole-process mechanized operation of wheat,

rice, corns and other major crops. We should expand the areas of conservation agriculture. Meanwhile, we should speed up the development of poultry and animal raising and aquatic product cultivation and stabilize the production of live pig, poultry and eggs. We should develop dairy industry, beef cattle, mutton sheep and high quality poultry meat production. We should intensify our efforts to prevent and control major animal epidemic, extend bio-friendly breeding concept and technology and promote the standardized, large-scale and industrialized development of animal raising, and enhance its quality and efficiency.

(c) Protect farmers' enthusiasm. We should develop and implement policies to strengthen and benefit agriculture, enhance policy support so as to protect farmers' enthusiasm to grow grains. Firstly, we should give full play the role of market in allocating resources; reduce administrative intervention into grain and food prices. Secondly, stabilize the price of grains and animal feeds means of production and reduce financial input in production and means of production.

(d) Speed up agricultural innovation and extension. We should further deepen agricultural science and technology system reform. We should do a good job of agricultural basic research and the research and development of key technologies. We should speed up the research of bio-technology, information technology and other high and new technologies and their application and extension in agricultural development. We should speed up the reform and development of agricultural technology, find approaches to manage the public function and operational service separately and improve the socialized service mechanism of agricultural technology extension. We should vigorously develop resource-saving and environmental-friendly circular agriculture, extend and use the technologies that save land, water, chemical fertilizer, seeds, pesticides, energy and resources. We should strengthen the treatment of non-point agricultural pollution, the protection of water bio-resources and fishery bio-environment, the protection and construction of grassland bio-environment. We should develop rural clean energy, reuse rural waste and agricultural by products.

(e) Strengthen macro-regulation. To protect grain producers and stabilize grain market, the Chinese government set up the lowest grain protection price and grain reserve system to regulate grain market supply, demand and price in 1990. Chinese government provides grain grant and relief to rural poor population, urban low incomers and the handicapped and seriously diseased people to make sure they live a normal life.

(f) Improve grain information early warning system and arable land quality dynamic monitoring network. We should set up a monitoring network combining ground-based observation and earth-targeted observation. We should refine grain production, market and supply and demand information collection system. We should strengthen the capacity to analyze the impact of the mid to long term climate change on grain production; provide relevant information related to grain production in a timely way.

We should make efforts to improve disaster prevention and mitigation system, forecast and study the disaster's impact on grain production and put forward the overall status of national food security and countermeasures in case of emergency. We should strengthen food security monitoring and pre-warning system, thus providing scientific reference for macro-regulation policy.

VI. Case Study- Introduction of Quality Grain Project

To ensure national food security, maintain and enhance the comprehensive grain productivity, increase income of farmers from the major grain producing areas and balance regional economic development, MOA formulated and implemented *the Plan of the National High Quality Grain Industrial Project (2004-2007)* in 2004 and put forward the initiative to select major grain producing counties and state farms with solid foundation and potential from 13 major grain producing provinces (Heilongjiang, Jilin, Liaoning, Hebei, Henan, Anhui, Shandong, Jiangsu, Jiangxi, Hunan, Hubei, Sichuan and Guangxi) to strengthen infrastructure construction. Emphasis will be given to the capacity buildings in six aspects, improved variety breeding and propagation, disease and pest prevention and control, auxiliary and alteration projects for irrigation areas, construction of standard grain fields, modern agricultural equipment and grain processing.

From 2004 to 2006, the government invested an accumulated amount of 12 billion RMB into the high quality grain industry, 2000 projects were implemented, covering 484 major grain producing counties in 13 major grain producing provinces, with a total arable lands of 37.87 million hectares, over half of the total arable land in the major producing areas. Thanks to these efforts, areas sowed to grain in these 484 counties expand by 36.7 million hectares, with the yield per unit area increased by 22 kg, the grain output increased by 28 million tons, 52.5% of the newly increased output from 2004 to 2005. The quality grain project focuses on good quality and industrialized operation. By combining project building and favorable policies, the comprehensive grain producing capacity was enhanced and the enduring mechanism for the development of grain industry was set up.

Chapter 2 Agricultural Industrialized Operations

I. Objectives and Tasks

Industrialization of agriculture takes the market situation as the guiding force and the household operation as the foundation. Driven by various leading enterprises and organizations, it shapes an operation mechanism in which production, processing and marketing of agricultural products are integrated and complementary to one another. The leading enterprises and specialized farmer cooperatives are the major driving force for agricultural industrialization. The main objectives for development of agricultural industrialization from 2010 to 2015 include:

——Remarkable development of leading enterprise clusters. The priorities include making breakthrough first in some industries with better conditions, such as the industries related to corn-processed products, dairy products, meat products, fruits or vegetables, boosting a batch of leading enterprise clusters with strong competitiveness and high market share, forming a pattern for common development of small, medium- and large-sized enterprises and cultivating a batch of leading enterprises with an annual sales of over 10 billion yuan or 5 billion yuan.

——Enormous improvement in processing capabilities of agricultural products. Efforts shall be made to markedly increase the share of intensively processed agricultural products, extend the industrial chain, raise the added-value of the products, enhance their market competitiveness and enable over 50% of the agricultural products to be processed.

——Significant breakthrough in brand-building of agricultural products. International or domestic advanced standards shall be widely adopted and quality and safety of agricultural products and application of science and technology in the production considerably improved. Efforts shall be made to develop a great number of high-quality, high-efficient, safe and eco-friendly products with famous brands. Food products of the leading enterprises above the provincial level shall meet the standards for green food and over 100 famous brand names shall be established. Standardized production, brand-oriented operation and standardized management shall be realized in more than 40% of the legally registered specialized farmer cooperatives. Products of more than 50% of the cooperative members shall be supplied directly to urban supermarkets through specialized farmer cooperatives or sold by the cooperative chain stores to achieve better organized agriculture.

——Marked enhancement in the driving role of industrialized operations. Support

shall be offered to develop a batch of specialized farmer cooperatives and intermediary service organizations and improve the benefit-sharing mechanism and the operation mechanism so that more farmers can market their products through those cooperatives or organizations. More than 30% of the total farm households in China shall become members of specialized farmer cooperatives. Income of the farm household from industrialized operations shall be considerably increased.

II. Latest Development

By the end of 2006, various agricultural industrial organizations totaled 154,800, which covered 90.98 million farm households. The farm households engaged in industrialized operations enjoyed an annual income increase per household of 1,486 yuan. Their growth rates over 2005 were 14.1%, 4.3% and 11.2% respectively. The specialized farmer cooperatives nationwide amounted to over 150,000, with a membership of 38.78 million. They had 34.86 million farmer household members, which accounted for 13.8% of the total farm households in China, up by 11 percentage points over 2002.

(a) Leading enterprises have made new progress. Various leading enterprises nationwide came to 71,691, of which 4,779 leading enterprises registered sales revenue above 100 million yuan, a year-on-year increase of 19.2%. The total value of fixed assets of various leading enterprises added up to 978.2 billion yuan, a year-on-year increase of 12.3%; and their total sales revenue 2418.8 billion yuan, rising by 31.1% over the previous year.

(b) The intermediary service organizations have been growing at a faster pace. All types of intermediary service organizations for agricultural industrialized operations totaled 70,874, a year-on-year increase of 12.7%; and their sales revenue 312.8 billion yuan, a year-on-year increase of 14.8%.

(c) Channels to increase farmers' income have been expanded. The total income of farm households engaged in industrialized operations grew by 135.2 billion yuan, a year-on-year increase of 16.0%; and the income increase per household 1,486 yuan, a year-on-year increase of 11.2%. Each farm household member of the specialized farmer cooperatives could get 400 yuan as return of earnings and dividend. Generally the income of members is 20% or even 50% higher than that of non-members.

(d) The area of production bases has been enlarging and the quality of their products improving. The industrial organizations covered crop production bases of 86.67 million ha, water area for aquaculture of 6.38 million ha, farmed animals of 1.46 billion heads and farmed poultry of 11.34 billion heads. The specialized farmer cooperatives had 26,600 registered trade marks and succeeded in 3,267 certification applications for safe agri-food, green food and organic agri-food.

(e) Forms for benefit-sharing have been gradually improving. Multiple forms for benefit-sharing were adopted in the industrialized operations. Specifically 57.7% of all the industrial organizations adopted contracts, 15.3% partnership, 15.1% shareholding cooperative system and 11.9% other forms. The diversified forms for benefit sharing have played a role of transmitting the results of value-added industrial chain and market expansion to farm households. Farmers have been gaining increasingly tangible benefits from industrialized operations.

III. Means of Implementation

(a) Policy support. The Chinese government stressed its greater support to leading enterprises and specialized farmer cooperatives and made clear that necessary support would be given to enterprises in terms of finance, taxation, banking services, import and export. In 2006, the document named as the Opinions on Accelerating Development of Agricultural Industrialization was issued. The Ministry of Agriculture (MOA) issued the Opinions on Encouraging and Guiding Participation of Leading Enterprises in Agricultural Industrialization in Building a New Countryside to encourage leading enterprises to take active part in building a new countryside. On 1 Jul. 2007, the Law of PRC on Specialized Farmer Cooperatives, the Regulations on Management of Registration of Specialized Farmer Cooperatives and the Model Constitution for Specialized Farmer Cooperatives came into force. On 1 Jan. 2008, the Financial Accounting Regulations for Specialized Farmer Cooperatives (Trial Implementation) took effect. The methods on implementation of the Law on Specialized Farmer Cooperatives were approved successively in Shannxi, Hubei and some other provinces. A framework of laws and regulations on establishment and development of specialized farmer cooperatives has taken shape.

(b) Demonstration and guidance through implementation of projects. The central finance has been allocated to support the agricultural industrialized operations, develop competitive leading industries and promote development of leading enterprises and specialized farmer cooperatives through implementation of projects, such as those initiated by the funds from the national agricultural comprehensive development program and special financial support. In 2007 alone, the funds for agricultural comprehensive development were allocated for carrying out over 1400 projects. Since 2002, MOA has earmarked the special funds for agricultural industrialization every year, which are mainly granted to national key leading enterprises for helping farmers with development of standardized production bases, technical services as well as breeding and introduction of improved varieties. The local finance has also been allocated to support development of agricultural industrialization. Since 2004, MOA has organized implementation of the demonstration project of specialized farmer cooperatives with support from the central finance. By 2007, altogether 508 specialized farmer cooperatives were supported by the demonstration project. Since 2007, MOA has successively carried out a range of demonstration activities, such as experiments on participation of

leading enterprises in building a new countryside, the model of leading enterprises + intermediary service organizations + farmers and agricultural insurance, which gives great impetus to development of agricultural industrialized operations.

(c) Enhanced administration and guidance. The Chinese government has unveiled a series of documents, including the Opinions on Support to Key Leading Enterprises Engaged in Agricultural Industrialized Operations, the Provisional Management Methods on Recognition of Status as National Key Leading Enterprises and Monitoring of Their Operation and the Opinions on Accelerating Development of Agricultural Industrialized Operations. The website of China Farmers' Cooperatives (www.cfc.agri.gov.cn) was launched to provide comprehensive and accurate consultation services on laws, regulations and policies to specialized farmer cooperatives in a timely manner. In order to push forward the agricultural industrialized operations, the local governments at all levels have strengthened development of weak links and valued and supported development of specialized cooperative economic organizations, intermediary organizations and specialized markets.

IV. Obstacles and challenges

New difficulties and problems have emerged when the agricultural industrialized operations are developing rapidly.

(a) The leading enterprises and specialized farmer cooperatives are not able to cope with risks very well so that their costs are rising. Some leading enterprises engaged in animal production or processing have seen their economic returns declining and their attraction to farmers weakening.

(b) The benefit-sharing relationship is not close enough and organization of the cooperatives needs to be improved. Some cooperatives are very weak in market exploration, brand-building and value-added processing.

(c) Some industries enjoy fast growing processing capacity while their agricultural production bases have not been developed accordingly.

(d) Export-oriented leading enterprises are faced with a number of difficulties due to changes in the international market and the trade barriers.

(e) Rural new-type market players are growing fast, which sets new requirements for the government's macro-economic regulation, management and services.

V. Countermeasures

(a) Developing leading enterprises that encourages farmers' participation and bring

benefits to farmers. Taking into account development of the industrial zones of competitive agricultural products, a range of demonstration bases of leading enterprise clusters will be established and a batch of leading enterprises with better basis, large-scale business and strong leading effects will be fostered. Great efforts will be made to develop intensive processing and improve added value of agricultural products. The capital operation and competitive brands will be regarded as a link to integrate resources, develop consolidation and cooperation involving different regions, industries and ownerships, push forward concentration of competitive production to competitive enterprises and concentration of competitive enterprises to competitive industries and regions. The brand strategy will be implemented to build brands on standards, explore market by brand, win economic returns from brand and develop a batch of brand products with high market reputation and high market share.

Improving benefit-sharing mechanism. Guidance will be given to development of specialized investment, services and purchase so that farmers can be provided with various services in farming technology, market information, means of production and product marketing and the leading enterprises can also improve their capacity in providing service. Great efforts will be made to develop contract-based agriculture, standardize contract content, identify right and obligations and raise the percentage of contracts performed. Leading enterprises will be encouraged to set up risk funds and adopt multiple practices, such as purchase by protective prices and return of earnings, so as to establish close and reasonable benefit-sharing mechanism between farmers and themselves. Farmers will be guided to become shareholders with factors of production, such as their right to land contractual management, capital, technology and labor. Diversified forms of consolidation and cooperation can be taken by the farmers to establish a community in which they share both benefits and risks with the leading enterprises.

(c) Developing intermediary service organizations. Attention will be focused on addressing the major issues that lead to lagging development of intermediary service organizations. Effective measures will be adopted and multiple forms taken to promote their development. With enforcement of the Law on Specialized Farmer Cooperatives, guidance will be given to farmers to establish specialized farmer cooperatives in accordance with the law in the principle of free will and mutual benefit; and support will be offered to leading enterprises, agricultural technical personnel, rural talented people, and various public service organizations to launch or lead various intermediary service organizations; support will also be given to foster a group of farmers engaged in large-scale specialized agricultural activities and rural brokers so that more farmers can be included in the cooperatives. The role of intermediary organizations, such as industrial associations and chambers of commerce, will be brought into full play. It is important to prevent those organizations from focusing on administrative functions, constantly strengthen their service functions, improve the self-discipline mechanism and effectively protect the legal rights and interests of enterprises and farmers.

(d) Enhancing development of production bases. Leading enterprises will be guided to increase their efforts in developing production bases so that the production bases can match with the processing capacity and blind development can be avoided. When developing the production bases, the principle of standardization will be followed. Priorities will be given to strengthening development of infrastructure, such as farmland water conservancy, improvement of land conditions, road system, distribution facility and telecommunication system. Production conditions will be improved constantly to build up the overall production capacity. All the market players, including specialized farmer cooperatives, village collective economic organizations, agricultural technical extension institutions, farmers engaged in large-scale specialized agricultural activities and farmer brokers, will be guided and supported in taking active part in development of production bases.

(e) Upgrading quality and safety of agricultural products. Guarantee of quality and safety of agricultural products will begin with the source of agricultural production. High standards will be applied to develop production bases of raw materials. A strict whole-process quality control system will be implemented, covering production bases, product processing, packaging and marketing and all the other links. Quality and management system certification like ISO9000, ISO14000 and HACCP will be gradually applied to speed up integration with the international practices. The market access system on quality and safety of agricultural products will be strictly followed. Application of standardized management in the field of agricultural product distribution will be expanded at a faster pace through a number of means, such as quantitative packaging, label and logo and commodity bar code.

(f) Improving development environment. Efforts will be made to enhance development of market system, information system and quality standard system of agricultural products, develop futures market of bulk agricultural products, standardize contract-based agriculture, guide farmers and specialized cooperatives in signing contracts on production and marketing with leading enterprises, set up and improve credit system and protect the trade mark and brand of high quality agricultural products and try establishing the inspection-free market access system for the products from the leading enterprises above the provincial level. The policy of Green Passage for fresh agricultural products will be implemented and improved nationwide to accelerate the formation of a nationwide market system that is unified and open and that allows orderly competition.

(g) Improving statistics and monitoring. In response to the new trend in development of agricultural industrialization, the statistics and indices system for agricultural industrialized operations will be established and improved so that timely preparation can be made for statistics analysis. The monitoring system will be improved. Scientific, fair and open methods will be adopted. Efforts will be made to intensify the dynamic management on key leading enterprises. Monitoring and evaluation on

their operations will be conducted on a regular basis. The operation and development of those enterprises will be learnt in a timely manner so that unqualified enterprises can be removed from the list of key leading enterprises and qualified ones can be included in the list. The status as a key leading enterprise is not permanent but depends on performance of the enterprise. Such rules are aimed at ensuring sound development of leading enterprises.

VI. Case study-development of the demonstration project of specialized farmer cooperatives

Special funds of 25 million yuan were earmarked from the central finance in 2007 for implementing the demonstration project of specialized farmer cooperatives under the organization of MOA. The project funds were mainly used to support specialized farmer cooperatives in enhancing their capacity-building in production and market exploration. The project implementation was based on the local dominating industries and famous, special and high-quality products and associated with development of industrial zones of competitive agricultural products by MOA. Financial support were offered to selected specialized farmer cooperatives which had better conditions and could play a leading role and serve as demonstration in improvement of agricultural industrialized operations and increase of farmers' income.

The demonstration project of specialized farmer cooperatives supported 100 selected specialized farmer cooperatives in 2007, of which 34 were based in the east, accounting for 34% of the total; 33 in the central area, accounting for 33% and 33 in the west, accounting for 33%. The project focused on supporting the specialized cooperatives related to the leading industries or famous, special and high-quality products, of which 14% dealt with production of grains, oil crops, pigs, dairy cattle and other major agricultural products; and 64% were engaged in crop production, 29% animal production, 5% fisheries, 1% agricultural machinery services and 1% weaving.

According to the statistics, altogether 61,243 cooperative members were included in this project in 2007, increasing by 33% over 2006 when the project was not carried out among those cooperatives. A total of 276, 944 farm households were covered, increasing by 48%. These cooperatives marketed 17.318 million tons of agricultural products for their members, increasing by 17% over 2006; purchased 1.0418 million tons of agricultural inputs, increasing by 20%; trained members of 288,000 person times, increasing by 70% over 2006; and registered 70 trade marks, increasing by 23% over 2006. Their total income grew from 1360.4342 million yuan to 2001.3396 million yuan, increasing by 47%; and the net income per farm household member grew from 12,900 yuan to 17,300 yuan, increasing by 34%. Implementation of this demonstration project helped to enhance the operation and service functions of cooperatives, improve their capacity in exploring market for their agricultural products, develop leading industries and distinctive products, upgrade quality and

safety of agricultural products, increase the number of farmers joining the cooperatives and facilitate development of regulations on specialized farmer cooperatives.

Chapter 3 Quality, Safety and Competitiveness of Agricultural Products

I. Objectives and Tasks

Strengthening science and technology support, improving market and information service, and guaranteeing agricultural product quality & safety effectively are the key measures to maintain and increase the market competitiveness of agricultural products. According to the '11th five-year development plan for national agriculture and rural economy (2006-2010)', 'outline of the plan for medium and long term national science and technology development (2006-2020)' and other relevant plan and policy document, the objectives and tasks of the relevant field are as following:

By 2010, an initial agricultural market system with complete legal framework, rational structure, standard service, and higher level of organization shall be established, which is led by modern market distribution means including modern logistics, chain supply, e-commerce and futures market, etc., based on wet market, retail stores and super market, with large and medium-sized whole-sale markets and chain supply centers backbone, various rural economic organizations and large and medium-sized enterprises as mainstay, futures market and spot market complementing each other, agricultural product market and input market developing in a balanced way, urban and rural market merging with each other, and domestic and foreign trade closely integrated.

By 2020, a national agricultural science and technology innovation system with rational structure, complete function, efficient operation and effective support shall be developed, with the comprehensive agricultural science and technology capacity coming into the leading positions of the world, promoting an innovative agriculture development with modern agriculture as the core.

Gradually establish a scientific, complete, highly efficient and authoritative national agricultural information system, based on information development and integration, with the information transmission network from the central level to the grass root level as the platform, and agricultural and rural economic surveillance and pre-warning, market superintendence and public information service as the main function.

Form a scientific, coordinated standard system basically, with brand name certification and agricultural product quality and safety certification work promoted in an all-round way; establish a testing system with reasonable structure, clearly

defined function, full coverage of various sectors, high operational efficiency, comprising ministerial, provincial and county levels; basically form a whole-process legal supervision system covering pre-production, in-production and post-production; establish a basically clearly defined emergency response organization for major agricultural product quality and safety incidents, with the management mechanism complete basically.

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II. Latest Development

(a) Infrastructure continued to be improved. In recent years, a number of crop variety improvement centers, key laboratories, engineering technology research centers, and major scientific projects were constructed, with effectively improved scientific research conditions. The number of agricultural product wholesale markets largely maintained at around 4500, open market and simple market were gradually replaced by fixed market and well equipped standard market. Agricultural departments of thirty one provinces, 80% of prefectures, and 60% of counties have established specialized website, and an initial agricultural information network covering the country has been established. Agricultural product quality testing system continued to be improved, an agricultural product safety testing system came into shape with testing agencies at ministerial, provincial and county level coordinating with each other, and providing technical support for strengthening agricultural product quality and safety supervision and management.

