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To: each provincial/autonomous region/centrally administered municipality Government and Xinjiang Production and Construction Corps of CPLA  
“National plan on sustainable agriculture development (2015-2030)” has been approved by state council, and herewith attached for you to carry out carefully.

May 20, 2015

Copy to: General office of State Council, department of agriculture (livestock production) of each province/autonomous region/centrally administered municipality and Xinjiang Production and Construction Corps.

National Plan on Sustainable Agriculture  
Development  
(2015-2030)

**May, 2015**

Agriculture is of great significance for national food, resource and ecology security. It is an inevitable choice and internal requirement to promote sustainable agriculture development for achieving beautiful China and agricultural modernization with Chinese characteristics. This plan is elaborated therefore to guide national agriculture sustainable development.

## **Part A. Development overview**

### **( 1 ) Main achievements**

Notable achievement has been made in agriculture and rural economic development since 2000, marked with fast development in modern agriculture, increased level of equipment and technology, strengthened support to agricultural resource and environment protection and ecological protection. Positive progress is seen in agriculture sustainable development and summarized as follows.

*Agricultural production capacity and farmer's income is increasing continuously.* Grain production has achieved historic "growth for 11 consecutive years", with stable output of over 500 million tons for 8 years and over 600 tons for two years. Other products (e.g. cotton, oil, sugar, meat, egg, milk, fruit, vegetable, and fish) kept stable growth resulting in adequate supply. Quality and safety of agricultural product are improving continuously. Meanwhile, farmers' income kept rapid growth, exceeded the income growth rate of urban citizens for 5 years.

*Agricultural resource use efficiency is improved stably.* Farmland occupation and water resource development is strictly controlled, a number of new techniques, new products and new projects are replicated for protection and high efficient use of resources, water and land resource use efficiency is improved. The proportion of agricultural irrigation water in total water use has dropped down from 61.4% in 2002 to 55% in 2013, and coefficient of effective use has rose from 0.44 to 0.52 in 2013. Grain yield has increased from 293kg/mu to 359kg/mu. It made great contribution for safeguarding main agricultural products including grain under serious shortage of water and farmland.

*Agricultural ecosystem protection is strengthened.* A series of national programs (e.g. soil and water conservation, converting farmland to forests or grassland, returning grazing land to grassland, sand prevention and control, rocky desertification control) and policies (e.g. subsidies for grassland ecological protection) are launched to enforce protecting farmland, forests, grassland and marine ecosystems, and preventing alien species invasion. Deteriorating trend of agricultural ecology nationwide has been preliminarily contained with improved signs in some region. National forest coverage and grass vegetation coverage reached 21.6% and 54.2% in 2013 respectively.

*Rural residential environment is improved gradually.* The following project/programs are carried out: renovation of dilapidated houses in rural areas; building permanent house for nomads; rural environment consolidation and beautifying; standardized animal breeding; integrated utilization of straw/stalk; biogas and drinking water system. The concept of eco-villages and beautiful countryside are promoted and rural tradition and culture are

conserved. Until the end of 2014, 15.65 million dilapidated houses are renovated, and 246,000 household of nomads are settled down. Rural environment consolidation and beautifying was carried out in 59,000 villages, the direct beneficiaries reached 110 million.

## **( 2 ) Risks and challenges**

Despite of the considerable achievement in rural development, a series of issues such as overdevelopment of agricultural resource, overuse of agricultural inputs, overexploitation of groundwater, overlapped pollution by internal and external pollutants, become increasingly critical, resulting in big challenges for sustainable agriculture development.

*The growing resource restriction makes national food security a huge task.* China has the basic national conditions of huge population with less land and water shortage. 4.8 million mu arable land will be occupied each year for construction purpose, reclaimed land is of poor quality in general because the topsoil of occupied land are wasted, the stress to maintain the red line of 1.8 billion mu (120 million hectares) arable land is getting worse. Degraded land quality, acid soil, decreased depth of tillage layer and black soil layer is becoming more prominent. Irrigation water use efficiency is 20% lower on average than developed countries, ground water in northern China region is seriously overexploited. The growing demand for grain and other major agricultural products make the contradictions between food supply and resource restriction prominent.

*Serious environmental pollution makes it difficult to ensure safety of agricultural products.* Industrial waste and municipal solid waste is spreading towards rural areas, and heavy metals like cadmium, mercury, and arsenic are infiltrating into producing areas of agricultural products. Main soil pollutants in 16.1% of the sampling sites national wide exceed national standard. Less than one third of chemical fertilizer and pesticides are effectively used, less than two thirds of used agricultural films are collected, only half of the animal manure are treated, and crop straw/stalk are being burned. Marine eutrophication is a big problem, resulting in frequent red tide and green tide as well as ecological deterioration of fishing waters. Treatment of solid waste and waste water in rural areas is far below expected. The growing environmental pollution in agriculture and rural areas directly affected the quality of agricultural products.

*Ecosystem deterioration makes ecological agriculture a difficult task.* Soil erosion area nationwide reached 2.95 million km<sup>2</sup> with annual soil loss of 4.5 billion tons, desertification area of 1.73 million km<sup>2</sup>, and rocky desertification area of 0.12 million km<sup>2</sup>. Extensive but high tensioned farming results in unbalanced farmland ecosystem and degraded function, agro-forestry and agro-husbandry ecosystem has to be established. Serious overgrazing caused overall deterioration of grassland ecosystem. Shrink of lakes and wetlands restricted its ecological service. Biodiversity is threatened critically and species in distinction are increasing. Deteriorated ecosystem posed serious challenge to ecological agriculture.

*Imperfect system and mechanism makes it an arduous task to establish systems for sustainable agriculture development.* Assets management system for water and soil has not yet been established and problems concerning mountains, waters, forests, farmland and lakes are not tackled in a comprehensive way. Market oriented resource matching

system, particularly the pricing system to reflect scarcity of water resource, is not yet established. Incentive mechanism for recycled agriculture is imperfect and agriculture waste is not reused adequately. Eco-compensation system for agriculture needs to be improved. Subject of liabilities for agricultural pollution is undefined clearly and the cost for pollution is too low. Imperfect and missing mechanisms and systems, which reflect the social and economic value of agricultural resources, restrict the rational use of agricultural resource and ecological protection.

### **( 3 ) Opportunities**

Sustainable agriculture development is facing a historical opportunity now and in near future. First, a common understanding for sustainable agriculture development has reached. Ecological civilization construction was incorporated into “5-pronged strategy” on the 18<sup>th</sup> national congress of CPC, the whole society are highly concerned about resource, ecological and food safety, the concept of green development, recycled development, and low carbon development enjoys popular support. Second, solid material foundation makes sustainable agriculture development possible. Our overall national power and financial strength keep growing, policies in favor of and to support farmers and agriculture keep strengthening, major agricultural products including grain achieved continuous growth for years, the capacity to use “two resources, two markets” to supplement national resource deficit is strengthened, all these factors provide strategic space and material base for agriculture readjustment and restructuring. Third, the role of technology and talents for sustainable agriculture development is being enhanced. Traditional agricultural technology is carried forward widely; modern biotechnology, IT, new material and equipment are widely applied; integrated innovation on ecological and recycled agriculture is happening, which provide sound technical supports for sustainable agriculture development. Fourth, systems and mechanisms for sustainable agriculture development are being improved. Law and regulation system is being improved steadily with the development of rural reform and ecological civilization, resulting in improved governance capacity, which will bring vigor and vitality into sustainable agriculture development.

“Agriculture, countryside and farmers” (*known as Three Rural Issues*) are solid foundation for national stability and security. We must seize opportunities and combat with challenges, based on international, national and agricultural conditions. We should fully carry out the strategy of sustainable agriculture development to achieve strong agriculture, well off farmers and beautiful countryside.

### **Part B. General Requirements**

#### **( 1 ) Guiding ideology**

We shall be guided by Deng Xiaoping’s theory, the important thought of “Three Represents” (*by President Jiang Zemin*) and Scientific Development Concept (*by President Hu Jintao*), fully carry out the spirit of series of speeches by President Xi Jinping. We shall follow the decisions and arrangement of CPC central committee and state council, stick to the guiding principles of producing capacity being highlighted with conservation taking priority, driving by innovation, and ruling of law, improving people’s

livelihood, and safeguarding security. We shall advance development of resource saving, environmentally friendly and ecological conservation agriculture, and transform from extensive management featuring with high input and resource consumption to intensive management featuring with improved quality and benefit, so as to ensure national food security, products quality, ecological safety and farmers' income growth, and provide solid support to moderately well off society and sustainable agriculture development.