(b) Human capacity was fortified. In 2006, the total number of scientific research institutes at and above prefecture level exceeded 1000, and the number of scientific research personnel was around 60,000, among which, those with a university diploma and above totaled 30,000, the overall agricultural research and development capacity was significantly improved. Agricultural product brokers increased to around 5 million, farmers' professional cooperatives developed to about 150,000, agricultural industrialization leading enterprises increased to over 4,300, becoming an important force for agricultural product distribution and marketing.

(c) Continued innovation. The 'green channel' network for the transportation of agricultural products has covered 31 provinces (regions and municipalities directly under the central government, with a network of 'five vertical and two horizontal' major highway, realizing full inter-provincial connection. Futures market developed stably. In 2007, the state government approved rape seeds and palm oil to be traded in the futures market, with which there're now 10 types of agricultural product and 12 agricultural futures commodities being traded in the futures market. Currently, 800 national agricultural standards, 2235 industrial standards and over 80,000 local agricultural standards have been formulated, with which, an agricultural standard system has been roughly established with national and industrial standards as the main body, local standards as support, and enterprise standards as supplement. Altogether 539 national level demonstration areas of agricultural standard operation,

100 standard agricultural demonstration counties, and 3,500 provincial level standard demonstration areas were established, covering a total area of 33.33 million hectares.

(d) Stable increase of export. In 2006, agricultural export volume totaled 31.415 billion USD, and China became the fifth largest agricultural product exporting country of the world. In the exported product, deep processed agricultural product continued to increase. The export value of deep processed agricultural product was 15.01 billion USD, increased by 23.0% on the previous year, and its percentage in the total value of agricultural product export increased by 3.4 percentage point compared with the previous year. The export market was further diversified, with a continuously improved structure.

III. Implementation Means

(a) Strengthen legal and policy support. The ‘Seed Law’ and ‘New Plant Variety Protection Regulation’ and other laws and regulations promulgated in recent years effectively protected agricultural science and technology innovation, creating a favorable environment for agricultural scientific innovation. On November 1st, 2006, ‘Agricultural Product Quality and Safety Law’ was formally launched, which further promoted the legislation of agricultural product quality and safety. Relevant government departments also issued consecutively the ‘Measures for the Management of the Production Place of Agricultural Product’, ‘Measures for the Management of the Packages and labels of Agricultural Products’, and ‘Measures for the Evaluation and Registration of Agricultural Product Quality and Safety Testing Organizations’, etc. as supporting measures. In 2006, the Ministry of Agriculture issued ‘National Agricultural Product Market System Construction Plan and ‘National Agricultural Information System Construction Plan during the Period of the 11th Five-Year Development Plan’, which provided a comprehensive instruction on agricultural product market system and information system construction.

(b) Continuously increase construction investment. In 2006, the total investment for agricultural science and technology from the government exceeded 6 billion *Yuan*. Currently, the research fund of the research personnel in agricultural research organizations exceeded 240,000 per-people. The construction of the projects including development of quality and safety inspection and testing systems for agricultural products, agricultural information warning system, ‘Golden Agriculture’ project, and rural telecommunication systems covering telephone, television and internet access was launched. By 2007, we had invested for the construction of 300 national level (ministerial level) quality testing centers, 1,780 provincial, prefecture and county level agricultural product quality testing agencies. We made active coordination with financial institutes to create a favorable financial environment. Through policy guidance, we try to attract enterprises, individuals and various other social resources to invest in different infrastructure construction, and actively introduce foreign investment, developing a diversified investment mechanism.

(c) Attach high importance to knowledge dissemination, service, support and guidance. Various forms are adopted to popularize the latest agricultural science and technology, the progress of market and information system construction, and the successful and typical experience, so as to enhance social awareness and attract more resources to participate in relevant construction work, and to create favorable environment for the enhancement of agricultural product quality and competitiveness.

IV. Obstacles and Challenges

(a) The overall R&D capacity is insufficient. Although many science and technology research results have been achieved, the capacity to convert them into actual production forces and their extension in practice is chronically low, the technology reserve to cope with international market competition is limited, wanting technology accumulation. The reform of agricultural science and technology innovation system is progressing slowly, with agricultural research system segregated, and research capacity dispersed, which has not yet been totally resolved.

(b) Market and information service facilities are weak and insufficient. The development of agricultural product market system is uneven geographically; agricultural information system is not complete yet; the information system for rural commodity distribution is still in the initial stage; agricultural product market facilities are very simple and crude, with over-simple service function, which restricts the market to play an even greater role.

(c) It's becoming more difficult to supervise agricultural product quality. In china, the agricultural production is carried out in separate small families, the operation scale is small, and involving many links, and is difficult to be monitored. There's a long way to go to improve the management of agricultural product quality and safety, and the establishment of quality and safety system, law enforcement team need to be further enhanced.

V. Countermeasures

(a) Accelerate system built-up. Based on *the Law on the Quality and Safety of Agricultural Products*, taking into consideration the specific situation, we should speed up the formulation of a complete, unified, scientific, appropriate agricultural product quality and safety legal system. Enforcement forces need to be integrated, to promote integrated law enforcement, strengthen enforcement capacity and implement the stipulations of the 'agricultural product quality and safety law'. Speed up the formulation of relevant management measures for various construction projects and funds; continue to improve standard operation, so as to ensure a sound operation and good result of the various projects.

(b) Actively promote management system innovation. Speed up the construction and improvement of agricultural product marketing service platform, to provide various marketing and product promotion service to producers, processors and traders. Encourage the exploration of new multi-lateral cooperation mechanism. While give full play to the government agencies, we should actively support and guide various social forces to promote socialized market and information service. Speed up the formulation of an agricultural product quality and safety supervision system with government agencies playing the leading role, various departments collaborating with each other, and all aspect of the society actively participating. According to the localized management principle, we shall establish and improve the responsibility system for quality and safety supervision, and comprehensively improve supervision capability and level.

(c) Strengthen publicity and training. Adopt various modes, to widely carry out publicity and training regarding the ‘agricultural product quality and safety law’, so as to guarantee all participants in this industry learn the law, understand the law and abide by the law, and create a batch of new type of farmers who know production, understand management, observe law and maintain good credit. Energetically promote and develop agricultural product production and operation enterprises and cooperative organizations, forming a industry structure with government taking the lead, the industry working together, and the whole society participating. Publicize timely the information of agricultural product quality and safety, correctly orient the public opinions, and advocate safe production and scientific consumption.

(d) Actively carry out international exchange and cooperation. Strengthen the exchange and cooperation with relevant international organizations, including FAO, WFP, Codex Alimentarius, OIE, UPOV, etc. strengthen the study of international standards and advanced foreign standards and improve the adoption rate of international standards. Actively promote the mutual recognition between certification organizations. Actively participate in international laboratory capacity verification. Continue to make effort to create a fair and orderly international trade environment, strengthening traceability and pre-warning and adopting effective countermeasures. Promote information dissemination, continue to enhance the international competitiveness of Chinese agricultural products, and establish a good reputation of quality Chinese agricultural products.

VI. Case Studies

(a) Inter-departmental collaboration to promote the market construction

In order to promote the upgrading of agricultural product wholesale market, the Ministry of Agriculture and Agricultural Bank of China signed ‘Agreement on the Cooperation Framework for Jointly Support the Construction of Agricultural Product Wholesale Market’ in April, 2007. Then the two organizations jointly issued a circular,

requesting the agricultural departments at various places to actively collaborate with the local Branches of the Agricultural Bank to provide financial support for the upgrading of agricultural product wholesale market, and this work is progressing smoothly.

By the end of 2007, altogether 208 agricultural wholesale markets across the country established cooperation with Agricultural Bank; Agricultural Bank provided in that year 1.66 billion Yuan of loan to support the development of the market, and plus the previous loan, the total amount reached 2.53 billion Yuan. The size of loan of 7 provinces and municipality including Zhejiang, Dalian, Jiangsu, Fujian, Hunan, Qinghai and Shandong exceeded 100 million Yuan. In 2007, some wholesale markets of Jiangsu, Shandong, Yunnan and Qinghai also got from the Agricultural Bank 85.95 million USD fund support for international settlements.

Agricultural Bank of China not only provide loan to support market upgrading, but also provide other financial support including transaction settlements, payment, e-banking, etc. By the end of 2007, Agricultural Bank issued 148,000 bank cards to the wholesale markets; opened the business of commissioned collection and payment in 76 markets, serving 27,894 dealers, with a total amount of 18.35 billion Yuan; opened e-banking service for 92 markets, serving 13,116 dealers, with an annual trading volume of 8.65 billion Yuan; help customers of the markets to accomplish the insurance and fund business, with a total volume of 300 million Yuan.

With the inter-departmental cooperation and active promotion, some wholesale market in urgent need of fund successfully got the fund support. Shouguang Vegetable Wholesale Market of Shandong Province got 550 million Yuan loan from the Agricultural Bank for its relocation and renovation, and got a package of financial service support from the Agricultural Bank including transaction settlements in the new market, and the bottleneck of fund restricting the development of the Market was effectively resolved. Agricultural Bank in Jiangxi Province provided secured credit loan to individual dealers in the wholesale market with the guarantee of the market, which not only helped to solve the shortage of fund of individual dealers but also turned the wholesale market and the dealers in it into a close interest community, achieving a win-win result.

(b) Comprehensive Agricultural Information Service and Agricultural Information Project Utilizing three Information Media Including Television, Telephone, and Computer Network.

In order to transmit the information needed by the farmers to each village, the Ministry of Agriculture launched the project of comprehensive agricultural information service platform construction using television, telephone and computer network, which was welcomed by the farmers. In 2006, the Ministry established an agricultural system public service telephone number 12316. The core of the

information project is to utilize telephone network, television network and computer network, to create a public data platform, provide integrated agricultural information, and provide diversified, interactive and tailor-made agricultural information service based on the information service system. The main activities include automatic telephone audio service plus expert consultancy system, computer network, television program production and broadcasting system and national public database. In practice, the computer network provide telephone audio system database support while providing network service; television programs will be made and broadcasted to answer the popular questions asked by the public through the telephone service system, and according to the feedback of the public, improvements will be made for the audio service system, so as to form a benign cycle.

According to the feedback, this information service modality has three benefits: firstly, it can provide timely information about the market, science and technology development, and government policies for farmers and agricultural enterprises, and meet the different special demand of agricultural producers and operators; secondly, it can fully utilize the advantage of various information media to extend the coverage of the information service; thirdly, it can improve the integration of various resources under current system, and effectively promote the collaboration between agricultural department and telecommunication, television and broadcasting agencies in information service supply.

By 2007, we have successfully established 2 provincial level platforms, 41 prefecture level platforms and 158 county level platforms for the integrated agricultural information service using television, telephone and computer network. It plays a positive role in promoting collaboration, guiding restructuring, etc. For the next step, the Ministry of Agriculture will continue to actively promote the integrated information service project, and according to the plan, a initial integrated agricultural information service platform will come into shape by 2010, the lag-behind agricultural information service situation will be significantly changed, and the project is expected to cover 2000 counties, benefiting 140 million farming households.

(c) Special Rectification Campaign for Agricultural Product Quality and Safety

In August, 2007, according to the instruction of the State Council, led by the Ministry of Agriculture, a concentrated special rectification campaign for agricultural product was launched. Relevant departments of different places took rapid action in a pragmatic manner, and successfully accomplished this campaign. First, agricultural product quality and safety was further improved. Second, all the 676 agricultural product wholesale markets of medium and large-sized cities have been covered by the quality & safety surveillance network of the agricultural departments by 100%, with government supervision and self inspection of enterprises combined system further improved. Third, the problem of application of illegal pesticides, animal drugs and

feed additives was basically resolved in agricultural production bases, large scale crop and animal farms and standard agricultural demonstration areas. Fourth, the illegal production, marketing and application of 5 kinds of highly toxic pesticides including methamidophos were basically eradicated.

Chapter 4 Building a New Socialist Countryside

I. Objectives and Tasks

In accordance with *the Eleventh Five-Year Plan for National Economic and Social Development* and *the Eleventh Five-Year Plan for Development of National Agriculture and Rural Economy*, the objectives set up for building a new socialist countryside during the Eleventh Five-Year Plan² are as follows:

- Developing production. The overall capacity of grain production will be 500 million tons, other agricultural products will be supplied effectively, and the position of agriculture as the foundation of the national economy strengthened.
- Improving living standards. Rural income will be up to 4150 yuan with an annual increase of over 5 percent, economic strength of farm households increased significantly, and the quality of life markedly improved.
- Improving the overall cleanliness of villages. Biogas will be available to 27 percent of farm households, safe drinking water will be provided to an additional 100 million rural residents, electricity to 3.50 million rural households; all the villages and townships will have access to tarred/concrete roads, all the village to telephone service and all the townships to Internet.
- Fostering more civil behavior and exercising democratic management. A total of 100 million farmers will be trained as new types of farmers, and 45 million transferred; over 80 percent of rural residents will be covered by a new type of cooperative medical care system; a rural social security system and self-governing mechanism of villagers will be established.

II. Latest Development

- a. Basically balanced supply of major agricultural products. In 2006 and 2007, grain production was up to 497.50 million tons and 501.50 million tons, respectively, rising four consecutive years, and the yield per unit of land created a historic new high four consecutive years. As for the production of cotton and sugar crops, it reached 7.5 million tons and 99.72 million tons, respectively in 2006; and 7.60 million tons and 111.10 million tons, respectively in 2007, with an increase of 1.3 percent and 11.4 percent, respectively. The production of eggs,

² In October 2005, the Fifth Plenary Session of the Sixteenth Central Committee of the Communist Party of China made an important strategic decision of building a new socialist countryside, which contains general requirements for developing production, improving living standards, fostering more civil behavior, improving the overall cleanliness of villages, and exercising democratic management.

- meat, milk and aquatic products remained steady increase.
- b. Constantly increased income of farmers. In 2006, the average annual net income of farmers was 3587 yuan, with an increase of 7.4 percent after adjusting for inflation. In 2007, it was 4140 yuan, with an increase of 9.5 percent after adjusting for inflation, which was the highest since 1997. For four consecutive years, the growth rate kept over 6 percent.
 - c. Accelerated innovation and application in agricultural science and technology. New types of vaccines and diagnostic reagents for highly pathogenic blue-ill disease have been developed. Due to implementation of the Project of Introducing Agricultural Technology to Farm Households, some 0.25 million farm-households have been trained for giving about five million farm-households demonstration. By the end of 2006, under the Sunshine Project³ a total of 8.80 million farmers received pre-employment training for surplus labor to be transferred from rural areas. In 2007, the number of trained farmers totaled 3.50 million. Over 11 million farmers have received various certificates including the Green Certificate, the Training Certificate for Young Farmers and the Qualification Certificate for Employment.
 - d. Increased efforts in strengthening infrastructure in agriculture and rural areas. In 2007, 41 percent of farming operations was carried out by machines, an increase of 5 percent over 2005. At the end of 2006, 22 million farm households built their own biogas digesters, medium- and large sized livestock/poultry farms established about 5000 biogas facilities. In 2006, more than 3.02 million kilometers of rural roads were built, and 98.27 percent of townships and 60.39 percent of administrative villages had access to tarred/concrete roads. In 2007, 0.423 million kilometers of rural roads were built or upgraded. In 2006, electricity was made available to all the counties in the country. As a result, 99.9 percent of townships, 99.8 percent of villages and 99.4 percent of farm households have access to electricity supply.
 - e. Accelerated development of rural social programmes. Mechanism for ensuring costs for rural compulsory education has been put in place, and the plan to make nine-year compulsory education basically universal and to basically eliminate illiteracy among young and middle-aged adults in the western region has been implemented on schedule. In 2007, 150 million students receiving compulsory education in primary and middle schools in rural areas were exempt from paying tuition and miscellaneous fees. The new system of rural cooperative medical care now covers 86% of all counties, and 730 million rural residents are benefited from such system. A system of basic cost of living allowances has been established in all rural areas of China, covering 34.519 million rural residents.
 - f. Increasingly deepened rural reform. In December 2006, the China Banking Regulatory Commission released the Opinions on Readjusting and Liberalizing Access Policy for Rural Banking Industry and Financial Institutions to Better

³ In order to intensify pre-employment training for surplus labours transferred from rural areas, since 2004 the Ministry of Agriculture, the Ministry of Finance, the Ministry of Labour and Social Security, the Ministry of Education, the Ministry of Science and Technology and the Ministry of Construction have jointly organized and carried out the Sunshine Project for Transferring Surplus Labours from Rural Areas or the Sunshine Project.

Support the Building of A New Socialist Countryside. Ever since then, pilots of village/township banks, subsidiary finance companies and farmers' mutual-aid groups for financing were launched. The Law of the People's Republic of China on Specialized Farmer Cooperatives came into force on 1 January 2007, which establishes the legal status of these cooperatives.

III. Means of Implementation

- a. Improve policy systems. The Chinese government has unveiled a number of policies to support agriculture, such as rescinding agricultural tax, livestock tax and taxes on special agricultural products; giving direct subsidies for grain producers, subsidies for quality varieties, general subsidies for purchasing agricultural supplies, and subsidies for purchase of agricultural machinery and tools. The government has put in practice the regulatory policy of minimum purchase prices of major grains, given incentives to counties with serious financial difficulties that have increased revenue from tax collection, to governments at provincial and city levels that have increased transfer payments to county governments with serious financial difficulties, to county and township governments that have downsized institutions and staff, to major grain producing counties, and to regions that have done a good job related to deal with financial difficulties faced by county and township governments. The government also released various policies to support production of pig, dairy cows and oilseeds, reinforced policies to support development of agricultural and rural infrastructure, and formulated policies to promote development of rural social programmes.
- b. Increase financial support. The government has kept stronger support to agriculture, rural areas and farmers. From 2005 to 2007, the central government allocated for developing agriculture, rural areas and farmers 297.50 billion yuan, 339.70 billion yuan and 431.80 billion yuan, respectively, with an annual growth rate of over 20 percent.
- c. Promote innovation of mechanism. Distribution systems for agricultural markets with diversified array of major operators have been put into place, leading to create employment mechanism for farmers to seek job opportunities locally or in others places, improve village/township management mechanism for self-governing by villagers and opening administration of township governments, and reinforce regulation mechanism for preventing increasing new financial burdens on farmers.
- d. Strengthen public services. The government has provided rural compulsory education (students receiving compulsory education in rural areas are exempt from paying tuition and miscellaneous fees and are supplied with free textbooks, and living allowances are provided to students from poor families who stay in school dormitories), established the new system of rural cooperative medical care and a system of basic cost of living allowances in all rural areas, and strengthened protection of rural migrant workers' rights and interests.
- e. Reinforce support through various projects/programmes. A number of major

projects have been implemented, including projects for national quality grain industry, quality varieties/breeds, plant protection, development of animal disease control, inspection system for agricultural product quality, development of rural biogas, returning grazing land grasslands, fishery administration and fishery ports, introduction of agricultural techniques to farmers, pre-employment training for surplus labours to be transferred from rural areas, technical training new types of farmers, and programme for ear-marked allocations to soil testing and formula fertilization.

IV. Obstacles and Challenges

- a. Stronger pressure for ensuring supply of major agricultural products. As regard to requirements, in spite of steady increase of grain production, demands for meat, eggs, milk, vegetable oil, fruits and vegetable have stepped up at faster pace along with upgraded structure of urban and rural consumption. As regard to supply, due to decreased total area of farmland and greater restricts from resources, there is stronger pressure for ensuring effective supply of agricultural products.
- b. Bigger gap between urban and rural areas. Since 2004, farmers' income has entered a new period of fast increase. In 2007, the growth rate of rural income was up to 9.5 percent, it was 2.7 percentage points lower than that of urban residents. In 2004, 2005 and 2006, the ratio of urban and rural residents' income was 3.21:1, 3.22:1 and 3.28:1, respectively. In 2007, the ratio increased to 3.33:1, with an absolute difference of 9646 yuan. Less secured foundation for farmers to increase production and fewer channels to sell their products have remained, which would have negative impacts on reducing the gap between urban and rural income.
- c. Insufficient support from agricultural science and technology. At present, 48 percent of growth in agricultural production value should be attributed to progress in agricultural science and technology, and just 30 percent of agricultural research achievements have been applied in farming practice, which are 30 percentage points and 40 percentage points lower, respectively, compared with developed countries. While large number of young rural labourers being transferred to cities, secondary and tertiary industries, almost only the old and women are left for farming in some places. Consequently, the holistic quality of rural labourers is getting weaker, giving more difficulties to introducing farming techniques.
- d. Weak foundation of agriculture. Agriculture in the country are still confronted with weak foundation of agriculture, backward equipment and facilities, irregular institution of disease control, insufficient capability for preparation against disasters, and prominent agricultural non-point source pollution. Both the average farmland and water resources pre capita are lower than the world average. Water and land resources are ill compatible and the use of water is highly extensive. It is necessary to strengthen the overall capacity of agricultural production.

V. Countermeasures

- a. Implement measures to balance urban and rural development, promote formulation of long-term mechanism for increasing agricultural production and farmers' income. We will readjust the distribution of national income by following the policy of balancing urban and rural development, improve agricultural performance and increase farmers' income by various measures to optimize agricultural structure, save costs, reduce production burdens, promote employment in non-agricultural fields and increase subsidies. We will strive to seek such institutional mechanism that would facilitate an integrated development of urban and rural areas; accelerate the development of an integrated new pattern of planning urban and rural development, distribution of industries, infrastructure, public services, employment and public administration; improve markets of the production factors with uniform standards for both urban and rural areas; and guide financial resources, technology, skilled personnel and other resources to move to agriculture and rural areas.
- b. Steadily develop agricultural production and ensure supply of major agricultural products. Firstly, we will focus our efforts on grain production. To this end, we will protect and mobilize farmers' initiatives in grain production, keep the area sown to grain crops, optimize mix of varieties and raise the yield per unit area to ensure a steady development of grain production. Secondly, we will ensure production for 'vegetable baskets'⁴ (non-staple food supply). To this end, we will effectively implement policies and measures to support production development of pig, dairy and oilseeds, work to change methods and ways of raising livestock and poultry, develop vegetable production, and keep promoting regionalization of competitive farm produce. We will improve the network of 'green channel'⁵ for transportation of agricultural products. Thirdly, we will enhance regulation over quality and safety of agricultural products on the basis of laws and regulations. We will take consolidation and expansion of results in addressing problems in quality and safety as the fulcrum to put responsibility of growing areas into place, reinforce supervision and inspection on the basis of laws and regulations, improve comprehensive services and permanent mechanisms, establish system/network of regulating quality and safety of agricultural products in the whole process from fields to markets. By doing so, we will upgrade the level of quality and safety of agricultural products.
- c. Promote employment and increased income of farmers through various channels to raise rural income level. To this end, we will accelerate the development of production belts for competitive farm produce, agriculture with high quality and

⁴ In order to deal with a short supply of non-staple food in the country, in 1988 the Ministry of Agriculture proposed a programme of "vegetable basket" (non-staple food supply) to ensure an all-year-round supply of fresh vegetables, meat, eggs, milk and aquatic products.

⁵ In order to improve agricultural distribution to support development of agriculture and promote increase of farmers' income, the national competent departments for public transportation have put in practice of the Implementation Plan for developing "Green Channel" for effective and Efficient Distribution of Fresh Agricultural Products Nationwide. By making use of uniform standards for "green channel" labeling, it facilitates drivers to identify the right channel. The "green channel" is for vehicles transporting living chickens and fish, fresh meat, eggs, vegetable and fruits, and lower or no fees are charged. In normal conditions, these vehicles may not stop for check, and help would be provided when necessary.

performance, agri-tourism, ‘one village and one product’, and leading industries. We will energetically develop township enterprises, rural secondary and tertiary industries, promote downstream processing, and improve farmers’ capability in farming and employment. We will regulate rationally prices of agricultural production supplies, improve use ratio of inputs, and cut down agricultural production costs.

- d. Vigorously strengthen the development of agricultural infrastructure to improve the overall capability of agricultural production. To this end, efforts are to be reinforced to ensure safety of rural drinking water, alteration of irrigation areas and pumping stations and water and soil conservation. Irrigation systems, especially small scale systems, are to be strengthened. 6,240 large or medium reservoirs and important smaller reservoirs that suffer from defects or risks shall be reinforced within 3 years. The control and improvement of medium and small watersheds shall be accelerated, so as to help transform the low- and medium-yield farmlands, add more farmland for soil testing and formula fertilization, and build up a number of high-standard farmland for high and stable production. We will promote development of agricultural mechanization; improve protected agricultural production and processing machines, equipment and facilities.
- e. Strengthen protection of farmland resources and agricultural ecological system to increase capacity for agricultural sustainable development. To this end, we will adhere to the strictest possible system for law-based protecting farmland; guide farmers to make good use of land; and ensure the preparation of master plans for using village/township land and plans for development of villages and townships. We will increase efforts to develop, improve and reclaim land; reinforce protection of agricultural ecological system; strengthen the development of water conservancy, forestry and grassland; and intensify protection of rural drinking water sources and improvement of water quality. We will promote energy conservation and emissions reduction in agriculture and rural areas; guide farmers to make rational use of production means such as pesticides, chemical fertilizers and plastic films; promote the development of rural cleaning projects, and control of agricultural non-point source pollution. We will make biogas available to increased number of farm households; speed up the development of biogas facilities to serve large-scaled livestock and poultry farms; properly develop non-grain/oilseed bio-fuel crops; and make greater use of renewable energy sources such as wind and water power, and solar energy.
- f. Strengthen the development of agricultural technical service systems to promote transform the mode of agricultural development. To this end, we will accelerate the establishment of technical systems to serve modern agricultural industries; promote extension and application of agricultural techniques; reinforce collaboration at all levels in agricultural research, education and extension, to pool efforts for extension and application of agricultural techniques; demonstrate new techniques; promote extension of simplified techniques for animal and crop farming, and techniques for disasters prevention and reduction; facilitate

introduction of agricultural technical knowledge into farm households, integration of agricultural science and education, and collaboration of production, education and research; reinforce agricultural technical extension for public welfare; improve extension systems at grass-root levels; ensure funds for extension institution for public welfare; and improve institutions, stabilize staff, and innovate mechanisms. We will energetically develop rural skill personnel; implement training programmes with focus on skilled personnel for animal and crop farming, farm machine operators, pioneers in applying scientific knowledge and techniques, rural agents and organizers of specialized cooperative organizations; implement the Sunshine Project for transferring surplus labours from rural areas, and facilitate them to find job opportunities; develop social support services for agriculture, and increase the service areas. We will enforce the Law on Specialized Farmer Cooperatives, support development of such cooperatives, develop and expand farm machinery service organizations, and accelerate agricultural industrialized operations.

- g. Accelerate rural public programmes to address problems in rural livelihood. To this end, we will keep improving rural infrastructure, accelerate improvement of village management, improve rural living environment; promote provision of same public services for urban and rural areas, and increase supply of rural public goods; accelerate reform of security system to ensure funds for rural compulsory education to improve such education; optimize a new type of cooperative medical care system and medical assistance system in rural areas, so as increase rural basic medical service capability; improve rural subsistence allowance system, keep pilot projects for adopting this system and speed up development of rural social security system; strengthen development of rural public cultural service systems to meet farmers' requirement for cultural life; keep improving capacity of development through poverty alleviation, and accelerate the process to eliminate rural poverty.
- h. Continue to deepen rural reform, create systems and mechanism that is conducive to the development of agriculture and rural areas. To this end, we will uphold the basic system for rural operations, stabilize and improve land contract relations, accelerate comprehensive reforms in rural areas, promote reform of the system of collective forest rights and pilots for reforming the system of the state-owned forest rights of forest areas. We will accelerate reform and innovation of rural banking systems, improve support and services provided by insurance for building a new socialist countryside, adopt effective measures to prudently reduce the debts of townships and villages with focus on clearing up overdue debts for rural compulsory education. We will speed up reform of land acquisition system.

VI. Case Study – demonstration actions of building a new socialist countryside

In 2006, the Ministry of Agriculture worked together with local governments of 31 provinces, autonomous regions and municipalities to identify 100 demonstration/contact villages/farms, and joint launched demonstration actions by the

ministry and provincial governments to build a new socialist countryside.

Currently, a work pattern of ‘jointing efforts of the ministry and provinces, relying on countries concerned, taking actions by villages identified and benefiting each household’ has come into being through demonstration actions in building a new socialist countryside. Thanks to joint efforts, we have made remarkable achievements as follows: First, accelerated economic development. Demonstration/contact villages have built a number of plastic greenhouses for vegetable production, standard livestock pens/houses and safe agro-food production bases; and introduced quality varieties and breeds. Over 70 percent of demonstration/contact villages have increased their production capability through readjusting structures of animal and crop farming. According to statistics, demonstration/contact villages witnessed fast rise in economic development and farmers’ income. The average growth of the total economic income of the 100 demonstration/contact villages was 12 percent over the previous year, and the average per capita of farmers’ net income 18 percent over the previous year. Second, markedly improved living conditions. Most demonstration/contact villages have prominently improved the living environment through installing road lamps, upgrading roads, remodeling houses and beautifying environment. According preliminary statistics, demonstration/contact villages have built or upgraded nearly 200 kilometers of village roads since last year, hardened soil ground of 25000 square meters, remolded or built houses for 2800 households; built more than 3000 biogas digesters for household use, four large scaled gasification stations, 247 pig insulation houses, 2750 toilets as well as centralized garbage disposal tanks, dustbins and sewerages. Third, most of them have built culture and sport facilities; and some of them built libraries, baseball grounds, and entertainment places; purchased ping-pong tables and body-building equipment. Most of them have improved management system for transparency in village affairs, adopt case-by-case system for mobilizing funds and labourers, established the system for transparency in village financial affairs, improved the system for collective decision-making at village level to promote democratic management. At the demonstration/contact villages, members of the Villagers Committees and the Party Branch have paid close attention to improvement of their own quality, and actively increased their organizing capabilities. At the same time, the demonstration/contact villages have set up a number of specialized farmers’ cooperative economic organizations, involving 77 percent farm households at the average. As a result, farmers are better organized in farming production, increasing the competitiveness of their products. The demonstration/contact villages now could see harmonious neighbours, families, relations between carders and villages, and a good public order. Fourth, improved significantly quality of villagers. The demonstration/contact villages have trained large number of a new type of farmers who are educated and understand both agricultural techniques and business management as well as skilled personnel who are willing to live and work for the villages through various training programmes carried out by relevant local governments and departments concerned on the basis of the Technical Training Programme for Rural Migrant Workers, the One Million

Polytechnic Schools Students, the Sunshine Project and other training programmes sponsored by the Ministry of Agriculture.

Chapter 5 Poverty Reduction in Rural Areas

I. Objectives and Tasks

China is a developing country with a large population. Since the founding of New China, the Chinese government has been committed to expanding production and alleviating poverty. By the end of 2000, we had achieved the goal identified in the National Seven-Year Priority Poverty Alleviation Program and had provided basic food and shelter for rural poor population. Based on these achievements, the Government of China formulated the Outline for Poverty Alleviation and Development in Rural Areas of China (2001-2010) (hereinafter referred to as the Outline), which defines the objectives of poverty reduction and development, including the provision of sufficient food and shelter, consolidation of achievements that have been made and creation of favorable conditions for a fairly comfortable life. Major tasks are to provide sufficient food and shelter for the remaining poor population, help low-income people to increase their income, improve basic production and living conditions and promote the development of culture, education and health in poor areas. Specific targets at the current stage are to provide sufficient and stable supply of food and shelter for the absolutely poor population and at the same time, to pay much more attention to reducing disparity and building harmony; to accomplish village-based integrated poverty reduction program, to cultivate dominant industry and carry out development program in land integrating small-scale land-plots; to extend radio and TV coverage to every administrative village, to build roads in villages where conditions permit, to supply electricity to natural villages, to further improve the availability of drinking water for human and livestock, to improve medical care and public health system, to achieve universal 9-year compulsory education in all rural areas, to improve the competence of labors in poor areas and to further increase the income level of the poor population.

II. Latest Development

(a) Continuous achievements in alleviating rural poverty. From 2000 to 2007, the number of people in absolute poverty was reduced by 53.9% from 32.09 million to 14.79 million while the number of low-income poor population decreased by 54.3% from 62.13 million to 28.41 million. Farmers' average per capita net income in key counties at national level for poverty alleviation and development increased from 1,277 yuan to 2,200 yuan.

(b) Further improved infrastructure and social service performance in poor areas. From 2000 to 2006, the percentage of administrative villages in key counties

nationwide which can have access to highway, electricity, radio and TV went up from 91%, 96.5% and 95.2% to 99.1%, 99.1% and 97.9% respectively. The proportion of farming households that have access to safe and hygienic water went up from 49.9% to 55.9% while the share of administrative villages with clinics increased from 69% to 73.5%. In 2007, the percentage of natural villages in key counties which have access to highway, electricity, telephone, radio and TV went up to 82.8%, 96.5%, 85.2% and 92.2% while the proportion of farming households who have access to safe and hygienic water reached 56.6%.

(c) Gradually accelerated poverty reduction. From 2001 to 2003, the number of rural population in absolute poverty reduced by 1.03 million annually and the annual reduction of low-income population was 1.98 million. From 2004 to 2007, these two figures were 3.55 million and 6.94 million respectively.

III. Means of Implementation

(a) Change the traditional methods of poverty reduction. In the past, poverty alleviation mainly relied on the driving force of economic growth and special programs for poverty alleviation. Since 2003, a Mega-Poverty-Alleviation Structure came into being with the integration of industrial, regional and social policies. The overall framework for poverty alleviation and development has been established with the on-going reform of forest tenure system and household registration system.

(b) Strengthen planning and continuously intensify financial and policy support to poverty reduction. First, the central government has always attached great importance to poverty alleviation in the long and medium-term planning for our national economic and social development. Poverty alleviation and development programs have been identified as major activities in the 10th Five-Year Plan and the 11th Five-Year Plan for National Economic and Social Development. The central government formulated the Outline for Poverty Alleviation and Development in Rural Areas of China (2001-2010) in which poverty reduction goals, target groups and major policy measures have been defined. Second, we have established and improved our institutional setup for poverty reduction from central to local levels. Government at provincial level is accountable for specific poverty reduction tasks, has the right to utilize financial resources and to make decisions related to poverty reduction. Administrative heads at various government levels assume full responsibility for poverty alleviation. Third, we have continuously increased financial inputs for poverty alleviation. From 2001 to 2007, the annual financial allocation from the central budget for poverty alleviation had increased from 12 billion yuan to 14.4 billion yuan and the total financial input stood at 87.3 billion yuan. At the same time, financial input from local governments at all levels has also increased year after year. In 2008, the total poverty alleviation funds from the central budget went up to 16.73 billion yuan.

(c) Mobilize all social sectors and enhance the twinning practice for poverty reduction. First is to encourage 15 provinces and municipalities in coastal areas of East China and cities with economic planning directly supervised by the State Council to twin with 11 comparatively poor provinces, autonomous regions and cities in West China. Second is to organize 272 central government agencies, democratic parties, social organizations and large state-owned enterprises to twin with 481 key counties at national level for poverty alleviation and development. Third is to mobilize privately-owned enterprises and NGOs to participate in poverty reduction programs. Fourth is to create favorable public opinion for participating in poverty reduction and relief activities.

(d) Continue the development-oriented poverty alleviation. Since the implementation of the Outline, we have paid more attention to the development of human resources while exploiting natural resources. First is to carry out the village-based integrated program for poverty reduction. With the participation of poor farming households, we have formulated the poverty reduction plan for 150,000 poor villages to improve the basic production and living conditions. Second is to carry out the Dewdrop Program which aims to provide vocational training for 1 million labors from poor areas every year and to offer guidance on training courses of practical farming skills in various places. Third is to reduce poverty through the development of distinctive industries in poor areas. We support those flagship enterprises which can help farmers increase their incomes and we provide financial and technical assistance to poor farmers to promote economic growth and farmers' income growth in poor areas. Fourth is to carry out resettlement program on a voluntary basis. For those living in areas without basic conditions for subsistence, a resettlement program is carried out on a voluntary basis in the light of local conditions and local capacity to completely change the basic conditions for subsistence of the poor population.

(e) Encourage the poor population to achieve development through their own efforts. We must respect the dominant role of the poor population in poverty reduction and development programs and we should encourage them to shake off poverty and improve the less developed economy through their own efforts. Since the implementation of the Outline, we have extended the participatory concept and approach in the whole country to call forth the vigor of the poor population for self-reliance and development. Currently, on-going efforts have been made to extend the community-dominant development approach for poverty reduction nationwide.

(f) Make great efforts to improve social services in poor areas. In order to alleviate poverty in rural areas, we shall not only improve the basic production and living conditions but also pay attention to the development of social services including science, education, culture and public health in an effort to improve living standards. We shall not only utilize natural resources but also put population growth under control so as to achieve the benign circle of resources, population and environment.

IV. Obstacles and Challenges

(a) Harsh natural conditions make it extremely hard to reduce poverty. At present, the majority of the remaining poor population lives in old revolutionary base areas, areas inhabited by ethnic groups, stone-mountain areas, desolate areas, alpine areas, the Loess Plateau and areas with high occurrence of endemics. Meanwhile, there are multiple factors causing rural poverty and it is quite common to have the recurrence of poverty.

(b) Rural areas witness fairly low income, relatively big development gap and rather stagnant social development. In general, it is quite possible for the income gap between urban and rural areas, among different regions to further expand. In 2007, the average per capita income of farmers in key counties was 2,200 yuan, only 53.14% of the national average for farmers which stood at 4,410 yuan and 15.98% of the disposable income of urban residents which came up to 13,768 yuan. The development of social services in poor rural areas also lagged far behind that in cities and other rural areas.

V. Countermeasures

(a) We will continue the development-oriented poverty alleviation practice, increase employment opportunities for the poor and actively boost industrial development. We will intensify our efforts to improve the infrastructure and public services, provide more chances for the poor to participate in economic activities, strengthen vocational training to build up the capacity of the poor for income generation, actively develop industries so that the poor can gradually accumulate family property in an effort to contain the expanding income gap.

(b) We will raise the poverty line and substantially increase inputs for poverty reduction and development. In accordance with the current economic development level and the actual expenditure of rural residents, taking into consideration of the demands both for subsistence and development and in the light of international practices, we will put forward the mechanism and approaches to gradually raise the poverty line, intensify efforts for industry nurturing agriculture and cities supporting countryside, gradually increase financial inputs both from central and local governments so that the size of funds for poverty reduction can correspond to our national economic development level and the magnitude of our poverty reduction program.

(c) We will earnestly press ahead with poverty reduction and development programs. One is to intensify efforts to carry out the village-based integrated planning for poverty reduction. By 2010, village-based integrated poverty reduction planning will be carried out in villages which are located in areas inhabited by ethnic groups, border areas and old revolutionary base areas in those key counties. Two is to expand

the scope and coverage of the Dewdrop Program. We will provide skill training courses to facilitate the transfer of 1 million labors and training courses on practical techniques for 10 million labors. Three is to reduce poverty through the development of industries. Before 2010, 1 or 2 flagship enterprises shall be established and developed for each key county. Four is to strengthen the practice of resettlement in an active and steady way in combination with regional development, rectification of national land-use practices and ecological construction projects. Five is to actively explore ways and methods of reducing poverty in areas with very unique conditions.

(d) We will give full play to the role of social sectors and international cooperation programs in poverty reduction. One is to expand the twinning practice and continue to carry out relevant policy measures and at the same time, we will specify poverty reduction tasks for different industries. When relevant departments formulate their industrial policies, they must take into full consideration of the interests of the poor and they should create favorable conditions for the poor in terms of project arrangement and financial allocation. Two is to intensify coordination between East China and West China. Three is to actively explore effective ways for privately-run enterprises to participate in poverty reduction. Four is to continue the exchange and cooperation with the international community in the campaign against poverty.

(e) We will facilitate the evaluation of impact of major policies and project decisions on poverty. We must strengthen the awareness of poverty reduction in the decision-making process and establish a complete science-based system of evaluation methods and indicators. We will evaluate the impact on poverty when we implement major policies and carry out industrial development projects.

VI. Case Study: pilot project of poverty reduction through resettlement

Since the implementation of the Outline, the central government, in order to solve the problems concerning subsistence and development of the poor population living in areas with specially harsh natural conditions, has carried out a pilot project of poverty reduction through resettlement and relocation (migration for ecological protection) in some provinces in West China. This pilot project covers some key counties at national level for poverty alleviation and development and the target groups include the rural poor people living in harsh environment and lacking basic subsistence conditions as well as those farmers and herders who have to resettle due to the construction of ecological programs. From 2001 to 2006, a total amount of 7.8 billion yuan of government bonds had been allocated for the resettlement of over 1.6 million poor people. The common practice is to complete engineering construction in the first year, conduct relocation of people in the second year and resume regular production in the third year. At present, encouraging achievements have been made for the pilot project. For example, most people resumed their production activities in the second year of resettlement and gradually raised their income; in this way, the subsistence issue can be basically resolved for these relocated people. The eco-system protection could also

be facilitated. In the past, people living in mountainous area cut down trees for fuel and they build bio-gas digesters after their resettlement. In this way, forests can be protected by reducing timber cut. Infrastructure construction could be carried out in a coordinated way such as the building of houses, transportation network, roads and drinking water facilities. It could also have a well-structured outlay of schools and clinics to substantially improve people's production and living conditions.

Chapter 6 Development of Township and Village Enterprises

I. Objectives and Tasks

The Guidelines of the 11th Five Year Plan for the National Economic and Social Development of the People's Republic of China sets goals for TVEs as follows: to persist in management improvement and technological innovation, contribute to farmers' entrepreneurship, employment and income rise, better the production mix and service, enhance capacity and market competitiveness, and continue reform and development. By the year 2010, their gross output value is expected to strike at RMB 7.98 trillion, industrial output value at RMB 5.75 trillion, value of export delivery at RMB 3.48 trillion, and turned-in tax at RMB 820 billion. From 2006 to 2010, rural labors that are attracted to these enterprises will total about 45 million, averaging at 9 million every year.

II. Latest Development

(a). Major indicators grow at a fairly rapid rate, and function well as a whole. In 2006, TVE's added value reached RMB 5.7955 trillion, rising by a year-on-year 13.83% with a slightly higher growth rate than the same period of last year. In all TVEs, industry remained as the dominating sector, creating an added-value about RMB 4.0864 trillion with a year-on-year rise of 13.86%, and well-connected link of production and sales. The overall quality of the economy ran at a steadily rising pace.

(b). Scale producers play a pivotal and supporting role for TVEs. Enterprises with scale production⁶ created an added-value of RMB 2.8847 billion the same year, representing a year-on-year rise of 16.78% which was 10 percentage point higher than those below the scale production level, and a share of 70.6% of the total industrial added value,. All indicators for scale enterprises were rising much faster, about 3 percentage points higher than the average growth rate of TVEs. The number of scale enterprises in TVEs is growing.

(c). Agro-processing becomes new spotlight for TVEs. In 2006, agro-processing enterprises of scale production created an added value of RMB 956.4 billion, representing a year-on-year rise of 16.75 %, including a value of RMB 278.7 billion created by food industry (covering agri-food processing, food making and beverage producing sectors) which grew by 16.79% year on year. The added value created by agro-processing took up 29.14% of that by industry TVEs of production scale, making it an important sector and driving force behind TVE industries.