## **( 2 ) Basic principles**

*Agriculture development matching with resource and environment bearing capacity.* We shall stick to red line of arable land, water resource and ecological protection, optimize agriculture layout and improve intensive farming level to ensure national food security and adequate supply of major agricultural products. We shall make policy according to local conditions taking account of production, environmental protection and ecological remediation. We shall speed up management of agriculture environmental problems and strengthen agriculture ecological protection to achieve sustainable use of resources and improved producing capacity and disaster prevention and mitigation capacity.

*Synergy between driving by innovation and ruling of law.* We shall push forward agricultural technology innovation and mechanism innovation, enhance the driving force of innovation, and promote agriculture readjustment. We shall raise awareness of and improve laws and regulations concerning agricultural environment and ecological protection to promote innovation and protect resource and environment.

*Adherence to the unity of current measures and long term protection.* We shall bear in mind that protection of ecological environment is protection of productive force, highlighting ecological management and protection. We shall start with the current problems taking account of national and international resources, internal and external pollutants to promote the establishment of long term mechanism for sustainable development and sustainable use of agricultural resources.

*Integration of pilot project and replication.* Agriculture sustainable development has to be treated in a comprehensive and systematic manner taking account of resource and ecological elements in different regions to solve technical issues which restrict sustainable development. We shall summarize lessons learnt from pilot projects and best practices for replication to other part and steady progress towards national agriculture sustainable development.

*Adherence to the combination of market mechanism and government guidance.* The polluter-pays principle shall be applied, more specifically the one who benefit is responsible for paying. We shall make efforts to build a fair, honest and credible market environment, encourage farmers, enterprises and social parties to actively participate in resource protection, environment management and ecological remediation. Government has an irreplaceable role in promoting agriculture sustainable development, and has to fulfill its responsibility in top level design, policy guidance, input support and supervision.

## **( 3 ) Objectives**

By 2020, sustainable agriculture development will have achieved preliminary results with

clear economic, social and ecological benefit. Agricultural transformation will make positive progress with improved productivity, optimized agricultural structure and better product quality. Agricultural resource protection and use efficiency will be improved notably with restored and strengthened ecological function of forest, grassland, lakes, and wetland as well as reduced rate of biodiversity decline.

By 2030, sustainable agriculture development will have achieved remarkable progress. A new pattern for sustainable agriculture development will have been set up with enhanced food supply, efficient use of resources, better environment, stable ecosystem, well off livelihood and beautiful countryside.

### **Part C. Main tasks**

#### **( 1 ) Optimizing development layout and improving agricultural productivity**

**steadily.**

*Optimized agricultural development layout.* We will set up new agricultural development layout which match with resource and environment capacity taking account of the local conditions of agriculture, forest and stock raising, based on the requirement of “self-sufficient grain, absolutely safe rations”. We will develop steadily specialized agriculture with comparative advantage in those areas where agricultural production matches perfectly with soil and water resource. However, we will readjust structure in those areas where natural resource is overused. We will implement program of converting farming land into forests, converting stock raising into grasslands in those ecologically fragile areas to restore function of agricultural ecosystem.

*Improved agricultural productivity.* We will step up efforts to promote better seeds and farming practice through science and technology innovation and extension, aiming at 60% contribution rate by science and technology by 2020. We will promote vigorously agricultural machinery and its combination with techniques, with a target of 68% mechanization level for plowing, planting and harvesting of major crops by 2020. We will strengthen agricultural infrastructure construction to improve the capacity to combat natural disasters. We will further construct storage and transferring facilities to improve storage conditions. We will encourage new agricultural business entities such as major planting/breeding households, family farms and professional cooperatives to play a decisive role in moderate large-scale farm operation and improved farming management and social service.

*Ecological and recycled agricultural development promoted.* We will optimize and adjust the structure of planting/breeding to promote agro-forestry and agro-animal husbandry. We will support grain producing area to incorporate animal husbandry and apply manure fertilizer. We will support planting of fodder crops such as lucerne and silage corn, and implement projects to demonstrate converting grain into fodder, combination of planting and breeding. We will extend agricultural techniques to save water, fertilizer and pesticide, as well as recycled model of “co-existence of fish and rice”, “pig-biogas-fruits” and understory economy. We are aiming to achieve recycled use of agricultural resource in national modern agriculture demonstration areas and major grain producing counties by 2020 and zero waste emission national wide by 2030.