⁶ Enterprises with an annual turnover of higher than RMB 5 million

(d). The tertiary industry is developing fast, and the production mix of TVEs is becoming more rational. The Ministry of Commerce has implemented projects like Franchised Markets in Thousand Towns and Ten-thousand Trustworthy Stores in rural areas. Municipalities and Coastal provinces, including Shanghai, Beijing, Zhejiang, Jiangsu, Shandong, Guangdong, have in place preferential policies to speed up the growth of tertiary industries, which has greatly contributed to improving the consumption environment in villages, and small towns in particular. More and more TVEs have diverted some investments to rural tour and services, thus leading to a fast development of rural tertiary industry which involves sightseeing, tour, holiday entertaining and transportation. In 2006, TVEs that were engaged in the tertiary industry created an added value of RMB 1.2733 trillion, with a year-on-year growth of 14.07%.

(e). Job seeking conditions are ameliorated for rural workers and the number of off-farm job seekers is increasing. In 2006, the Chinese Government released Proposals on Addressing Issues of Farmer Workers, which abolished barriers that had prevented farmer workers from looking for jobs in cities and in other regions, opened all the public job-recruiting agencies to rural labors by providing free services such as policy advice, recruitment information, job-seeking guidance and recommendations. According to surveys, there were about 118.91 million rural labors that sought off-farm jobs nationwide in 2006 (7.05 million more than that of last year at a rate of 6.3%), and about 126.09 million in 2007 with a rise of 7.18 million than previous year at a rate of 6%.

III. Means of Implementation

(a). The direction of TVEs shall be based on the guideline of Scientific Outlook for Development. Labor-intensive TVEs shall be promoted to employ more rural laborers and increase their income. Immigrant rural workers and persons with intelligence shall be supported to start up businesses in their hometowns, which could also contribute to the local employment. Rural industrial supply chains shall be extended to establish belts of agro-products farming and belts of agro-processing industries in different regions with their own comparative advantages.

(b). Development of agro-product processing industry shall be stressed with the focus on expanding government's function of supervision and services. Campaigns to promote agro-processing industry shall be launched, with experts being organized to carry out specific researches over the processing of grain and oil, groceries and animal products. The function or role of the government in terms of supervision and services shall be strengthened as the Central Government has empowered the Ministry of Agriculture with the function to supervise agro-processing industry. At present, agricultural bureaus in various local governments have already started the new function, with an aim to seek more preferential policies to support the

development of agro-processing industry.

(c). Enterprises' independent innovation capacity shall be built up with the promotion of significant key technologies as the priority. Key agro-product processing technologies shall be advocated while selected results of researches and studies in related areas shall be fully utilized. A preliminary quality & safety system for agro-processing industry shall be established.

(d). Regional cooperation and village-enterprise interactions shall be encouraged to achieve industrial concentration. The 'regional cooperation and enterprise-village interaction' strategy aims to introduce the advanced operational methods, business management concepts, equipment and technologies from TVEs to village farmers so that the traditional stereotyped 'farmers, agriculture and rural area' could be transformed and modernized. Agro-product trade fairs and exhibitions shall be organized.

(e). Training and employment for rural labor forces shall be strengthened. Ad hoc (specific) funds shall be arranged in the central and local budgets to support the 'sunshine project' aiming at offering non-agricultural skills to rural laborers via training. From 2006 to 2007, the central budget had arranged 1.5 billion ad hoc funds, which trained 8.8 million rural laborers with 85% percent of the trained laborers being employed in non-agricultural sectors. The exporting and importing places of rural labor forces had strengthened their cooperation by sharing employment information (supply and demand) and organizing various forms of job markets, recruitment fairs and other cooperation mechanism for employment. As a result, an effective demand and supply platform had been formed.

(f). Strengthen employment supervision and social services. Wage-payment supervision system, wage-deposit system and other wage (salary) payment warranty system shall be established fully, and minimum wage and minimum hour wage systems shall be strictly observed. Employment contract system shall be widely promoted and labor safety and health system shall be strictly observed to ensure the immigrant laborers' personal safety could be safeguarded. In addition, immigrant farmers shall have access to public services. And a social security system that fits for the immigrant workers shall be explored positively.

IV. Obstacles and Challenges

(a). Regional disparities still stands out, and the gap between the western, central and coastal areas becomes further widened. In 2006, added values of TVEs in the eastern, central and western regions accounted for 67.18, 27.01 and 5.81 percent respectively in the country's total. Compared with the same period of 2005, the figure of the eastern areas increased 0.58% while the central and western area decreased 0.58% accordingly. The total amount of added value of Zhejiang, Shandong, Jiangsu,

Guangdong, Hebei and Liaoning provinces, coastal provinces whose TVEs have an annual turnover of over 1 billion Yuan respectively, is twice that of all the provinces in the central and western areas.

(b). Expanding labor demands of TVEs could not be satisfied due to the limited capacity and poor innovative ability of the rural laborers. On one hand, skilled workers are in shortage due to the enterprises' quick production expansion, and on the other hand, the poor welfare and salary system disappointed job-seekers greatly, making them very reluctant to work in TVEs. A structural shortage of workers for TVEs has occurred with most of the on-job workers' quality being very poor.

(c). Shortage of energy, land, transportation and other production factors remains a headache for most enterprises, and capital restraints still stands in the way of the development of TVEs. With the series of measures to construct a thrifty (saving) state, the restraints of energy, land and transportation as well as other production factors are expected to exert impact on the reproduction expansion capacity of TVEs. To make things worse, the price hike in coal, oil, electricity and transportation demands for more operational capital. When being forced to invest much bigger quantities of capital in the production stage, enterprises would soon find themselves in greater shortage of funds.

(d). Poor labor skills and low efficiency in collective job seeking. Training for rural laborers is still at a very preliminary stage, with poor and backward training conditions. Lack of adequate training in complicated skills directly resulted in the poor quality of rural laborers, which could not meet the demand for skilled workers. The employment service system still needs to be improved greatly, and collective job seeking is very rare. In fact, most of the immigrant workers still rely heavily on the help of their friends and relatives to find jobs.

(e). A system to ensure equal employment between the rural and urban workers is not yet in place and the immigrant workers don't yet have sufficient access to public services. Due to the slow progress of reforms on the urban-rural administration and employment systems, many policy and regime barriers remain discriminatory factors for rural immigrant workers. For example, the children of some rural immigrant workers could not enjoy compulsory education in the working places of their parents, and most of the rural immigrant workers still face training, employment, living and housing problems. The social security network for rural immigrant workers remains to be strengthened greatly, especially in terms of its coverage and effectiveness.

V. Countermeasures

(a). Continue to promote cross-regional cooperation of TVEs from the eastern and western areas, and encourage them to participate in the process of 'rectifying the old industrial bases in the northeastern China'. Cooperation modes shall be diversified so

that online communication and exchanges could be actively promoted on the basis of traditional trade fairs. In terms of cooperation range, multi-tier cooperation between enterprises, cities, and provinces shall be encouraged as complementary to national wide economic cooperation. In addition, regional cooperation shall be more specialized to enhance the cooperation efficiency so as to pin down the specific needs of cooperating parties.

(b). Optimize the industrial structure and layout of TVEs. TVEs shall be guided in industrial upgrading, optimization and restructuring to eliminate backward productive methods in accordance with market changes and national macro-control policies. Where conditions permit, enterprises shall be supported to develop new high tech industry and the tertiary industry, such as supporting industry and modern service industry. The percentage of the forgoing industries shall be increased. TVEs shall be guided to concentrate to small cities and towns as well as industrial concentration places to give better play to the concentration effect so that relevant industries could enjoy a more coordinated development.

(c). Continue to improve the township enterprise service system, with the focus on the establishment of a township enterprise credit guarantee system composed of non-profit (policy), commercial and mutual guarantee institutions with guarantee and re-guarantee mechanisms in place. Direct financing channels shall be widened by establishing a township enterprise listing preparation system and a venturing capital investment system. The township enterprise information online service system shall be formulated to provide an online information service platform that caters to the needs of TVEs, social intermediaries and competent authorities. Small enterprise start-up guiding centers and public technical service platforms shall be established to foster a supporting service system that cultivates (hatching up) small enterprises. A township enterprise laborer training system shall be introduced to train the workers as needed in a well-planned way to enhance the overall quality of the laborers. A comprehensive system composed of technical supporters, management consultants; market exploring and legal service providers as well as industrial associations shall be established step by step.

(d). Continue to promote the 'walk out' strategy of TVEs. All round foreign exchange and cooperation activities shall be carried out. Supporting services shall be provided to enterprises in key provinces (autonomous regions and municipalities) to follow up the cooperation and investment projects with their Russian counterparts. Seminars on agro-processing industry and TVEs' foreign economic cooperation shall be organized.

(e). Energy saving and emissions reduction campaign shall be strengthened. Clean production and recycling concept shall be introduced to encourage TVEs to formulate industrial recycling clusters, recycling production and recycling of resources. A number of energy saving and clean productive enterprises shall be cultivated to increase the comprehensive utilization rate of the resources and promote the

fundamental shift of economic development modes.

(f). Technical innovation system for agro-processing industry shall be improved with relevant agro-processing projects being duly implemented. Powerful measures shall be adopted to encourage enterprises to make technical innovations and add more technical contents and values to their products. Technical innovation system shall rely mainly on enterprises while promoting the practice of production-study-research combination. Academies, researching institutes and universities shall be encouraged to jointly establish research and development centers with enterprises to enhance the renovation capacity of the latter.

(g). Key agro-processing technologies shall be promoted and large scale technology matching activities shall be organized. Energy-saving fruit and vegetable dehydration techniques and peanuts aflatoxin controlling techniques shall be promoted in the regions where conditions permit and where enterprises have a strong interest. Advanced storage methods shall be promoted to solve the serious after-harvest losses of potatoes due to the backward storage methods in China. Large agro-processing technology matchmaking fairs shall be organized.

(h). Guidance to start up small and medium sized agro-processing enterprises shall be provided. It is encouraged that agro-processing business start-up guiding centers be established in places near the major consumption market or where there are abundant agricultural products and raw materials. Such start-up trainings shall be provided to farmers who returned to their hometown with an aim to start up businesses, capable persons, veterans, demobilized soldiers and college students who have returned home. Small and medium-sized processing enterprise hatching centers shall be established in places with abundant agricultural raw materials and in places where there are good market demands.

(i). Training shall be strengthened to transfer the rural labor forces to various non-agricultural sectors. Training subsidy standard shall be lifted and training contents shall be enriched, especially in terms of law, occupational health, production safety and epidemic disease prevention, etc. Meanwhile, more training of complicated skills shall be carried out. Grassroots level training institutions shall be furnished with better facilities so that they could enhance their training quality. Practical measures shall be taken to ensure the training management system is in place. While rural laborers shall be encouraged to seek jobs outside their hometown, they shall also be encouraged to get employed in the local market or in the vicinity areas of their locations.

(j). Standardize the protection of laborers. *The Law on Employment Promotion* and *the Law on Employment Contracts* shall be advocated so that enterprises and rural immigrant workers could know better of their own lawful rights and obligations and be aware of the laws. Relevant supplementary laws and regulations shall be

promulgated to set up and promote the wage guarantee system for rural immigrant workers. Supervision against enterprises shall be strengthened in terms of employment to ensure that more labor contracts could be signed. The occupational safety and health system shall be strictly observed to safeguard the personal safety of the rural immigrant workers. Law enforcement efforts shall be intensified to protect the lawful rights of rural immigrant workers.

(k). Improve public services. The insufficient access to school problem faced by the children of rural immigrant workers shall be tackled by tapping the accommodation potentials of public schools and by supporting and standardizing private schools that cater to the specific needs of those children. Epidemic disease prevention and control among the rural immigrant workers as well as vaccination & immunity measures for their children shall be stressed. Meanwhile, their housing, inhabitation and medical conditions shall be improved. Rural immigrant workers shall be covered by medical insurance if hospitalized during their employment in cities. In the end, a proper pension system featured with low premium, wide coverage and mobility for rural immigrant workers shall be explored to constitute a seamless scheme with the rural and urban pension systems that has already been in place.

(l). Continue to reform the current employment system. Rural labor forces shall be incorporated into the local employment planning, and the segmented employment management system shall be eliminated so that rural and urban laborers, local and outside rural workers could enjoy equal employment opportunities. The reform of the Hukou system shall be actively explored and rural immigrant workers who enjoy a regular residence and income shall be granted an urban Hukou so that they could better integrate themselves into the urban life.

VI. Case Study--- Hunan Province: promoting the development of TVEs with a modern concept of industrialization

Hunan province has actively encouraged TVEs to develop green agro-processing, service and new high tech industries. After a few years' development, and by the end of 2007, the total number of agro-processing industries had reached 42000, with 2400 having comparatively large scales. Tertiary industry in the countryside had also boomed, especially in the field of entertaining agriculture, with more than 4000 entertaining farms having good scales, employing about 120 thousand people. According to statistics, by the end of 2007, the output value of township agro-processing and service industries had accounted for 47.5% of the province's total, which led to an optimization of TVEs' structure and a much closer relationship between them and the rural residents.

Meanwhile, Hunan province has also encouraged the enterprises to cooperate with researching institutes and universities with an aim to make breakthroughs in terms of innovation capacity, product quality and core competitiveness. Driven by demand of

enterprises during development, joint establishment of R&D centers by leading enterprises and researching institutes on key areas have been set up, greatly enhancing the enterprises' independent researching and development capacity. A good number of scientific and technical staff is recruited into enterprises through the cooperation between enterprises and scientific researching institutes. Since 2004, Hunan launched an annual matchmaking fair to promote the cooperation between enterprises and researching institutes. According to statistics, by the end of 2007, more than 60 research institutes, 110 leading enterprises had joined in such cooperation, with more than 200 projects being incepted. Through these matching, a great number of leading enterprises and researching institutes had established cooperating partnerships with one another, speeding up the translation of research achievements into productive forces and providing a strong technical prop to the development of enterprises. Some enterprises had established joint R&D centers with academic institutions to focus on the development of high and new tech products with their own intellectual property rights, which in turn, sharpened their competitive edge. With the development of technological level of the enterprises, a great number of famous trademarks and brand products had been cultivated. By the end of 2007, Hunan province had cultivated 11 national famous trademarks, 18 national famous brand products, 165 Hunan famous trademarks and 170 Hunan famous brand products.

Hunan province keeps improving the interest-concurring mechanism that links agro processing enterprises and farmers with a clear purpose to increase the farmers' income and get them rich. Specialized farmers' cooperatives had been developed to cater to the demand of leading enterprises, with many new cooperation modes, such as the 'company + bases + industrial associations + farmers', 'company +bases +farmers' and 'contract farming', etc, which led to a closer cooperation between the leading enterprises and the farmers as well as a stronger capacity of the latter to get rich. By the end of 2007, agro-processing supporting bases of 4.37 million hectares had been established, involving 7.49 million rural households, accounting for half of the province's total. 16800 specialized agricultural cooperatives had been established with 7 million farmers as members, among which, the number of cooperatives cooperated with leading enterprises reached 21% of the total, involving 21% of the total households. Contract farming system had been steadily improved; with agro processing enterprises providing loan guarantees, technical services and price protections (bottom price procurement) to farmers. The total area of contract farming of the province had been on an increase, with 45% of the major cash crops and 40% of animal husbandry products being contracted beforehand. Due to the rational division of labor, and with more values being added to the agro-products, the difficulties of agro-products selling were fundamentally overcome, and thus brought more benefits to the farmers. From January to November of 2007, the average personal income of farmers participated in the agricultural industrial chains was 1020 Yuan higher than the provincial average.

Chapter 7 Protection of Rural Ecological Environment

I. Objectives and Tasks

The departments concerned of the Chinese Government issued the *Opinions on Strengthening Environmental Protection in Rural Areas* in November 2007, which specified that: by 2010, the growing trend of rural environmental pollution shall be contained and the eco-system quality of rural drinking water source be improved; the status of national soil pollution and agricultural pollution sources shall be found out, preliminary progress be made in the control of agricultural non-point source pollution, the coverage of soil testing and formulated fertilization techniques and the use of high-effective, low-toxic and low-residual pesticides be raised by 10 percent, and the resource utilization rate of rural animal droppings and treatment rate of domestic wastes and waste water be raised by at least 10 percent; modifications on rural drinking water systems and latrines shall be well advanced, with 65% percent of the rural areas covered by hygienic latrines, and major rural environmental and health hazards under control; the prevention and control of industrial pollution and domestic pollution in the rural areas shall yield preliminary results, ecological demonstration activities be intensified, the capacity of monitoring and control of rural environment be reinforced, public awareness of environment protection be raised, and the living and productive conditions of the farmers be improved.

By 2015, the habitat environment and ecological systems in rural areas shall be improved markedly, the growing trend of agricultural and rural non-point pollution be contained, the capacity of monitoring and control of rural environment and the public awareness of environmental protection be raised, thereby achieving concerted social-economic and rural environment development.

Seven major tasks were identified pertinent to the objectives listed above: (1) concrete efforts shall be made on environmental protection of rural drinking water sources and improvement of water quality; (2) domestic pollution abatement and control in the rural areas shall be vigorously pursued; (3) industrial pollution in rural areas shall be put under stringent control; (4) prevention and control of pollution related to animal raising and aquaculture shall be strengthened; (5) rural non-point pollution shall be controlled; (6) prevention and control of soil pollution shall be actively dealt with; and (7) protection of rural natural eco-systems shall be reinforced.

II. Latest Development

(a) Basic work of rural environmental protection was strengthened. *The Regulations on Wild Plants Protection* and *the Regulation on the Safety Administration of Agricultural GMOs* were formulated and implemented. Legislation work has been launched for the prevention and control of pollution related to animal farming. Technical best practices and administrative rules have been developed to step up the prevention and control of pollution related to animal farming, the safety of places of origin of agricultural produces and environmental protection in small townships. At local levels, a series of policies and measures have been issued to strengthen the work on rural and agricultural environmental protection. The National Survey on Soil Pollution and the Census of Agricultural Pollution Sources have been launched. And surveys on rural drinking water sources have been conducted in some localities.

(b) Preliminary results were achieved in the comprehensive remediation of rural environment. In recent years, comprehensive remediation actions have been taken nationwide and concrete progress has been made in ensuring rural drinking water safety; prevention and control of pollution related to animal farming; rational use of agri-chemicals; rural bio-gas; prevention and control of industrial pollution in rural areas; remediation of rural rivers and watersheds:

——Rural drinking water safety improved. During the Tenth Five Year Plan period, a total of 22.2 billion yuan of state bond funds, allocated by the central government, local input and self-mobilized funds was invested in improving rural drinking water quality, and the so-called Rural Drinking Water Project helped 67 million farmers out of water shortage. In 2006 and 2007, China solved drinking water safety issue for 28.97 million and 31.52 million people, respectively. By the end of 2007, there are 252 million people in China facing drinking water safety issue, a decrease of 127 million compared with 2000.

——Demonstration of pollution prevention and control in animal farming is well advanced in key watersheds and areas. Chinese Government focuses its demonstration work in three major rivers, three major lakes, as well as in Yangtze River delta, Pearl River delta and Yellow River delta.

——Control on safe use of pesticides and fertilizers is tightened. Soil testing and formulated fertilization is implemented to prevent non-point source pollution caused by improper use of fertilizers, pesticides and film, thereby ensuring the safety of agricultural products. The establishment of organic food production bases, while helping protect rural environment, boosts local economic growth.

——Monitoring and control of rural environment is reinforced. In recently years, 3.95 million persons/times worth of enforcement operations were dispatched to inspect 1.72 million enterprises/times. 45,000 cases of environmental law irregularities were dealt with and many heavily polluting enterprises inconsistent with relevant policies were closed down.

——Rural bio-gas achieved prominent results. By the end of 2006, the number of rural household bio-gas digesters reached 22 million nationwide. There are about 17,475 agricultural waste bio-gas spots and 130,793 domestic waste water purification bio-gas spots. A total of nearly 198 million energy-saving stoves and

heatable brick beds have been put into use. 122 straw gasification bio-gas stations were built and straw bio-gas was extended to 5104 household.

—Ecological protection is enhanced. China's forest coverage keeps growing and stock volume of forest is on a steady rise. According to the Sixth National Forest Resources Inventory (1999-2003), the total forest area is 174,909,200 hectares, with forest coverage of 18.21%, a standing stock volume of 13.618 billion cubic meters and a stock volume of forest of 12.456 billion cubic meters. By the end of 2007, 230 million hectares of grassland have been contracted in the country, equivalent to over 70% of the total usable grassland; area of non-grazing, delay and rest grassland reached 930 million hectares. 28 million hectares of cultivated grass were retained and over 60 million hectares of grassland were fenced.

(c) Extension of fertilizer and pesticide saving techniques. In 2006, subsidized projects of soil testing and formulated fertilization were implemented in 600 key grain producing counties. Soil testing and formulated fertilization was applied a total of 900 million mu/times, and free testing and fertilization services were provided to 140 million farm households. Large scale trainings on pesticide safe use techniques were conducted to raise the awareness of farmers of safe use, helping them to alter improper use and thus reduce environment pollution by pesticides.

(d) Agricultural wild plants protection. Surveys on agricultural wild plant resources were conducted, using GPS, to identify the geological location, zone, area and distribution. A number of agricultural wild plant resources were collected and conserved *ex situ*, fearing their extinction. Identifications and assessments of the outstanding properties of wild rice, wild fruit trees, wild soybeans and tropical wild plants resources were conducted, and R&D and demonstrations were made with wild soybeans, wild rice and wild buckwheat rhizome. By 2007, 84 *in situ* conservation spots have been set up covering important agricultural wild plants such as wild soybean, wild rice, wild citrus and wild lotus.

(e) Conservation of aquatic organism resources. In February 2006, the State Council issued *the Action Plan on China's Aquatic Organism Resources Conservation*, which identified three key conservation actions, i.e. conservation and enhancement of fishery resources, biodiversity and protection of endangered species, protection and restoration of watershed ecological system. According to tentative statistics, during the period from 2004 to 2007, 64.5 billion of aquatic organism fingerings were released to the seas or to inland waters nationwide; over 90 new species were enhanced; 97 artificial reefs were built; and 1.26 million cubic meters of artificial reef bodies were planted. The increasing introduction of new species is starting to yield results in generating income for fishery communities.

(f) Prevention and control of foreign invasive species. Prevention and control actions were taken in key areas to eradicate and detoxify harmful organisms. Specialists and experts were invited to the fields to provide technical guidance and advocacy. 1.33

million hectares of foreign invasive species were eradicated by manual elimination, chemical elimination or displacement control. Information database on major agricultural harmful organisms and foreign species was preliminarily established; risk assessment and early warning research were made; fast testing techniques were developed to detect harmful foreign organisms; a series of prevention and control techniques were developed, thereby providing technical and expertise guarantee to the prevention and control work.

(g) Further progress in rural ecological demonstration programme. Since the Tenth Five Year Plan (2001-2005), China has gradually set up an ecological demonstration system, comprising of Eco-Provinces, Eco-Cities, Eco-Counties, Environment Friendly Townships and Eco-Villages. By the end of 2007, 320 counties (districts) were granted the title of National Ecological Demonstration Zones, 425 townships the title of National Environment Friendly Townships. Actions to build model villages for eco-conservation and cultural development were taken in provinces, municipalities or regions such as Hainan, Hebei, Guangxi, Guangdong, Xinjiang, Ningxia, Beijing, Shandong, Jiangxi, in the process of which the localities have committed themselves to the readjustment of industrial structures, the development of eco-economy, the restoration of eco-systems and the revitalization of eco-culture, thereby having improved the rural environmental quality in the pilot areas.

III. Means of Implementation

(a) Laws and policies as guarantee. In recent years, Chinese government stepped up the development of the legal system for the protection of rural ecology and environment and a series of laws and regulations were promulgated. *The Law on Energy Saving* and *the Law on Renewable Energy* were promulgated; the *Law on Grassland* is revised; *The Regulations on Wild Plants Protection* was issued; *The Eleventh Five Year Plan for the Protection, Construction and Utilization of Grassland*, *the Mid- and Long-term Plan for the Development of Renewable Energies*, *the National Plan for the Development of Rural Bio-gas*, *the National Plan for the Development of Bio-energy* and other action plans were formulated. *The Action Plan on China's Aquatic Organism Resources Conservation* was also promulgated. These laws and regulations have provided strong support to the protection of rural ecology and environment. At local levels, a number of locally-tailored regulations and standards were formulated and implemented. Efforts were made in exploring rural ecological compensation mechanism and the principle of 'He who utilizes protects; he who damages restores; he who benefits pays' was applied in the search for the right pattern of rural ecological compensation.

(b) Financial support strengthened. Chinese government has added financial support to the protection of rural ecology and environment and a total of over 10 billion yuan has been invested in the implementation of grazing withdrawal and grassland management, and the remediation of the sandstorms sources to Beijing and Tianjin.

Support to soil testing and formulated fertilization was also increased. In 2006, allocations by the central government were 200 million yuan directed to soil testing and formulated fertilization programme, covering 200 counties; in 2007 the allocations were 500 million yuan, covering 600 counties. By 2006, the central government had invested a total of 6.12 billion yuan in the field of rural energy. In order to deal with rural environmental pollution, notably the treatment of rural domestic sewage and wastes, many efforts were made at all levels on the search and practice of various solutions. The Rural Cleaning Projects, implemented in several provinces and municipalities, achieved desirable results by comprehensive disposal and treatment of rural domestic wastes, with natural villages being the basic units. The division-by-household, collection-by-village, transportation-by-township and treatment-by-county model was gradually extended, upgrading the levels of non-hazardous waste treatment.

(c) Scientific and technological supports reinforced. The scientific and technological inputs and supports were increased in the protection of rural ecological environment. R&D efforts were commissioned on renewable agricultural technologies such as resource utilization of wastes, breeding of bio-energy crops, restoration of soil pollution, selection and breeding of new grass varieties, monitoring of grassland resources, disease and pest control and resources-saving agriculture. New models of eco-friendly villages were also explored, key elements of which include rural bio-gas, rural cleaning projects, purification of domestic waste water and animal farm bio-gas projects.

(d) Advocacy stepped up. In connection with World Environment Day, World Earth Day, World Water Day and other thematic activities, mass media of radio, television, newspaper and internet were used to advocate and disseminate knowledge about rural environmental protection and to report stories of advanced models and successful experiences, so as to raise environmental awareness of rural public and to mobilize the incentives and originality of the farmers in participation in rural environmental protection.

IV. Obstacles and Challenges

(a) Acute shortage of agricultural resources. China is one of countries that suffer from severe shortage of agricultural resources, and the conflict between resource constraints and economic growth is increasingly prominent. Water shortage is of particular concern. The per capita availability of arable land is less than half of the world average. In recent years, the conflict between people and land is ever more acute because of land lose caused by construction land use, withdrawal from cultivation and disaster damages. Grassland resources were gravely compromised and its productivity is low. Countrywide, there are 135 million hectares of grassland lost to degradation, desertification or alkalization, about a third of the total grassland, a trend that still evolves at the rate of 2 million hectares a year.

(b) Low efficiency in the comprehensive utilization of resources. In 2006, China's irrigation water use efficiency was barely 46%. Land cultivation and utilization intensity is high and land rehabilitation is often neglected, causing serious degradation of soil fertility. The annual availability of China's straws is about 650 million tonnes, over 40% of which are discarded or burned, explaining the low overall efficiency of utilization. China produces about 2.7 billion tonnes of animal droppings a year, most of which are not utilized as a resource.

(c) Rural environmental pollution worsening. About 1 million tonnes of domestic wastes are produced everyday in China's rural areas. Most of domestic wastes and waste water are not treated, becoming not only mosquito and fly breeding sites, but also an important pollution source of surface and underground water. China's annual use of chemical fertilizers exceeds 47 million tonnes, the utilization efficiency of which is generally low. For instance, the current season utilization rate of nitrogen is only about 35% and that of pesticides 30%. The burning of straws is not uncommon in some areas, causing, in extreme cases, closures of airports and highways and directly threatening human health.

(d) Legislations and systems for rural environmental protection incomplete and monitoring and control capacity weak. The work of rural environmental protection suffered from a late start and weak groundwork. Specialized legislations for rural environmental protection are not in place. For example, no legislation is ready and applicable in the prevention and control of pollution related to animal farming, prevention and control of non-point source pollution, prevention and control of soil pollution as well as in resource utilization of agricultural wastes. The monitoring and control capacity of rural environment is weak. Most local environmental agencies is hindered by old and backward facilities and lack of staff, unable to properly discharge the functions of monitoring and control of rural environment.

(e) Development of rural environmental infrastructures lagged and non-point source pollution severe. Ever so long, villages and townships have been lacking treatment facilities for domestic sewage and wastes, which constitute major sources of habitat pollution. A considerable portion of industrialized animal farms does not have essential treat facilities. The outflow of pesticides and fertilizers has become a major cause of water pollution in some rivers and lakes.

V. Countermeasures

(a) Innovate in working mechanism. Governments at all levels should intensify guidance and support to farmers, fully respect farmers' wishes and mobilize farmers to improve their homeland by their own efforts while at the same time, real benefits should be shared by farmers. We shall introduce the modern property management system to demonstration villages to explore the way of establishing a long-term mechanism so that villagers can make their own management decisions, operation

will be done by professionals and beneficiaries must pay.

(b) Consolidate projects. Attention should be given to strengthen coordination, synthesize resources, give full play to the capital, human and technical strengths of different projects and guide all agencies and all social sectors to actively participate in rural eco-environmental protection. We shall explore ways of setting policies and mechanisms for agricultural eco-compensation and increase financial inputs for this purpose. The market mechanism should be introduced to encourage enterprises, social organizations and individuals to invest in the protection of agricultural and rural environment.

(c) Enhance scientific innovation and the extension of practical techniques for rural environmental protection. The control of rural pollution should be driven by scientific innovation and applicable techniques should be developed to promote rural environmental protection, such as the protection of source areas of drinking water in rural areas, sewage and waste disposal in villages, integrated utilization of agricultural wastes and non-point source pollution in rural areas. Training courses and pilot demonstration projects shall be strengthened in the field of rural environmental pollution control techniques.

(d) Intensify surveillance and management. We shall establish and modify the early warning system for rural environmental monitoring. Efforts should be made to establish standards and methods for the monitoring and assessment of rural environmental quality in order to carry out relevant work. We shall strengthen the environmental monitoring in key areas such as sources of drinking water, nature reserves and basic farmland. Capacity for emergency response shall be built up in rural areas. Stringent measures shall be adopted for environmental management in construction projects while the environmental impact assessment shall be conducted according to law and the practice of '3-simultaneousness' for environmental management must be implemented. The water resources verification system shall be followed for construction projects. Efforts should also be intensified for the training of rural administrators and technicians at grass-root level for environmental protection.

(e) Create favorable atmosphere. We shall improve our policy outreach and training programs, take full advantage of all media resources to have extensive and in-depth coverage of agriculture and eco-environmental protection, raise the awareness of regulatory officials and the public and mobilize the public to participate on a voluntary basis. In this way, the favorable atmosphere will be created with the guidance of governments, support of all social sectors and participation of the general public.

6. Case Studies

(a) Conversion of grazing land for grassland

The state launched the Conversion Program of Grazing Land for Grassland in 2002. By 2007, a total area of 34.6 million hectares had been arranged for fence building, among which 16.53 million hectares were prohibited for grazing, 17.33 million hectares were for grazing moratorium, 856 thousand hectares were for rotation grazing and 6.573 million hectares of degraded grassland were replanted. Through the practice of grazing prohibition, moratorium, rotation and replanting, tangible eco-benefits have been achieved in 8 provinces namely Inner Mongolia, Sichuan, Yunnan, Tibet, Qinghai, Gansu and Xinjiang as well as in the Xinjiang Production and Construction Corps. It was stated in the *National Grassland Monitoring Report 2006* by the Ministry of Agriculture that the vegetation coverage rate increased by 29%, vegetation height 64%, grass production 78% and edible grass production 82% thanks to the implementation of the Conversion Program, which also pushes forward the enforcement of grassland contracting system and grassland protection system, facilitates the change of production and management methods of animal farming on grassland and mobilizes farmers and herders for grassland protection. Meanwhile, the policy of feed grain subsidy within the framework of the Conversion Program directly helps to increase the income of farmers and herders in program areas.

(b) Development of circular agriculture by Shandong Jiufa Group

In agricultural eco-system, straws and stalks are the major wastes in crop production while manure is the main waste in animal and poultry production. Shandong Jiufa Edible Fungi Corporation develops new technology to use crop residues and chicken feces to produce *Agaricus Bisporus* (button mushroom), building an important production base in Asia.

The major model adopted by Jiufa Group for circular development of wastes is as follows: use crop residues and chicken feces to make culture medium for the production of *Agaricus Bisporus*; conduct refined processing of *Agaricus Bisporus*; processing leftovers are used to improve soil fertility and produce compound fertilizer which will be used for the production of asparagus and carrots in Jiufa Production Bases; asparagus are also be processed and carrots are used to produce carrot juice; Jiufa Packaging Material Company provides packaging materials for products produced by all other branch companies and Jiufa Heat and Power Plant supplies power and steam required by all other branch companies.

The comprehensive utilization of wastes is the most typical characteristic of Jiufa Model. Within this industrial conglomerate for edible fungi, the ecological association is established through the exchange of wastes, products and energy, thus formulating an eco-industrial chain. Starting from crop and animal farming, multiple eco-industrial chains have been established, such as crop farming→animal & poultry farming→*Agaricus Bisporus* production→refined processing of farm products;

Agaricus Bisporus production→compound fertilizer→crop farming; compound fertilizer→asparagus production base→refined processing of farm products; compound fertilizer→carrot production base→fruit & vegetable juice production; heat & power plant→packaging material company, Agaricus Bisporus production, refined processing of farm products, fruit & vegetable juice production plant; packaging material company→Agaricus Bisporus production, refined processing of farm products, fruit & vegetable juice production plant. Through the share of substance, energy and information, these chains interconnect with each other horizontally and establish an eco-network with the integration of crop farming, animal farming and industrial development.

Through the integrated utilization of wastes, Jiufa Group established the eco-system of circular industry and found a fairly satisfactory solution to the major problem of environmental pollution caused by agricultural production. They successfully get the added value of farm products and at the same time reach the targets of environmental safety, resource safety and food safety.

(c) Dispersed sewage disposal pattern in rural areas of Changzhou City

Changzhou City is located in the alluvial plain of the Yangtze River and the water network has the features of reciprocating flow, slow current velocity, small flow volume and limited environmental capacity. A new concept of sewage disposal and control for small cities and towns was put forward in Changzhou City Drainage Plan (2004-2020). Towns would share their resources to build five sewage disposal plants in towns of Benniu, Huangli, Hengshanqiao and Jiaoxi. However, even if the sewage disposal plants were established, it would still take a pretty long time to put sewage and environmental pollution under control for towns far away from city areas due to the long construction cycles and large financial inputs.

How to find an environmentally friendly, technically reliable and economically viable solution for water pollution control in towns and villages far away from city areas? It is one of the priorities identified by China-German Technical Cooperation Program for Eco-city Planning and Management in Changzhou City. The China-German joint research group, on the basis of advanced German eco-technology, produced a set of applicable techniques which are technically reliable, economically viable and suitable for the building of a new countryside. That is the dispersed sewage and sludge disposal system based on the technology of vertical undercurrent ecological filter.

The technology of artificial wetland, which is based on the vertical undercurrent ecological filter, is one of the effective engineering tools for dispersed sewage disposal. On the basis of full absorption and digestion of advanced German eco-technology, this joint research group focused on the development of dispersed sewage disposal system, which also contributed to sludge disposal, and established a long-term and stable system of wetland-based ecological treatment. The practice of

China-German Cooperation Program in Changzhou City for ecological sewage disposal makes it clear that its strength include low lump-sum input, low maintenance expenses (sewage disposal cost is 0.2 yuan per ton), reliable techniques, environmental safety (compliance discharge up to Grade-1 B) and beautiful landscape (botanic eco-landscape). It is a perfect combination of ecology and functions. The dispersed sewage disposal system has short construction cycle, small investment, no large-scale discharge of tail water and sludge, high efficiency, low operational cost and simple maintenance; therefore, the currently available physical and financial resources can be fully used to apply this technology by different stages and in different places. It is an ideal way for water pollution control and landscape improvement in city outskirts and rural areas of China. Each household only has to pay 2,000 yuan in average to build the dispersed sewage disposal system in towns and villages far away from city areas and pays less than 50 yuan each year for sewage disposal fee, thus providing a comprehensive sewage disposal package.

(d) Stock enhancement of aquatic resources and fish-fry release

Stock enhancement and fish-fry release should be regarded as an important way for fishery efficiency improvement and income increase of fishermen. According to incomplete statistics, from 2004 to 2007, a total amount of 780 million yuan was allocated by various places for stock enhancement, 64.5 billion fries/larva of more than 90 aquatic species were released, including large yellow croaker, prawn, sea cucumber, abalone, black carp, grass carp, silver carp, common carp, crucian carp, bream and mitten crabs, covering almost all major species suitable for release in different eco-types and fishing areas. The practice of stock enhancement helps to realize the goal of fishery efficiency improvement and income increase of fishermen. Monitoring data in recent years show that the catch of prawn, jelly fish, swimming crab and other major released species in coastal areas has increased substantially and the share of released freshwater species including the four major domestic fishes in inland water areas also went up. In 2005, 156 million jelly fish fries were released in Liaoning Province and the jelly fish catch in the same year was 14,400 tons with the production value of 100 million yuan. The ratio between direct input and output was 1:20. According to the primary estimates done by Shandong and Liaoning Province, the total catch in Shandong Province was 26,000 tons in 2006 as the result of stock enhancement, with 590 million yuan of production value and more than 100,000 direct beneficiaries while in Liaoning Province, the total catch was 13,000 tons with 110 million yuan of production value and additional 600 yuan of income per person was realized for fishermen in Liaodong Bay fishery ground. The practice of fishery stock enhancement not only creates remarkable economic returns but also plays an active role in alleviating the degradation of fishery resources and improving the eco-environment of water areas.

Chapter 8 Land Resource Management

I. Objectives and tasks

The goal set by *China's 11th Five-year Plan for National Land Resource* is to ease the restraint of land resource on social and economic development, establish a land resource distribution system which combines macro regulation with market mechanism, effectively slow down the rapid decrease of arable land, significantly strengthen the efforts to protect, nurture and improve basic farmland; maintain a total area of 120 million hectares of arable land in year 2010; keep the accumulated area of newly approved land for construction in the next 5 years within 1.8 million hectares, and consolidate and rehabilitate 1.15 million hectares of land to compensate the loss of arable land.

The 11th Five-year Plan of People's Republic of China for National Economic and Social Development and *The National 11th Five-year Plan for Agricultural and Rural Development* clearly state that during the 11th Five-year period, the Chinese government shall consolidate and improve the rural household contract operation system, adheres to the basic operation system in rural areas, further stabilize and perfect the land contract relations, and protect farmers' rights over the land they contracted in accordance with law. The prime goal during the 11th Five-year Plan period is to consolidate the two-tier system based on the household contract operation that integrates centralized and decentralized operation. In places where conditions allow, the right to contract and operate land can be transferred voluntarily and with payment in accordance to the law. Appropriately enlarge production scale through various forms, and provide sound arbitration service to the transfer of land contract right.

At present and for a time in future, the tasks in China's land resource management are as follows: First, implement the most stringent land administration system. Establish and improve legal system for land resource administration, rigorously carry out regulation on compensation for the occupation of arable land, and prohibit the action of offering low prices for land in order to invite investment. Strictly regulate the development and revision of overall land utilization plans, overall city plans, and township and village plans. Strengthen planning for land utilization, tight the control on the purposes land is used for, and improve management of land used for projects. Strengthen management over land for village or township development, and reform the examination and approval system for rural housing land. Improve evaluation systems for arable land protection. Second, vigorously promote saving and intensive utilization of land resource. Regarding to the land for construction, we shall control the total amount of it, strictly supervise the increase of it, tap the stock resource, and control the amount of agricultural land converted to land for construction. Establish

and improve standards on utilization quantity of land, and encourage the construction of standardized multi-floor factory buildings. Carry out land consolidation and rehabilitation in rural areas, readjust the distribution of residential houses in rural areas, limit the amount of land occupied by residential houses, and promote the rehabilitation of deserted land. Third, improve land marketing system. Give full play to the market mechanism in basic distribution of land resource, achieve breakthrough in forming a unified market for urban and rural land, improve the efficiency of land distribution system, increase the frequency of land exchange and transfer, enhance efficiency in land utilization, and improve government capacity in regulating land market. Establish the real-estate registration system; intensify research efforts on policies on land rights confirmation to perfect the land rights system. Improve the dispute mediation and settlement mechanism, enhance the capacity to ‘protect rights and interests, and serve the society’. Fourth, improve the mechanism to grant appropriate compensation to farmers whose land has been acquired by the government. Develop a more detailed land acquisition catalogue, cautiously exercise the right of land acquisition, and adopt the minimum level of compensation rate. Establish compensation standards for land acquisition based on scientific calculation, formulate a comprehensive compensation rate for an area of land under acquisition based on its conditions, offer same rate to land with same conditions, and ensure the living standards of farmers whose land is under acquisition do not worsen. Adopt transparent procedures in land acquisition, improve the hearing system, and intensify follow-up and supervision efforts concerning land acquisition. Fifth, strengthen survey, evaluation and monitoring of land resource. Conduct the second National Land Resource Survey, and establish dynamic monitoring system for land utilization at both national and provincial levels. Strengthen survey and monitoring of land market. Conduct survey and monitoring of land resource, ecosystem and environment.

II. Latest Development

(a) The role of land in macro-control and the promotion of steady and rapid economic development has become more outstanding. The government exercised strict control on land resource, strictly regulated land planning activities and land for construction, and kept the annual increase of land for construction under the limit of 400,000 hectares. The supply of land shall first meet the demands by important national projects and livelihood projects. Restrictions have been implemented strictly and the land supply catalogue has been prohibited. The right to use land for industrial development has been transferred through open tender, auction or listing, and the minimum price for land for industrial development has been set so as to curb the quick expansion of land for industrial development due to its low cost. The control on land has restrained the overheated growth of investment in fixed assets, encouraged the saving and intensive utilization of land, and thus promoted the upgrading and optimization of industrial structures and balanced development of different regions.

(b) The government has endeavored to increase new arable land resources while be thrifty in converting agricultural land into land for other purposes. Its capacity to safeguard land resource has been further improved. The government has implemented the most stringent arable land protection system, made intensive efforts to control on agricultural land that converted into land for construction, promoted land consolidation and rehabilitation, and created the responsibility system for arable land protection. As a result the rapid decrease of arable land has been curbed. From 2003 to 2007, 1.53 million hectares of new arable land was added through land consolidation and rehabilitation. 116 demonstration areas for national level basic farmland protection have established around China. The demonstration of some high-standard basic farmland improvement projects and some models and experiences concerning saving and intensive utilization of land has proved to be effective.