#### **( 2 ) Protecting arable land and promoting sustainable use of farmland**

*Arable land areas stabilized.* Arable land protection system shall be carried out strictly to stabilize grain planting areas and control additional land areas for construction to make sure that China's arable land area do not fall below the red line of 1.8 billion mu (120 million hectares) and prime farmland does not fall below 1.56 billion mu. The better quality arable land surrounding cities, along railway/highway, and of grain/cotton/oil production base will be designated as permanent prime farmland for protection. Both quantity and quality of reclaimed land will be emphasized, and the topsoil of occupied arable land will be removed separately for after use.

*Arable land quality improved.* Soil improvement measures (e.g. deep tillage, conservation cultivation, returning straw back to soil, making and application of organic fertilizer) shall be taken to increase soil organic matter and improve soil fertility. Soil micro flora shall be restored and nurtured to promote nutrient circulation and decomposition of agricultural waste and organic matter. Protection of black soil in northeast shall be strengthened to reduce black soil loss. Land consolidation, low-yield farmland improvement, agricultural infrastructure construction and well facilitated prime farmland construction shall be carried out to achieve the target of 800 million mu concentrated and well facilitated prime farmland irrespective of drought and flood by 2020. National soil productivity shall be upgraded by 0.5 and 1 level respectively by 2020 and 2030. The external pollutants such as emission by mining and manufacturing, urban disposal and sewage shall be controlled strictly. Heavy metal and organic contaminated soil shall be treated, and soil grading system for origin of agricultural products shall be established.

*Moderate conversion of farmland into forests and grasslands.* In accordance with the new overall plan for converting farmland into forest and grassland approved by state council, we will continue to implement the program of converting farmland into forests and grasslands taking account of natural conditions, and promote the combination of forest and grass where possible, to increase vegetation cover.

### **( 3 ) Saving and using water efficiently, safeguarding agricultural water use.**

*Red line system for water resource management applied.* Red line will be determined for water resource development, the total water use for irrigation will remain 372 and 373 billion m<sup>3</sup> respectively by 2020 and 2030. Red line for water use efficiency will also be determined, the ratio of effective water use for irrigation will reach 0.55 and 0.6. Integrated management of overuse of surface water and overexploitation of ground water shall be promoted; irrigation area will be decreased moderately.

*Water-saving irrigation extended.* We will step up establishment of effective water-saving system to promote water-saving irrigation in large scale. The proportion of irrigated areas will reach 55% and 57%, of which 64% and 75% will be water-saving irrigation respectively by 2020 and 2030. Water-saving irrigation systems shall be built in areas featured with grain production, severe water shortage and fragile ecosystem. Water-saving irrigation technique, such as water proof channel, pipe irrigation, drip and spray irrigation shall be extended, and irrigation water measuring facilities shall be improved so as to achieve the target of 288 million mu of water-saving irrigation area by



2020. The key irrigation schemes in large and middle-sized irrigation district shall be upgraded for water saving purpose, small irrigation and drainage system shall be strengthened and field ditches for large and middle-sized irrigation district shall be built to improve productivity and capacity to combat drought. We will introduce agronomic techniques to keep soil moisture and improve farming practice, readjust structure and extend drought resistant varieties.

*Rainfed agriculture expanded.* In semi-arid and sub-humid region, we will construct rain collecting facility, popularize plastic film mulching technique, and promote rotational cropping and intercropping practice. We will optimize the cropping structure, improve farming systems and increase the planting area of high yield and drought resistant species while controlling the planting areas of high water-consuming species. We will expand conservation tillage in regions where soil and water erosion is likely to happen.

#### **( 4 ) Controlling environmental pollution and improving agricultural and rural environment.**

*Farmland pollution controlled.* Prevention and control of non-point pollution shall be strengthened and agricultural input shall be used rationally to reduce internal sourced pollution and improve efficiency. Targeted fertilization shall be further improved and application of organic fertilizer, bio-fertilizer and green manure shall be encouraged to achieve the goal of 90% coverage of targeted fertilization, 40% of fertilizer use efficiency with zero increase in fertilizer application by 2020. The use of effective but low at toxicity and residue chemical, bio-pesticides and advanced sprayers shall be promoted, integrated pest and disease control shall be strengthened, to achieve the goal of 40% coverage of integrated pest and disease control with zero increase in pesticide application by 2020, this goal shall be achieved one year ahead of time in 3 regions, including Beijing-Tianjin-Hebei region, Yangtze River delta region and Pearl River delta region. Ecological channels and purification ponds shall be built to purify field discharge and surface runoff. Thick plastic film shall be promoted, the collecting of used film by machine and its reuse shall be demonstrated by project, degradable film shall be researched and developed to achieve the goal that used plastic film and pesticide package shall be basically collected and reused by 2030. Environmental monitoring and risk assessment for the origin of agricultural products shall be carried out, the use of heavily contaminated land will be controlled, and national monitoring system for agricultural environment shall be established and improved.