(c) The land acquisition system has undergone reforms and improvements to effectively protect farmers' rights. An announcement before land acquisition and a hearing on the compensation rates are officially required now. The land acquisition process has become more open to the public, and a significant number of farmers now participate in it. The compensation rates rose gradually, and a system to guarantee the long-term livelihood of farmers whose land have been acquired has taken shape. The adjudication and coordination system to address disputes over compensation for land acquisition has been implemented, and farmers whose land has been acquired were guided to seek disputes settlement through legal means.

(d) Continuous rectification programs were carried out resulting in a significantly improved order in the land development and utilization. Since 2003, land market rectification programs that focus on economic development zones have the cut the number of such zones and the planed area of them by 77% and 74% respectively, and promoted standardized land utilization. During the latter half of 2007, a National 100-day Campaign on Enforcement of Laws Related to Land was carried out, during which more than 31,000 cases of violation of laws and regulations involving 220,000 hectares of land were discovered and treated. Special rectification programs on prominent problems concerning rural land were conducted solving a great number of prominent problems reported by the public. As a result, the rural land contract relations have become more stable and sound.

(e) Farmers' right to contract land has been further ascertained. China adopts the rural land contract system, which grants farmers the long-term and guaranteed land-use right in accordance with the law. Under such system, land of a rural economic collective is contracted to the households that belong to this collective. By 2006, more than 220 million rural households have contracted land from collectives, accounting for over 90% of total number of rural households of the nation. Among the farmers who have contracted land, 94.46% have signed land contracts, and over 90% have obtained the certificates for land contract and operation.

(f) The transfer of the right to contract and operate rural land has been sound and steady. By 2006, the contracting and operation right of 4.57% of the total land under the household contract system has been transferred. Such transfers were mainly completed through subcontracting and leasing. 53.6% of the transfers were completed through subcontracting, and 21.9% were completed through leasing.

(g) Breakthroughs have been achieved in legislations on arable land quality improvement. Investment in this field increased, and the *Measures on Inspection and Acceptance of Quality of Arable Land* has been drafted. Hunan, Tianjin, Jiangsu and some other provinces have issued their local *Administrative Measures on Quality of Arable Land*. Jiangxi Province has issued the *Interim Measures on Balancing the Occupation and Supplement of Arable Land and Inspection and Acceptance of Quality of Supplement Arable Land*. Meanwhile, the central and local governments have both increased their investment to improve the quality of arable land. The central government has launched a number of projects, some of which are ‘High Quality Grain Industry Project’, ‘Fertile Land Project’ ‘Pilot Project of Increasing Organic Content in Soil’, ‘Dry land farming and Water-saving Agriculture’, ‘Subsidies for Soil Testing and Formulated Fertilization’. Infrastructure for farmland has been improved in major grain-producing areas. Shanxi, Jiangsu, Hunan, Guangdong and Shanghai have formulated specific policies to locate funds for agricultural production.

(h) Initial success has been achieved in monitoring and evaluation of quality of arable land, and the plan for basic research and key technologies development concerning arable land improvement has been started. Monitoring spots for quality of national level arable land has resumed operation, and the number of monitoring spots for quality of local level arable has increased by a large margin. More than 1200 counties have begun the evaluation of soil fertility of arable land, completed *Arable Land Soil Monitoring Rules, Technical Standards on Inspection and Acceptance of Quality of Arable Land*, and a number of other standards on arable land quality inspection. In 2007, the central government launched a number of scientific and technical support programs concerning the control of quality of arable land, invention of new fertilizers, protection and conservation of arable land, key technologies for ‘Fertile Land Project’ and ‘Dry Land Farming and Water-saving Agriculture’ as well as the ‘Reduce Fertilizer, Increase Productivity Plan’, or the 973 Plan. The Central government is going to locate 250 million RMB from central budget to support these programs.

III. Means of Implementation

(a) Guarantee by laws, regulations and policies. In order to exercise strict management of land, strengthen control and regulation of land resource, and promote the saving and intensive utilization of land, the state has issued a number of important laws, regulations and policies successively. *The Law of People’s Republic of China on*

Real Right was issued on Mar.16, 2007, which clearly defines the scope of land the rights of which can be transferred through tender, auction and listing. *Regulations on the Transfer of Use right of State-owned Land for Construction through Tender, Auction and Listing* was issued in September, 2007, which clarifies the principles, scope and procedures concerning the transfer of the right of land for industrial development through tender, auction and listing. Besides, a series of policy documents including *Administrative Measures on Land Reserve* and *Land Registration Measures* have also been published. Thus, a complete policy system that covers both macro and micro levels, and contains both principles and details has been formed.

In improving the laws and regulations on rural land contract, after the adoption of the *Law on land Contract in Rural Areas, the Real Right Law of People's Republic of China* was issued in March, 2007, which clearly defines farmers right to contract and operate land as a real right. The Ministry of Agriculture published the *Administrative Measures Certificates of Right to Contract and Operate Rural Land* and *Administrative Measures on Transfer of Right to Contract and Operate Rural Land*. The Supreme Court has adopted *The Interpretations of the Supreme People's Court about the Issues concerning the Laws Applicable to the Trial of Cases of Disputes over Rural Land Contracting*. By the end of 2007, altogether 10 provinces (autonomous regions, municipalities directly under the central government) have implemented local supplementary regulations on land contract in rural areas. The legal framework of land contract in rural areas has taken shape.

(b) Financial support from the central government. In recent years, the investment of the central government in land consolidation grew steadily. From year 2001 to 2006 the government has allocated nearly 20 billion RMB as payment for the use of new construction land. Since 2007, the Ministry of Land and Resources has started to invest approximately 100 billion RMB annually for the protection and improvement of basic farmland, land consolidation and land reclamation.

(c) Planning. *The National General Plan for Land Utilization* is being drafted at present, which will determine the total amount of land for construction increased during the period of the plan, the amount of arable land that shall be converted into land for construction, and scientifically allocate land for construction for different purposes.

(d) Tighten law enforcement and supervision activities over land issues. Combine information collected from reporting of the public, visits and letters, and media releases, and use ground patrol and remote sensing technologies to discover violations of laws related to land.

(e) Strengthen regulation of land contracting and land transfer, enhance disputes mediation and settlement service. Guide and encourage local governments to improve

management of land contracting records, establish and perfect the responsibility system for management of land contracting records. Accelerate the issuance of certificates of land contracting and operation right, and ensure the rural households to receive them. Promote democracy in of land contracting process and the management of income from land contracting. Strengthen regulation of land contracting and transfer mainly through enforcing transfer contracts and transfer registration; guide farmers to conduct the transfer of land contracting and operation right voluntarily and with payment in accordance with law; and appropriately enlarge production scales through various forms. Carry out pilot arbitration of disputes over land contract in rural areas, and make attempts to establish a disputes mediation and settlement mechanism that consists of mediation at village level, arbitration at county and city level and legal means.

(f) Intensify efforts to improve the quality of arable land. Soil monitoring has been carried out across the country. According to incomplete statistics, there are about 3000 provincial-level, 2000 prefecture-level and 9000 county-level monitoring spots around country that are in long-term and continuous operation. Soil fertility survey and quality evaluation have been conducted on arable land. By the end of 2006, the survey and evaluation work has covered 4.845 million hectares of arable land, which involves 49.32 million of agricultural population. A pilot project to grant subsidies for increasing the organic content of soil was carried to provide incentives for farmers to improve the fertility of arable land, and enhance the comprehensive production capacity of arable land. Some monographic researches have been conducted on soil degradation at regional level.

IV. Obstacles and challenges

(a) Sharp imbalance between supply and demand of land, and growing pressure in arable land protection. As the population grows, the demand for land in economic and social development keeps increasing, the imbalance between the supply and demand of land for construction becomes even more severe, and there is a strong call for protection and improvement of environment. There has been serious pollution and degradation of arable land. The reserve of land resource is insufficient, and the trend of population growth with land decrease can not be reversed in the short run. The utilization of land for construction in urban areas is not efficient enough while the residential houses in rural areas generally scatter disorderly, and there is a great many 'Hollow Villages' and scattered plots of unutilized land.

(b) The market has not played a full role in distribution of land. According to the present law, the appropriate percentage of state-owned land in urban areas distributed by the market or can be used with a payment shall be 40% to 50%. However, this figure only reached less than 30% at present.

(c) Obstacles exist in implementing the land property right protection mechanism.

First, large amount of land for construction owned by rural collectives flows into the market spontaneously, resulting in live but unregulated invisible land market. Second, the range of land under acquisition is wide, the compensation rates are low, and the current system to ensure farmers' reemployment and long-term livelihood is not effective enough.

(d) Stronger regulation of the management of land contracting and operation right is needed. First, in a very few places, the renewing of land contracts has not been carried out yet, some people have not acquired land contracting and operation right, and not all the certificates of land contracting and operation right has been issued to rural households. Second, in a few places, changes are still made to land under contract during the contract period. Third, in some areas, the transfer of land contracting and operation right does not completely comply with regulations and laws. In some cases, transfer of land rights or concentration of land is carried out against farmers' will, and some of agricultural land is converted into land for other purposes during the transfer.

(f) There are arduous tasks ahead and a long way to go in improving the quality of arable land. First, there still exists the phenomenon of occupying high quality arable land and substitute it with the low quality. The majority of arable land that are taken for non-agricultural development is fertile land with good infrastructure located in surrounding areas of cities or along roads and railways while the newly reclaimed arable land are mainly land located in remote mountainous areas with harsh natural conditions and insufficient irrigation facilities or barren hills, ditches and beaches with low water and fertilizer-holding capacity. Second, quality degradation of arable land tends to be more serious. The organic content of the black soil of slope land in Heilongjiang Province is decreasing at 5% annually, and the annual decreasing rate in areas with serious soil erosion can reach 13.7%. In 15 southern provinces, the area of paddy rice fields with soil gleyization has increased by at least 10% compared with that of 1980s. Third, we are facing a grim situation of soil pollution. In some regions, factories causing pollutions have moved from urban areas to rural areas. Due to the lack of comprehensive utilization and bio-safe disposal of animal waste from large scale animal farms, animal waste has become new unneglectable pollution source to farmland. Fourth, the resistance of arable land to natural disasters has weakened. The end-canal system for irrigation in farmland is incomplete, and lacks effective maintenance. Serial drainage⁷ and flooding irrigation is very common in rural area. The capacity of arable land to resist natural disasters and retain harvest has apparently decreased compared with that of 1980s. In recent years, every year, 6.67 to 20 million farms around the country suffered crop losses due to droughts, which posed a serious threat on national food security.

V. Countermeasures

⁷ Water flows from one field to another during paddy rice field irrigation or salt-leaching process of saline-sodic fields.

(a) Strengthen land management and protection. Vigorously encourage the saving and intensive utilization of land, promote the change of economic growth patterns, and prevent waste in land utilization. Coordinate land utilization of different purposes; promote the balanced development between urban and rural areas, and between different regions; optimize the structure and distribution in land utilization; and put priority on protection of natural space, and creation of an environment suitable for humans to live both in urban and rural areas.

(b) Strictly control the land for construction. Control the total amount of land for construction, strengthen overall planning of and policy guidance on land utilization to bring land resource utilization under effective control and promote the sustainable land utilization. Intensify efforts to tap the stock land resource for construction, encourage the development of surface and underground space. Regulate land for construction in rural areas, guide farmers to build their houses close together, and promote reconstruction of 'Hollow villages'.

(c) Improve land marketing system. First, further improve the land-use system. Enlarge the scope of land the use right of which can be acquired with a payment, and adopt various forms of such acquisition. Reform the land use system for land own by rural collectives. Stabilize the household contract responsibility system, further clarify the property right and use right of land own by rural collectives, and grant farmers long-term guaranteed land-use right. Establish the land rights transfer system, and promote the industrialization of agriculture. Second, nurture and improve land market. Establish and perfect the land price publication system. Regulate the participants, trade behavior and intermediary services in land-use right transfer. Tighten supervision over transactions in land market.

(d) Further stabilize and improve land contract relations in rural areas, and perfect the market for the transfer of land contracting and operation right. First, continue to carry out the follow-up work after land contracts were renewed; and solve the problems rose during the renewing of land contracts; correct the behavior of changing or taking back the land contracted by farmers during the contract period; accelerate the issuance of certificates of land contracting and operation right so as to confirm every household's right to contract and operate land. Second, strengthen regulation of land contract; form and perfect the system for management of rural land contracts, certificates of land contracting and operation right; enhance records management of land contract; and accelerate the steps in forming the registration system for land contracting and operation right. Third, continue to conduct pilot arbitration on land contract disputes in rural areas; strengthen the training of arbitrators, and enhance the capacity to mediate and settle disputes over land contract in rural areas. Accelerate the adoption of legislations on arbitration disputes over land contract, and improve disputes mediation and settlement mechanism for land contract in rural areas. Fourth, perfect the market for the transfer of land contracting and operation right carried out

voluntarily and with payment in accordance with law; strengthen regulation of land rights transfer and enhance services to it; and appropriately enlarge the production scales in areas with necessary conditions. Firmly prevent and correct the action of forcing farmers to transfer land rights against their will, and converting agricultural land into land for other purpose during the transfers. Fifth, adapt to the change of labor structure in rural areas and meet the needs for the development of modern agriculture; adhere to the basic operation system of rural areas, vigorously promote the industrialization of agriculture and the growth of farmers' economic cooperatives; actively seeking for new models of agricultural production; and raise the level of organization and intensive production in agriculture.

(e) Intensify efforts in improving quality of arable land, and strengthen quality management of arable land. First, carry out a nationwide arable land soil fertility survey, and draft different technical standards on arable land quality improvement for different regions. Second, increase input into organic fertilizer industry, and promote the commercial production of organic fertilizers. Popularize technologies of green fertilizer production and returning stalks to the field so as to promote the bio-safe disposal and comprehensive utilization of organic waste like crop stalks and animal manure. Develop policies to support the organic fertilizer industry, and promote the commercial production of organic fertilizers. Establish the national soil testing for formulated fertilization service network to provide guidance to farmers on scientific fertilization and enhance the efficiency of fertilizers. Third, strengthen infrastructure construction, and improve the compound efficiency of irrigation and fertilization. Carry out farmland infrastructure construction; popularize technologies on returning stalks to fields, covering fields with organic matter and water saving technologies such as combination of irrigation with fertilization so as to improve the compound efficiency of irrigation and fertilization. Fourth, establish the arable land quality monitoring network to exercise dynamic monitoring and management of the quality of arable land, and regularly publish information from monitoring. Fifth, strengthen technology innovation, integration and transfer concerning arable land quality improvement. Promote technology innovation and integration concerning conservation tillage, soil fertility enhancement, rehabilitation of degraded farmland, scientific fertilization, water saving in dry land and so forth. Maximize the role of grass-root agro-technology extension service to demonstrate and extend the latest developed technologies and products. Sixth, establish and perfect laws and regulations for arable land quality improvement. Draft the *Regulations on Arable Land Soil Fertility Conservation*, which shall provide legal grounds for arable land quality improvement, and define the law enforcement body, and its responsibilities and powers for arable land quality improvement and management by law. Revise *Land Administration Law* and *Law on Basic Farmland Protection* to include articles on arable land quality improvement and management providing legal basis for the stringent arable land protection system. Speed up the legislation process of *Administrative Regulations on Fertilizers*.

VI. Case Study: remarkable achievements in arable land protection of Jilin Province

In 2006, Jilin Province has earnestly implement the basic national strategy for resource conservation, implemented the responsibility system for arable land management and protection, strictly followed the ‘take one, supplement one’⁸ principle, and actively conducted land consolidation and rehabilitation. Jilin Province has applied for and registered 32 national level land consolidation and rehabilitation projects receiving nearly 400 million RMB from the central government. It has launched 27 provincial-level land consolidation and rehabilitation projects with a total investment of 270 million RMB. According to the statistics, in 2006, 7000 hectares of arable land were occupied for construction while more than 10,000 hectares of new arable land were added. Upon the approval of central government, 5 national level demonstration areas for high-standard basic farmland were established, receiving an investment of 100 million RMB from central government. Soil of the tillage layer of arable land occupied for construction was stripped for land rehabilitation, and more than 1000 hectares of arable land have been rehabilitated. At the end of 2006, the total area of arable land of Jilin Province was 55.368 million hectares, remaining the same as that of the base period of the plan. The area of basic farmland of the province has always remained as 48.489 hectares, retaining the dynamic balance of arable land area for 16 years in a row.

⁸ In cases of converting arable land into land for construction, a same amount of new arable land with the same quality of the converted land within the same province shall be supplemented.

Chapter 9 Response to the Impact of Drought

I. Objective and Tasks

The Guideline of the 11th Five Year Plan on Economic and Social Development of the People's Republic of China has explicitly put forward the proposal of building resource conservancy and environmental friendly society. In the water scarcity areas, it is encouraged to develop dry farming and water saving agriculture, with the aim of intensifying the efforts for unifying management on water resources, the use of water for livelihood, production and ecology, thus making well the distribution of water at upper and lower reaches, allocation of surface and ground water and controlling of the exploration of ground water. The main missions and objectives at present and for the future in dealing with the impact of drought are: in the future ten years, the ability of drought-resistant and disaster reduction will be greatly improved with remarkable progress being made in building of water-saving society and the raising of people's awareness for drought and disaster reduction as well as the enhancement of efficiency and effectiveness for resource utilization. We will guarantee the water supply for the livelihood for urban and peri-urban areas and for the industrial use in order to ensure agricultural production and ecological environment not being affected when the medium degree of drought occurs. If severe drought occurs, we shall guarantee the water supply for the livelihood in urban and peri-urban areas and minimize the impact of the losses to industry and agricultural production. We shall adopt comprehensive measures and build a reasonable water resource allocation system from the perspective of harmonious development of human resources, economy, ecology and environment. A balance system of water resources should be built from the perspective of increasing income, resources conservancy and protection, and a guarantee system on reducing the impact and losses of natural disasters from the perspective of interrelated measures on engineering and non-engineering aspects. We should scientifically plan and regulate the building of water source areas, rational allocate and distribute water sources so as to enhance the capability of water supply, intensifying the efforts for improving water saving facilities in irrigated areas as well as upgrading the efficiency and effectiveness of agricultural water use with the aim of ensuring the supply of drinking water for urban and peri-urban areas, the supply of water for city areas and the safe water supply for energy base and grain production. We should build and improve drought observation system, conduct long, medium and short-term monitoring, forecasting, early warning and evaluation on drought, strengthen the drought disaster information collection, evaluation and research on the causes of drought and climate change, build up the service system for mitigating the risk of drought and timely release the products for drought monitoring, forecasting

and impact evaluation in order to provide service in response to drought disaster. The basic dry farm land facilities have been improved, and the technology for dry farming and water saving extended to large areas, thus preliminary setting up the agricultural development model of stable yield and high efficiency, with remarkable improvement of rainfall utilization proportion and efficiency. The problem of water scarcity in dry land farming has been mitigated with steady enhancement of grain comprehensive production capacity and constant increase of farmers' income level.

II. Latest Development

(a). The building of water conservancy in dry areas has made big progress and the ability of ensuring water supply for urban and peri-urban areas has been improved. The construction of East and Middle First-Phase Project in addressing the problem of water scarcity and transferring water from the southern part to the northern part as well as a group of water sources and regional water resources reallocation and distribution projects have been started. The project of emergency water supply for transferring water from the southern part to northern part will start its operation in 2008. The key comprehensive utilization projects of Guanying in Liaoning, Nierji in Neijing, Shapotou in Ninxia provinces and autonomous regions have been completed and will start its operation one after another. Some other key projects of Dahoufang Second-Phase water transmission and water supply in Gansu province have been going on smoothly. The Project of Capital sustainable use of water resources in 21st Century, and the projects for the harness of Talimu River and Hei River have been further implemented, and the project of key harness on Shiyang River has made a good start.

(b). The management of water resources has been strengthened and the rational allocation of water resources pushed forward. The system of setting standards on the use of the overall amount of water has started and the management agencies for seven river basins have completed the drafting of quota on the use of water. Meanwhile, various localities have started the work of water allocation, and Gansu, Ninxia, Inner-Mongolia, Zhejiang and Guangdong provinces have actively conducted the work on the right for water in order to press ahead the water right transfer.

(c). The unified allocation of water resources has been stressed and the safe supply of water further guaranteed. The system of water transfer for main and branch of Yellow River has started in an all-round way, making the management of water supply and transfer adapted to standardization and law-based channel. The Yellow Rive has no cutoff for the past 8 years in a row. The provinces of Shanxi and Hebei have transmitted water to Beijing areas for the past five years, thus guaranteeing the supply of water to the Capital. Since 2000, the National Headquarter of Flood Prevention and Control has implemented the emergency water transferring program, namely diverting water from the Yellow River to Tianjing, transferring water from Jianing River and reducing salty content and supplement with fresh water to Zhujiang River,

thus ensuring the safe supply of water to Tianjing, Chongjing, Guangzhou, Zhuhai, Zhongshan and Macao. With a view to protect the ecological environment, the National Headquarter in recent years implemented the emergency water supplement program for four lakes, such as diverting water from river to supplement Taihu Lake, diverting water from Yue River to supplement Ding Lake, diverting water from the Yellow River to supplement Ding Lake and diverting water from Cha River to supplement Xiang Lake as well as supplementing water to the wet land in Zhalong. Water supplement ecologically has also carried out in He River and lower reaches of Talimu River, timely saving and improving the ecological environment in these areas and protecting biodiversity in the wet land.

(d). Disaster prevention and reduction should be beefed up in response to the climate changes. In 2006 and 2007 respectively, China has undergone abnormal climate, with constant drought occurring in winter and spring in most parts of Northern areas and some parts in Southern areas, and sever drought in summer in some parts of Southern areas. The drought situation mainly concentrate on the grain producing areas and critical growing period, covering broad space, lasting longer time and producing serious impact. Confronting with sever drought and flood disaster, the Chinese Government has put the security of people's life and safety of drinking water at the priority place, intensifying emergency management and carrying out prevention and control measures by law and in an orderly manner. The Government has also strengthened disaster forecasting, making scientific decisions and bringing water conservancy facilities into full play in fighting drought and minimizing the losses of disaster. In 2007, the irrigated area reached 27 million ha.. The amount of over 45 billion kilogram of grain has been saved, addressing the problem of drinking water for more than 31 million people in urban and peri-urban areas.

(e). The building of water saving society has been carried out in an all-round way and water saving program has made new progress. As of the end of 2007, the pilot projects of national level for the building of water saving society had extended to 42 with 100 provincial level pilot projects. The pilot projects in Zhanye, Mianyang and Dalian have been verified and accepted. The relevant good experience and results have been extended across the country. The provincial people's governments in Gansu and Ningjia have released the relevant policies in pushing forward the building of water saving society.

(f). A number of dry farming and water saving agricultural demonstration areas has been set up. China has established demonstration zones of drought resistance and water saving with total area of 467,000 ha, water saving equipments and facilities of 22,000 (sets), agricultural machinery of 12,000 (piece), and testing equipments of 5,282 (sets). The earth work of 31 million cubic meters has been done and 5.6 billion cubic meters of water storage facilities completed, which has benefited about 3 million households. The newly added capacity of grain production in demonstration zones reaches 750-1350 kilogram/ha, with increased water saving capacity being at

1200 cubic meters/ha.

(g). Group of dry farming and water saving agricultural technologies has been applied and extended and a system of dry land and water saving technology with unique features established which are suitable and adapted to different regions. As to the characteristics of regions and needs for dry farming and water saving agricultural development, and focusing on raising the efficiency and effectiveness of rainfall utilization, we have carried out systematic research in the areas of variety selection, cultivation models, field engineering, equipments and facilities as well as chemicals. A large group of technology results for dry farming and water saving agriculture has been made. The various agricultural projects of dry farming and water saving have been implemented and large numbers of science and technologies extended. The following technologies have been applied in large areas, such as crop farming in ditches, rain gathering pond, field mulching (stalk), deep tillage, drip irrigation under mulching, zero tillage cultivation, biological fences and drought agent, etc.. As of today, the accumulated extended area for dry farming agricultural technologies of various kinds reached 20 million ha.. Through a lot of research and development and extension activities, the agricultural technology system of dry farming adapting to the different parts of China has come into shape.

(h). The network of grassroots' service system for drought resistance has been formed. At present, besides Shanghai and Tibet, 29 provinces (regions and municipalities) have set up more than 1600 drought resistance service teams at county level with over 9000 service teams at township level. More than 920 Farmers' Associations for Drought Assistance have been set up in Hebei, Shanxi, Shandong, Sichuan, Shaanxi, Anhui and other 21 provinces (regions and municipalities) with membership of more than 1.223 million households. The drought resistance service network of four levels has been established, with the drought resistance demonstration county of national level as the core center, county level drought resistance service team as the basis, township drought resistance service as the forces which they can rely on and village level drought resistance groups and farmers' groups as the link.

(i). The observation system for drought has been constantly improved, and monitoring, early warning and evaluation further strengthened. The meteorological observation system which monitor on drought related rainfall, temperature, sunshine, evaporation, wind and soil has been set up and the dynamic monitoring on soil moisture under the natural environment carried out. We have built an early warning and monitoring system on 'China's drought and flood situation', which has realized the timely and daily monitoring of the occurrence of drought and its development. We carry out dynamic and objective observation on daily basis on the drought area and its future trends. The technology of satellite remote sensing on monitoring drought has been applied in agriculture and further developed. The system of national level for decision making on flood prevention and drought resistance has been undergoing smoothly, and as of the end of 2007, the total investment in this regard exceeded 500

million yuan.

(j). The research on drought monitoring, early warning and evaluation has been further developed. In order to ensure the smooth agricultural production, the meteorological departments along with agricultural departments have jointly released newspaper on drought forecasting service for agricultural purpose. They have released National Agricultural Meteorological Newspaper and Agricultural Climate Indication by seasons, and published agricultural drought service materials on irregular basis by crops growing seasons. Through meteorological channel and TV, they release drought related materials. We have carried out ‘technology research on meteorological disaster prevention and control’, established the technology system for comprehensively dealing with disaster prevention and reduction. A remarkable progress has been achieved in the demonstration of drought disaster relief.

(k). The standard system for drought monitoring has been strengthened and the national standards on ‘drought category’ published. Based on the standard rainfall, the amount of evaporation and the first phase rainfall, we have developed integrated meteorological drought index (CI index), and implemented the national standards on ‘meteorological drought category’.

III. Means of Implementation

(a). On the basis of completion of the survey and evaluation on the utilization and development of water resources in China, we have started to conduct the integrated planning on the utilization of the water resources across the country and put forward the proposals for macro-use and development of water resources and rational distribution pattern.

(b). We have increased the input into the projects of building water conservancy in dry areas and agricultural demonstration bases for dry farming and water saving. In 2007, the investment by the central water conservancy construction increased by 3.4% in compare with the year 2006, and the financial subsidy project on farm land water saving technology was implemented. As of today, the central budget has put a total investment of over 600 million yuan.

(c). The management and unified coordination on water resources have been implemented. We have applied a combined water resource management system on river basins and administrative regions, and started the formulation of water use quota and conducted the work of water allocation. So far, we have completed the design of water allocation for Yongding River, Daling River and some other rivers. We have intensified the management on water use allowance and implemented the planned use of water. We will severely punish those who violate the rules of water use. Through management on water use approval, we have promoted the upgrading of industry structure and guaranteed the requirements for economic and social development. We

have clearly indicated the responsibility for the governments and various departments concerned in relation to the building of water saving society, their roles in work division and cooperation and coordination. We have made a lot of efforts in mobilizing the social participation in the building of water saving society.

(d). Crop farming patterns have been adjusted. Focusing on restructuring on water saving, maximization on crop pattern and reform on farming system have been conducted. We have built farming system of high efficiency and water saving which are related to the conditions of water resources, thus transforming counter-cultivation into adapted cultivation. Based on the construction of water saving infrastructures, we have strengthened the infrastructures, namely for field rain collection and water-saving irrigation techniques. In the areas where water scarcity is resources based, we have selected and extended those varieties that are drought resistance, low water consumption and high yielding in order to enlarge the farming area that is low water consumption. We are trying our best to enhance the consistency in terms of water consumption required by crops growing and the time and space of natural rainfall. In the areas where water scarcity is engineering based, we implemented the rotation and inter-cropping techniques with the aim of reducing the impact of seasonal drought. In the irrigated farm areas, on the basis of stabilizing the crop growing area, we have maximized crop varieties and actively promoted the development of economic crops of high efficiency and horticulture industry, so as to minimize the wastes of water and upgrade production benefits of water use.

(e). Field water-saving facilities have been improved. Focusing on water-saving in the infrastructure, we have strengthened the building of infrastructure in terms of field rain collection and water-saving irrigation. In dry farming areas, we built mini drought resistance projects and flood prevention projects on the slop. We have adopted such measures as mini rain collecting pond and 'three ditches' (water intersection ditch, ditches along mountains and water diverting ditches), and other countermeasures as 'three ponds' (flowing sand pond, energy digesting pond and water storing pond), so as to increase the capacity of rain collection and utilization. In the irrigated areas, we proactively promote the construction of field engineering program, balancing and improving land soil, upgrading irrigation cannels in the field, and equipping the field with water tube to transmit water, with drip irrigation and spray irrigation, and the controlled capacity of irrigation for farm land has been raised.

(f). Efforts on research and technology extension have been intensified. We have carried out many national science and technology projects, strategic research on major water conservancy projects, research on the key technology for water resources planning and management in order to intensify the extension role played by science and technology. In dry farming areas, we have built almost 30 experiment basis for dry farming and water saving and outdoor observation stations. A number of soil laboratories with a certain testing capacities have been set up and more than 600

monitoring spots for drought situation been established.

IV. Obstacles and Challenges

(a). The non-matching of water resource distribution and land resources as well as productivity pattern has made water resources situation even more severe. The distribution of water resources in China is as follows: the southern parts enjoy more water resources, while the northern parts less of that, east parts more and west parts less, with mountainous areas embracing more water while plain areas less. The amount of 93% of surface water comes from mountainous areas, while plain areas have less water resources. The features of west mountainous areas are: rivers with high water level, high level of farm land with low water level, which have a lot of difficulties to get access to water resources. Plain areas are densely populated with concentration of cities and irrigated areas are densely located, where water is mostly required. The water supply is mainly dependent on the outside supply. Over the past 20 years, due to the climate change and the impact of human activities, the water scarcity problem in the North is becoming even more serious, with most parts lacking of water even more severe, and the situation of water supply is faced with severe challenge. The frequent occurrence of drought with more serious impacts is making the situation even more serious. The increased years of serious droughts are causing more losses.

(b). The management on water resources is still weak, confronting with more burdens in terms of water resources protection. Over the years, simply relying on the management by administrative departments alone, the role of markets which can play an important part in water reallocation has not been brought into full play. The economic means such as water price is not adequate in terms of water resources protection. The main entities for water development and utilization did not have the internal driven forces in the regard of water saving and protection, and the general public did not actively participate in the management of water resources. In recent years, China has witnessed rapid economic development, however, the ability and capability in dealing with and recovery of waste water is lacking behind the economic development, with low level of handling capacities. In addition, rivers in dry areas have weak self cleaning capacities, making its water suffering different degree of pollution, which has drawn great attention by the Chinese Government. The Government is therefore carrying out all-round and comprehensive harness and protection program on water environment.

(c). The system of emergency response and management on drought resistance is not yet fully completed. Firstly, drought resistance agencies in various places are not adequate, lacking of professional staff with incomplete emergency response mechanism and inadequate information on droughts. Secondly, the construction of water conservancy engineering projects for emergency response is inadequate developed with low standard. When drought occurs, the required needs for water

supply can not be satisfied. Thirdly, the number of response programs for drought is not enough with low quality and poor operational capacity. The various measures contained in the response programs cannot be fully implemented.

(d). The input to the development of dry farming and water saving is seriously inadequate with insufficient technical support. Over the years, the input to dry farming and water saving is seriously inadequate; furthermore, dry farming areas are subject to the less developed areas with insufficient financial strength and low income level for local farmers. These areas have quite weak investment capacities. These situations have resulted in inadequate construction for dry farming and water saving agricultural development. The weak infrastructure and slow enhancement of their capacities for drought resistance and disaster reduction have seriously impacted the sustained growth of productivity in agriculture in dry areas. The capacity of dry farming and water saving technologies is on the whole weak with sparsely located technical strength and incomplete technical extension mechanism. The service and technical means at grassroots' extension institutions are inadequate, and the research and development on major dry farming technology are lacking behind with slow speed and small scope on popularization of technical results.

V. Countermeasures

(a). The building of water conservancy infrastructure in dry areas and agricultural engineering projects for dry farming and water saving should be strengthened. We should beef up the building of water diverting projects from the south to the north areas. Through the three water diverting routes and linking with Yangtze River, Yellow River, Huai River and Hai River, we will gradually develop the rational water resources allocation pattern which diverts water from the south to the north areas. We will further strengthen the water control engineering program, improve and upgrade water saving facilities and large scale water pump stations, and continue to implement or start the construction of regional water diverting and storing engineering projects. We will speed up the implementation of safe drinking water program in rural areas, and by 2015 we will basically address the problem of unsafe drinking water in rural areas. Combined with addressing the problem of safe drinking water in urban areas, we will put our emphasis on the protection of water source and engineering construction. We will select about 600 key counties (or farms) which conduct dry farming to build dry farming and water saving agricultural demonstration zones of about 715,000 ha.. We will intensify the functions of those 600 dry farming and water saving agricultural experiment and extension stations, boost the agricultural development which covers an area of 13 million ha..

(b). We should strengthen the management on water resources in dry areas, intensify the efforts and input by the Government to the irregular development and utilization of water source as well as to dry farming and water saving program. We will proactively mobilize funds through market mechanism and arouse the enthusiasm of

people to take part in the fund raising activities. We will explore the ways and means in setting up dry farming and water saving agricultural development mechanism with massive participation of farmers, support and give guidance to farmers in applying the techniques and equipments for water saving, organically linking water saving agricultural development with the benefits of farmers. Therefore, farmers' enthusiasm will be fully brought into play, forming a long-term mechanism in which farmers will earnestly take part. We will improve soil to keep its moisture content and resist drought, strengthen the efforts in improving medium and low yielding land. In line with the requirements for land balancing, fertile soil which mach with water ditches and cannels, we will beef up the building of high standard farm land with high and stable yields.

(c). The emergency response system for drought should be established. We should build up the emergency response system for the major and constant droughts, and make emergency plan for water allocation. We will strengthen our efforts on the maintenance, protection and safeguard of those facilities for emergency water supply, especially for drinking water and water transmitting equipments. We will set up and complete emergency management system and safeguard social and economic stability. We shall further complete the working system for drought resistance, intensify the building of service organizations and strengthen our support and guidance to the drought resistance service organizations. We will encourage social organizations and individuals to run drought resistance service organizations of various kinds. We will strengthen the fundamental work for drought resistance; improve the monitoring, forecasting and early warning as well as decisive decision making ability. We will strengthen the publicity of information in order to create a sound environment for drought resistance.

(d). We should timely release and apply the information relating to drought monitoring, forecasting and early warning. Focusing on the accuracy on forecasting of drought disaster, we shall continuously improve monitoring and early warning system and establish a drought early warning system which combine dynamic and statistic methods. We will speed up the building of effective and smooth information release system on drought disaster forecasting and early warning, setting up early warning information release mechanism and timely release the relevant information on disaster situation, its trend, density and affected scope. We will adopt effective and science-based emergency response measures in order to control and reduce the impact and losses caused by drought disaster.

(e). We will increase the input to drought resistance, establishing and improving the financial investment mechanism which is relevant to the economic and social development level and requirements for drought resistance and disaster reduction. We should carry out the formulation and compiling of drought resistance planning, maximize and integrate various resources and enhance the comprehensive capacity for drought resistance, while strengthening the work for drought resistance

institutions, adding more technical staff and improving work mechanism. We should set up and complete the law and regulation system, making efforts to publish 'Regulations of the People's Republic of China for Drought Resistance', and formulate the relevant rules and measures, with an effort to speed up the process of legal system for fighting drought. We will proceed with the implementation of drought early warning system, while compiling and revising the prevention program of various kinds, strengthening dynamic management, setting up emergency response mechanism of various levels with emphasis on the program's relevance, adaptation and implementation.

(f). We will strengthen research, technology transformation and extension. We should put our research on the transformation mechanism and maximizing the allocation technology for the development of atmospheric water, surface water, soil water and ground water. We will make our research on the techniques for handling of polluted water and rain water collection as well as for man-made rainfall. We shall research and develop recycle use of water for industrial purpose, water-saving irrigation, dry farming and biological water saving techniques while strengthening the development of water-saving technology for livelihood. We shall also intensify our efforts on the research and development and extension of desalination of sea water techniques.

VI. Case Study-An Example of Water Resources Utilization and Management in Shiyanghe Basin of Gansu Province

Shiyanghe located at Hexi region, Gansu province is one of the inland basins with most densely population, most high degree of water resources utilization, sharp contradiction in water use and most fragile ecology. In recent years, due to human, natural and historical reasons, water has been over explored and used. The upper and middle reaches have been over developed irrigated land, lower reaches over explored the ground water, as a result, social and economic development have been exceedingly over used water used for ecology with serious deterioration of regional eco-environment. The Chinese Government has attached great attention to this problem. Chinese Premier Mr. Wenjiabao has made important instructions on many occasions, stressing 'we can no longer allow Minqin Lake to become the second Lop Nur Lake'. In order to save Minqin and improve the eco-environment in Shiyanghe basin, we should accelerate the speed of comprehensive harness of Shiyanghe basin. Since 2002, Gansu province and some other national departments have mobilized the forces to start the planning of harness of Shiyanghe basin and other relevant work.

At present, 'Shiyanghe Priority Harness Program' has been approved by the State Council. Within the context of planning and harness program, we should stress the importance of building water-saving society and unified management of water resources in river basins with an effort to addressing institutional and systematical problems of over diverting water in the upper reaches and over exploring ground water in the lower reaches. By identifying water amount distribution program in the

basin and clearing the initial right of using water, we have strengthened the control of overall amount of water and quota management, thus forming an operational mechanism for water-saving society with government macro-regulation, market guidance and the general public participation. We should improve the system of payable use of water resources; constantly raise the efficiency and effectiveness of water utilization so as to realize the rational allocation and unified management of water resources. We should also conduct the strategic restructuring of economic structure in the whole basin areas, carry out the adjustment of cropping structure and irrigation methods in particular in order to implement the powerful measures of water-saving and waste water treatment, control agricultural irrigated area and gradually resume the water use by ecology. Gansu province established Shiyanghe basin management committee headed by the Governor as the Director of the committee, set up Shiyanghe basin administration, and the provincial government has released a series of regulations for strengthening the surface water transferring and ground water management. Wuyang municipality has adopted the following measures, such as specifying the land based on the number of persons, specifying the quantity of water based on land, controlling water by electricity and supplying water by certificates, so that the over exploring of ground water has been strictly controlled. We have also accelerated the upgrading of water-saving project in irrigated areas and some other emergency harness projects while implementing water distribution program in the basin areas. Furthermore, we should greatly develop labor economy and build water-saving and high efficient sunshine green houses, in order to ensure the stable income of farmers after the reduction of the use of irrigated water. Through the above-mentioned comprehensive measures, the harness and management on Shiyanghe basin has achieved some progress, with mitigations of local ecological and environmental deterioration. The Government put forward that we must rely on the local water resources and be supplemented with water transferred from outside areas. We must implement unified management on water resources and govern water by law while intensifying the quota management on the quantity of water use, establishing fair and rational order on water use. We also formulated 'Regulations for Water Resources Management in Shiyanghe Basin, Gansu Province', implemented unified management on water resources in the basin areas, intensified the efforts in saving and protecting while at the same time improving the system of controlling the water quantity and quota management, readjusting industrial structure, extending new technology for water-saving, implementing various water-saving measures and exploring the way on the reform of water right system. Any organizations or individuals are prohibited to reclaim waste land and build industrial projects with high water consumption and pollution. Emphasis should be put on protecting and maintaining of water resources. In areas of the upper reaches with sea level of over 2600 meters, we should return the reclaimed land into grass, and in areas of lower reaches within 5-10 kilometers along the desert, we should adopt such measures as return farm land, resettlement, reforestation in order to restore ecology. We should also press ahead the building of water-saving society. The whole basin in Shiyanghe has been listed as the pilot for water-saving society. We shall continue to intensify

water use management, proactively apply the trading of water right, improve water price mechanism and enhance the efficiency and effectiveness of water resources. We will push forward the building of water-saving society, reduce the irrational use of water in the irrigated areas in upper and middle reaches, increase the quantity of surface water that enter into Minqin areas, reduce the exploration of the ground water and accelerate the improvement of eco-environment.

Chapter 10 Desertification Combat

I. Objectives and Tasks

Desertification is the most serious eco-environment problem in China. China is one of the countries who suffer most from desertification. Desertification area in China totals 263.32 km², accounting for 27.4% of total territory of China, and spreading over 18 provinces, autonomous regions and cities, with 400 million people affected, which has severely restricted economic and social sustainable development.

According to “National Eco-Environment Construction Plan” and China’s NAP for Implementation of UNCCD, the overall target of China’s combating task is as follows: take all-rounded measures to protect and increase vegetation, to constrain the trend of desertification in still expanding areas, to consolidate achievements in controlled areas, to greatly ameliorate ecological condition in the vast desertified areas as soon as possible. By 2010, to control 22,000,000 ha desertified land and to make remarkable improvement in key controlled areas, with the construction of a set of water-saving farming, dry farming and ecological farming projects. By 2020, over a half of desertified land is under control, with remarkable improvement of the ecological environment in all desertified areas. By 2050, most controllable desertified land will be brought under control, with establishment of a relatively complete ecological shelterbelt system and relatively developed sand industry system, so as to realize economic and social sustainable development.

II. Latest Development

Since the beginning of this century, China has made great achievements in desertification combat, such as effective control of 20% desertified land as well as a net decrease of desertified areas from the annual expansion of 10,000 km² in the end of last century to an annual shrinking of 7585 km² now. The major achievements are:

(a) Establishing a legal framework. Law On Combating Desertification ratified by the standing committee of NPC on Aug.31th, 2001 and implemented since Jan. 2002, which is the world’s first special law made for desertification combat, which provides powerful guarantee of law for preventing sandification, managing desertified areas, maintaining ecological security as well as boosting economic and social sustainable development. Up till now, China has initially established a legal system with The Law on Combating Desertification as the core, joined by other related laws, including Forest Law, Grassland Law, Environment Law, Law on Meteorological Services, Law on water and soil conservation, on soil management, etc, thereby legalized the

combating work.