*Integrated management of breeding pollution.* Large scale livestock and poultry farms shall be standardized to improve the mechanization level of manure collecting and treatment. Separation of rain water and sewage, and resourceful utilization of manure shall be carried out to control discharge and achieve the goal that comprehensive utilization rate of livestock waste shall reach 75% and 90% respectively by 2020 and 2030, more specifically 100% for large scale livestock and poultry farms. No-breeding and restricted breeding zones will be defined in drinking water source and scenic areas. By the end of 2017, livestock and poultry farms will be closed or moved out of no-breeding zones, this shall be achieved one year ahead of time in 3 regions, including Beijing-Tianjin-Hebei

region, Yangtze River delta region and Pearl River delta region. Facilities for harmless treatment of died livestock and poultry shall be constructed, the production and use of veterinary medicines and feed additives will be regulated, the system for monitoring and supervision of quality of veterinary medicines will be improved. Aquaculture capacity and density shall be strictly controlled in coastal waters, rivers, lakes and reservoirs. Ponds for aquaculture purpose shall be standardized, efficient and safe compound feed shall be promoted to minimize the use of chilled trash fish as bait.

*Rural environment improved.* Comprehensive rural environment consolidation shall be carried out based on scientific planning, protection of drinking water source and treatment of sewage and waste shall be strengthened, and rural clean energy system shall be established. The separation of large scale livestock and poultry farms from residence areas shall be promoted. Crop straw/stalk burning shall be prohibited, and full utilization of crop straw/stalk shall be promoted to achieve complete use of straw/stalk in major production area by 2030. We will promote eco-villages, beautiful countryside campaign to protect and restore natural landscapes. We will implement household courtyard renovation and village beautification program as well as river regulation on a village or township base. We will pay more attention to the display and inheritance of farming culture and customs, and promote sustainable development of recreational agriculture.

#### **( 5 ) Recovering agriculture eco-system, improving ecological function.**

*Ecological function of forests enhanced.* Aiming at forest coverage of above 23% by 2020, we will improve the overall forest productivity and its ecological function by combating desertification in west, expending space for forest in east, recovering natural forest in North, and improving forest quality and benefit in South. Protection of natural forests, particularly the forests for public benefit shall be strengthened. Farmland shelter belt system shall be established in plain area, aiming to cover 90% and 95% of farmland respectively by 2020 and 2030.

*Grassland ecosystem protected.* We will fully implement the subsidy and incentive mechanism for grassland ecosystem protection to promote conversion of grazing land to grassland, control of sandstorm source of Beijing-Tianjin and grassland disaster reduction. We will stick to regulations for protection of primary grassland, carry out measures like grazing prohibition, rotational grazing and pasture improvement to promote livestock-feed balance and shift from traditional grazing towards modern animal husbandry. We will improve the grassland management of transition zone between agriculture and animal husbandry to restore grassland ecosystem. Construction of grassland natural reserves will be strengthened. We will make good use of grassland in Southern China to protect and recover alpine meadow ecosystem. National vegetation cover of grassland will reach 56% and 60% by 2020 and 2030.

*Aquatic ecosystem restored.* We will increase water supply for important wetlands, rivers and lakes, by water saving, water diversion and use of recycled water. The establishment of natural reserves for hydro bios and protected area for aquatic genetic resources shall be enhanced to facilitate aquatic ecosystem restoration. By 2020 and 2030, the area of healthy aquaculture will account for 65% and 90% respectively. Protection of marine

fishery ecosystem shall be strengthened and fishing intensity shall be strictly controlled. We will continue to restrict the number of marine fishing vessels and replace those high energy consuming vessels. We will strengthen the protection of seashores, and allow moderate development of tidal flats. Landfilling is prohibited in important fishing waters and artificial reef deployment is encouraged. We will strictly implement the regulations on the minimum mesh size of fishing tackle.

*Biodiversity conserved.* We will enhance protection of animal and poultry genetic resources and agricultural wild plant genetic resources, and highlight the protection zone for wild animals and plants. We will carry out special rescue project for endangered animals and plants species, and improve monitoring and alarming system for wild animal and plant resources to reduce the rate of biodiversity decline. We will establish monitoring and alarming system, risk analysis and remote diagnosis system for alien invasive species, and establish demonstration base for integrated management and utilization of alien invasive species. We will establish safety barrier of animal and plant inspection and quarantine along borders to guard against animal and plant diseases.