(b)Forming a nascent policy mechanism. In Sept. 2005, the state council issued “A Decision on further strengthening the work of combating sandification”, which further established the significant status of desertification combat in social and economic development and clarified its guiding principles, targets and strategic emphases, by putting forward policies in revenues, credits and loans, project subsidies, ecological compensations and prizes, as well as the principle of “who combat, who will manage and benefit”. Besides, the government exerts effort in distribution and consolidation of responsibilities. For example, the state council held the National Conference on Desertification Combat in March 2007, which systematically summed up past experience and made an all-rounded deployment for the future work. During the conference, pledges were signed with provincial governors; placing them liable for punishment should they fail to complete the assignment of Combating Desertification.

(c)Making a scientific layout of desertification combat at a state level. In Jan.1999, the “National Eco-environment Construction Plan” was constituted which provided a scientific layout as well as clarified the targets, tasks and measures for desertification combat. To boost the combating work, the state council ratified the National Plan on Combating Sandification, making a scientific zoning for the combat, listing the main focus, construction work, key projects and goals, and ensuring measures so as to drive the career into a new programmatic phase of plans and scales.

(d)Setting up an investing system. China establishes investment system based on capital from central government as main source, implementing policies that foster national eco project, and provide fiscal compensation for ecological Forests in desertification area. In recent years, China has initiated a series of state key ecology-building projects, such as Beijin-Tianjing Wind and Sand source control, the 4th phase of the “three North ” protection shelterbelt Program (covering most areas in northeast, northwest and north China), Degraded Farmland conversion to Forest and Shrub land, Pastureland Conversion to the Natural Grassland, Natural Forest Protection Program (NFPP), Key Soil and Water Conservation Program in the Yellow River Basin Area, Key Inland River Basin Area Soil and Water Conservation Program, as well as special controlling programs in key ecological areas such as Tarim River Basin, Heihe River Basin and Three River Source, along with the Rock Desertification Control Program.

(e)Gradually complementing the desertification monitoring and forewarning system. Since 1994, China has successfully carried out three rounds of desertification and sandification monitoring program across the country, one for every five years. In the 2004 survey, over 4000 technicians were involved and 5.02 million compartments were zoned and contained, with 156 million units of information obtained through the newly-set geographic info database on desertification and sandification, so as to

command the dynamic changes, causes and combating effects and to back up scientific methods. Thereby technical courses are compiled which combines ground survey with interpretation of remote sensing data and to set up a monitoring system with macro monitoring, positioned monitoring and monitoring in sensitive areas, now the 4th round of desertification monitoring is in preparation. Also we have endeavored to construct a national monitoring network of water and soil erosions which provide basic statistics for the state's macro decisions. Through the 3rd national remote-sensing survey of soil erosions, we have generally informed with situation and dynamic trend.

(f)Exerting more efforts in implementation of UNCCD. China initially issued and implemented the NAP. While in multilateral field, China hosted the “International Conference on Women and Combat against Desertification” in Beijing, May.2006. And in Jan.2008, “International Conference on Desertification Combat” was jointly held by State Forestry Administration P.R.C and UN Secretariat, which ratified “Beijing Statement” and greatly contributed to the 16th session of UNCCD. In bilateral field, China attaches importance to learning from technically leading countries in desertification combat such as Australia and Israel and to keep close cooperation with them for years. Moreover, China has taken up construction work of “TPN-1”, founded the International Training Center on UNCCD, and conducted a variety of classes and academic seminars.

III. Implementation Means

(a)Combat desertification on a sound legal basis and protect vegetations in desertified areas on a solid ground. Raise people's sense of law through publicizing and training. To exert a “three banning”(Ban of over-grazing, unreasonable farming & illegal logging) measure to fix numbers of livestock and to make rational use of water, therefore to implement environment evaluating system for programs in sandified area, to regulate exploitation and to put an end to illegal activities such as over-herding, over-digging, over-plucking and irrational use of water. Enhance implementation of law and survey, exposal of grave crimes so as to prevent the continuous desertification.

(b)Adopt a synthesis of policies and mobilize all sides' enthusiasm in participation. The government has provided many supports in financial investment, credit and interests, tax and fee, protection of rights and ecological compensation; adopted policies such as “who combats will manage and benefit”, right to convey or inherit combating achievements, extension of land's ownership to 70 years, etc. which have greatly mobilized all-rounded enthusiasm, positivity and creativity.

(c)Take programs as propellant drive and accelerate the combating pace. These years, China focused on investment and launched a series of state key ecology-building projects such as Beijin-Tianjing Wind and Sand source control, the “three North ”

protection shelterbelt Program, small watershed management and grassland construction, as well as a set of regional controlling programs like desertification combating projects in Hetian, Xinjiang, sandified land controlling project in former course of the Huanghe River, which have obviously accelerated the controlling effects. By 2006, in total about 9,600,000 ha. of sandified areas had been controlled with an annual pace of over 1,900,000 ha., which more than doubled that amount before 2000.

(d)Enhance science and technology support. China has formed a Senior Expert Group on combating desertification composed of over 20 senior scholars from different departments, establishing a expert consulting mechanism and carrying out more advanced decision-making. Also, China has done researches on basic science and applicable technologies concerning desertification combat, set up nearly 40 integrated demonstrating areas, summed up and spread over 100 sets of technology mode, e.g. “Five-in-one” railway protection forest construction pattern, Sand-prevention Engineering System for Highway in Desert Region, the sparse and narrow forest belt with small network protection pattern, etc. Moreover, we have been continuously complementing technology-promoting service system, enforcing promotion and adoption of advanced technological achievements, enhancing scientific combat capability, so as to raise quality and efficiency of the combat work. In 2002, the “ Desertification Combat strategy-----Research on China’s Sustainable Development Strategy for Forestry” , which was a joint work of over 100 experts, put forward the ideas and measures of desertification combat in China, therefore became an important theoretical achievement and scientific guidance in advancing the healthy development of desertification combat in China.

(e)Realize better inter-department cooperation and integrated combat. Desertification combat involves varied fields and departments, China has formed a coordinating group constituted of 18 departments, with head of State Forestry Administration as group leader to execute macro management and form a mechanism in which the forest department is responsible for organizing, coordinating and supervising, assisted by departments such as agriculture, water resource, soil, meteorology and environmental protection. In specific combating tasks, measures in agriculture, water resource, soil and animal husbandry are organically combined for a all-rounded integrated combat.

(f)Develop industries in sandified areas and enable a fine economic and ecological interaction. To fully exert these areas’ advantages in solar energy, electricity and plant resources while protecting the ecological environment, the government encouraged all these areas to vigorously develop sand industrial bases of sand willows, sand thorns, medlars and almonds, thereby to organically combine ecological construction and desertification combat with improvement of local people’s working & living conditions and increase their incomes, leading to the exploration of successful road as “ more green in desert, more incomes for people, more profits for enterprises and

more tax by local government.” As for Ordos Inner Mongolia, the production value in forest and sand industry totals 680,000,000 RMB, with an annual tax of 140,000,000 RMB. It helped many farmers and herd men find the exact cutting point of ecological construction and improvement of working and living condition, as well as realized sound economic and ecological interaction.

IV. Obstacles and Challenges

(a) Large scale and severe damages: China now has 3,310,000 km² of dry areas, including 2,636,200 km² of desertified land, taking up 81.6%, which affects life and development of a population of 400,000,000. Throughout the country China got more than 50,000 villages, 1300- kilometers railways, 30,000 km highways, 50,000 km valleys and thousands of reservoirs under perennial impact. Every year sees a direct financial loss of over 50 billion RMB (7 billion dollars). Desertification has invaded into human space for living and developing, degraded land productivity, caused frequent natural disasters such as droughts and sandstorms, affected species diversity, deepened regional disparity, therefore has seriously threatened ecological security, economic development and social stability.

(b) Still outstanding unreasonable activities of human being: Because of lingering poverty, people in desertified areas made excessive use of ecological resources, resulted in the outstanding problems such as over-lumbering, over-grazing, over-farming and overuse of water, etc, each separately taking up 31.8%, 28.3%, 25.4%, 14.5%, with the first two accounting for 60% due to concerns of livestock and firewood.

(c) Still prominent conflicts in less investment: In recent years, although China has increased investment in key ecological constructions, still under the underdeveloped social and economic conditions, on the other hand it has dragged education, leading to lack of combat capability building; also the limited fund-raising capability of local governments has in a great degree leading to severe shortage of combating resources. At present, except The Program of Combating Desertification in the Wind/Sand Source Areas Affecting Beijing and Tianjin, most sand source areas in northern China are still quite weak in combat and are calling for more investment.

(d) Still incomplete policy mechanism. Documents such as “Law On Combating Desertification” and “A Decision on further strengthening the work of combating sandification” have stated certain favoring policies in adding interests to credits and loans, taxations and project compensations, but with no enough specific policies that are practical to regulate and fulfill all, policies of ecological compensation for vegetation in desertified areas and of state purchase still need further research and continuously complement, so as to make the existing policies much practical and search for policy mechanisms suitable for different areas, to make sure the “ who combats, who will manage and benefits” policy does have effects. Through making

and complementing a synthesis of effective policies, to defend for rights and interests of practitioners as well as guarantee sound and rapid development of China's desertification combat.

V. Countermeasures

(a) Adhere to strict rule of law and regulate combat works. China will make laws and regulations relevant to "Law On Combating Desertification", completing the legal framework on desertification combat. In the execution of law, China will intensify capability building, strengthen inspections, clarify responsibilities and improve supervising mechanism. Thus more heavily crack down on illegal activities such as destroying vegetation and wildlife resources in sandified areas or unlawful occupation of sandified land, and launch particular legal actions at proper times. Also, China will enhance relevant propaganda and education on law, so as to strengthen people's awareness of protecting vegetation and taking up combat responsibilities as well as construction of an integrated law executing system which is efficient, powerful and in order. Moreover, China will intensify water & soil preservation and supervision of the exploiting and constructing projects. For those may have no suitable water source and might harass the earth's surface and are likely to cause land sandification, China will ban them. When a project is accepted and established, a preserving plan for countermeasures against desertification should be drafted and reported, otherwise those projects should be investigated and dealt with strictly.

(b) Innovative systems and mechanisms with more energy at work: China will actively seek after a system in accordance with Chinese domestic situation and rule of market economy, effectively mobilize enthusiasm and initiative of the whole society in combating desertification. China will hold on to the principle of "Who combats, who will manage and benefit", extend the contract and leasehold span of sandified land, well implement the existing taxation and credit favoring policies, complete ecological compensation mechanism and protect legal rights and interests of those practitioners. The contracting and running right of controlled sandified land could be inherited or on the move, incorporated in forest resources and/or in sandified areas under public management, those are confiscated or assigned to natural protection areas and closed prohibiting protection areas will receive financial compensation. As for the industrial enterprises like water power plants or mining in areas of sandified area, a liability mechanism on rehabilitation and management of sandification should be established and completed. From the incomes from waterpower and mine exploitation, set aside certain sum of money for controlling desertification in local areas.

(c) Go ahead to increase input and accelerate project management. Aimed at the severe situation of desertification, China will, as soon as possible, initiate key-controlling programs collectively. In some areas without controlling conditions for now, yet of very important ecological locations, China will implement closed prohibiting protection, adopt coercive measures, prevent any man-made destruction

and facilitate natural restoration. In sandified areas of different patterns, launch projects to build integrated demonstration areas on combating desertification, and research for new policies, mechanisms, technologies and patterns, so as to promote combating work throughout the country.

(d) Intensify science and technology supports and exert more efforts in integrated combat. Due to the severe natural conditions in China's desertified areas, it's extremely difficult either to protect or increase vegetation. So China will exert support of science and technology, while combining modern techniques and traditional experiences, which not only brings modern techniques into full play, but also attaches importance to summing up and promoting grassroots' tradition effective experience and methods. Also, China will encourage technicians to focus on key problems through cooperation, then to promote superior plants that are anti- drought, fitting for cold weather, alkali soil, diseases and insect pests and suitable to various areas, along with advanced and adoptable forest & grass planting techniques and managing patterns. Moreover, China will vigorously promote the technical course of integrated control with small watershed as a unit, take local conditions into account, form a scientific layout, along with an optimized allocation of engineering, biological, agricultural technical measures and integrated control of mountains, waters, farmlands, forests, roads and villages. Finally, China will pay attention to enhance technological training of grass-roots technicians, especially farmers and herd men, thus to enable mastery of relevant basic knowledge and skills within a wide range, to closely combine combating soil erosion and desertification with people's transferring from poverty to abundance, to mobilize their enthusiasm in these programs.

(e) Transform productive styles and control sand source strictly. To combat desertification, China will control the source, through integrated work to facilitate structural adjustment of industries and transformation of producing styles, to closely combine ecological and economic benefits, always with improvement of ecological conditions as a major task. Moreover, China will reinforce allotment and management of water resources in those basins with scientific and reasonable arrangement among everyday life, production and ecological use, actively develop dryland farming and water-saving agriculture, and exert great efforts in building an intensive developing society.

(f) Develop featured industries and increase incomes of farmers and herd men. Desertification and sandified land do harm, but they also can be some precious resource. So China will stick to the close combination of ecological amelioration and industrial development, and with the premises of strict protection and effective combat, fully exert resource advantages such as light and heat resources in desertified areas, vigorously develop featured industries, especially support sand industries with low resource consumption, high technology content and bright market expectation. It is necessary to support by policies in order to foster leading enterprises, to drive structural adjustment, to develop industrialized management and to increase incomes

of farmers and herd men.

(g) Consolidate the liability system and enhance inter-department cooperation. China will step further to consolidate the liability system in which local governments should be liable for desertification combat, perfecting assessing measures on the aimed liability system and establish an inspiring and restricting mechanism. Also China will incorporate desertification combat into the overall plan of regional economic and social development, and to have ensured economic development, China will protect and improve ecological environment. Government at all levels will strictly perform their duties granted by law and accomplish combating work through close cooperation.

(h) Do well in survey and forewarning, increase technical level for decision-making. China will form a sound surveying system on desertification to make technical criterions, improve the equipments, enhance capabilities and intensify analysis of the results, so as to provide scientific basis for decision making. In particular, China will make efforts in meeting and dealing with emergent grave sandstorms, consummate emergency plan and, to the greatest extent, try to combat desertification. Moreover, the national desertification survey timely organized, and trends of land use will be informed as for reference of local governments at all levels to adjust countermeasures.

(i) Raise public awareness and mobilize all-rounded forces. Desertification combat is a common cause of the whole society; thereby to accomplish it China will mobilize all positive factors and forces to implement it. China will reinforce warning education on desertification of the country on a solid ground, by all means of propaganda, such as printing and sending out posters, popularizing common sense, investing and shooting documentaries, as to raise civil awareness of ecological protection. Meanwhile, China has also held a variety of training courses on combating desertification for grass roots to enhance their capabilities and to bring their master spirit into full play. In addition, China will exert the important functions of the PLA, armed police force, policeman, soldiers on prep service, as well as the labor union, youth league and women's union and other communities in society, as well as bestow units and individuals who have made prominent achievements in combating desertification with corresponding honors and prizes.

(j) Intensify international cooperation and UNCCD implementation. Desertification combat is the common duty of all countries in the world and need the joint efforts of international community. China will continue implementation of UNCCD and take on all of its due obligations while at the same time extend international communication and cooperation based on its own domestic situations and real condition of desertification to strive for inflow of overseas investment, technologies and advanced managing experience. China has realized the combating capability of under-developed and developing countries themselves cannot be without relevant

powerful support of international community. Therefore, China has called on all sides to pay close attention to this global ecological disaster of desertification and promote development of desertification combat through actions.

VI. Case Studies

(a)The Program of Combating Desertification in the Wind/Sand Source Areas Affecting Beijing and Tianjin

The Program involves 75 counties in Beijing, Tianjin, Hebei, Shanxi, and Inner Mongolia and a population of 19,580,000, with a total project area of 458,000 km², including 101,800 km² Aeolian desertified lands. The program lasts from 2001 to 2010, with construction of 20,000,000 ha., of which 2,650,000 ha. of Degraded Farmland were converted to Forest and Shrub land, 4,940,000 ha. of forests were built, 10,630,000 ha. of grassland were controlled and 23445 ha. of small watershed were combated, involving 110,000 relevant water projects, 180,000 ecological immigrants and a total industrial investment of over 56 billion RMB.

The program has adopted an integrated combat measure focusing on vegetation building, combined with other means in forestry, agriculture, irrigation and animal husbandry, which mainly receives state investment compounded by local government. In the liability system, the program implemented a system in which the central administrative departments operate, organize and lead with local governments who put into effect. Specifically, the targets, tasks, funds and liability were divided and implemented at the level of county, charged and organized by the government, with its main principal as primary responsible person who's in charge of signing the liability paper.

Through 7 years' construction, this program has made great achievements. In aspects of ecological protection and combat, compared to 2001, vegetation coverage has been raised by 10.5—20.4%, wind erosion and water erosion of soil have seen a net decrease of 196,000,000 tons with each by 16.4% and by 50.7%, dust release from the earth to the atmosphere has been cut by 15.8% with a net decrease of 4,950,000 tons. In economic and social construction fields, nearly 40 percent of increase of sustainable development index is from projects. In 2006, food output per person in project household was 1378.74 kilos with 16.09 kilos increased since 2005. food production value per household was 4463.09 RMB, increased by 35.43 RMB, the net income of tree-planting per household reached 4566.09 RMB, increasing by 1176.49 RMB and by 34.71%. In 2006, nearly 99.97% of children before school age would go to school and nearly 99.32% will receive the nine year compulsory education, with every thousand people's ownership of 2.72 medical personnel higher than the national average, therefore to prove anti-poverty policies in those areas have greatly raised the welfare standard of local people.

Key experience: First, correctly handle relation between ecological construction and economic development. With ecological construction as a main goal, governments highly focus on issues concerning farmers' incomes and food supplies, so as to ensure the continuous raise of farmers' living and income standard, to accelerate strategic adjustment in economic structure and to advance production mode transformation therefore to push ecological economic and social development into a fine circle. Second, reinforce scientific support and to increase quality of the programs. All areas have strengthened training of farmers, management and technical personnel at grass-roots level, paid attention to promotion and application of advanced technology with forestry building pattern, and optimized tree species makeup. Third, ensure strict program and fund management. Counties in which it's implemented should strictly hold the pass for design, construction, check and acceptance of the program. Forth, protect construction achievements. By strict implementation of forestry law, desertification combat law, water & soil preserving law and grassland law along with formulation of a synthesis of rules and regulations based on local real conditions, to protect resources and construction achievements by means of law, to assign constructing, contracting and protecting tasks by hillside or field plot, and to ensure readiness to take all these tasks, especially in personnel assignment

(b) Sand combating and forest building program in Chi Feng Inner Mongolia through financial cooperation between China and Germany

Total investment in this program was 113,700,000 RMB, of which 16,000,000 mark (72,000,000 RMB) were donated by Germany, 33,340,000 RMB from China in cash, and 8,360,000 RMB through labor support. This program is expected to last for 9 years, including a 6-year constructing period, at the end of which about 40,250 hectares of land in 4 target areas will come under control. Presently, it has created favorable ecological and social benefits during its implementation, especially for the economic profits in labor, seeds and feeding grass. Experience gained from this program mainly includes,

Participated land use and layout. All program-executing offices strictly adhere to rules, fully respect farmers' wills, and try to involve as many participants as possible.

Training course on the program. All program-executing offices, along with experts home and abroad have held training courses on schedule to execute specific plan and have carried out pertinent management and technology training for those who participated.

Make efforts to mobilize enthusiasm of people on the front line. Throughout implementation of this program, the city has unfolded a participant plan step by step, and put access to land into real effect, strictly implementing a contracted forestry-building system. At the same time, all payments for labor are in cash directly, being sent out from the government office to households, thereby has laid foundation

for the program.

(c) Soil preservation in the An'ding District of Gansu Province

This is a district on Yellow Soil Plateau, with a population of 430000 covering land of 3638 km² and suffers from quite severe water and soil erosion. Before any combat work was initiated, it has got fragmented landscape and sparse vegetation, with a water-soil erosion area taking up over 90% of its territory. With low food production, people there lived a quite hard life, even without enough drinking water.

Since 1983, this district has been listed in national key water-soil erosion combat zone, and an integrated combat was initiated at the level of small watershed. Concerning to characteristic of soil erosion, landscape and current situation of land using, people here have draw an integrated combat course combining mountain, river, forest, farmland and road. They have cultivated terraces one after another on sloping plow land, planted pasture on steep plow land, grown grasses and trees on barren hillside, along with construction of dams, grain threshing workshops, water cellars and pools. Moreover, some small watersheds combat there is of high level and outstanding economic, ecological and social benefits, which has wined them the title as national model.

Up to now, more than 90 small watershed and 1620km² of soil erosion area have come under control, with three draining field becoming three conserving field with an increase of vegetation coverage from 8% to 43% , and the lack of firewood ,feedstuff and fertilizer are almost settled. In this combat, people asked for not only social and ecological benefits but also economical benefits from barren hills. After converting slopes to terraces, people started to grow potatoes within a wide range and to launch industrialized management of agriculture. With growing potatoes of nearly a million ha. annually, local people have seen great income increase, which even more mobilized their enthusiasm in combat. Also, the rain water collecting project was launched, building 3,490,000 m² of collecting field and over 50,000 water cellars, therefore have met the need for drinking water, of over 200,000 people and 300,000 livestock. Local people endeavored to grow grasses and trees, to develop stockbreeding, and the production value has soared from 8,780,000 RMB in 1982 to 98,460,000 RMB now; meanwhile, the improved condition for agricultural production has lead to increased food output which has remained above 100 million kilos successively for the decade, with improved living for most people. Generally speaking, poverty has been eradicated there.