#### **Part D. Functional zoning**

The whole nation is divided into three regions: optimized development region, moderate development region and protected development region, based on the factors of resource capacity, environment capacity, ecosystem, and foundation for development. The direction and focuses for sustainable agriculture development of each region are determined according to the local conditions and time arrangement.

##### **( 1 ) Optimized development region**

This includes northeastern China, Yellow River-Huai River region, the middle and low reaches of Yangtze River, and southern China, characterized with better natural conditions and great potential, is the major producing areas of bulk commodities. However, problems can be found such as overuse of resources and agricultural inputs, environmental pollution, and low level recycled use of resources. For this region, we shall protect agricultural resources and ecological environment with the precondition that improved productivity of major agricultural products including grain is ensured, to achieve steady development, sustainable use of resources and environmentally friendly farming.

—*Northeastern China.* The key focus will be protection of black soil, comprehensive use of water resource and mixed farming so as to become modern production base of grain and animal products characterized by sustainable use of resources, integration of planting and breeding, and healthy ecosystem. For typical black belt, we will carry out conservation tillage, integrated management of soil and water erosion, application of organic fertilizer, and rotational cropping of grain and soy bean. By 2020, deep tillage will have been applied where appropriate, soil organic matter restored, and soil water and fertilizer holding capacity improved remarkably. For three-river-plain region, the major rice producing area, we will control the area of paddy field, restrict groundwater exploitation, convert well irrigation into channel irrigation, the proportion of channel irrigation will be lifted up to 50% by 2020 and channel irrigation as leading method by 2030. For transition zone between agriculture and animal husbandry, we will promote coordination of cropping and grazing,

encourage planting of silage corn and lucerne, and develop high quality dairy and beef industry. We will promote moderate large-scale livestock and poultry raising, and strengthen regional management of animal disease and while building up no-epidemic areas. For Da and Xiao Hinggan mountains region, we will strengthen forest and grassland protection to make it a security barrier for protection of farmland ecosystem.

— *Yellow River-Huai River region.* We will focus on control of ground water overexploitation, fertilizer and pesticide application, and resourceful use of agricultural waste to establish a modern agriculture system, which match with resource and environment capacity, supply grains and vegetables stably. For areas of north China plain where groundwater is overexploited, we will readjust cropping structure to reduce planting areas of those which are highly dependent on irrigation. We will vigorously promote water-saving irrigation methods, adopt irrigation quota system, and enhance quality management of irrigation water. We will promote agronomic techniques to save water as well as conservation cultivation so that the issue of groundwater over exploitation is mitigated. For Huai River basin where non-point pollution is seen as a major problem, we will promote targeted fertilization, green control of pest and disease, and resourceful use of straw/stalk. We will readjust and optimize layout of livestock and poultry breeding, stabilize production capacity of pigs, poultry meat and eggs, and establish facility for treatment and recycled use of manure. For floodplains of Yellow River, we will promote healthy aquaculture according to natural conditions. We will fully implement high standard prime farmland program, upgrade low yield farmland and saline land, and establish farmland shelterbelt net.

— *The middle and low reaches of Yangtze River.* We will focus on control of non-point pollution and heavy metal contamination. We will set up healthy production model for rice, pigs and aquatic products to ensure product quality and improve rural and agricultural environment. We will promote scientific application of pesticide and fertilizer, reduce its pollution to farmland and waters through check dams and green manure. We will promote moderate large-scale livestock and poultry breeding, reduce pig raising in densely populated area, accelerate resourceful use of livestock and poultry manure, and advance treatment of solid waste and waste water in rural area. We will strengthen protection of fishery resources, promote herbivorous fishes, filter-feeding fishes and well known local products. Ponds for aquaculture purpose shall be standardized to expand healthy aquaculture. Fisheries enhancement and release will be continued, and rice paddy pisciculture will be promoted. Pollution discharge caused by mining and manufacturing shall be strictly controlled to ensure water quality. Heavy metal contaminated arable land shall be remedied through application of organic fertilizer, returning straw back to field, establishment of buffer zone, and optimized cropping structure to mitigate the impact on agricultural production. By 2020, the edible agricultural products shall be produced according to national standard, the expansion of non-point pollution in agriculture shall be contained.

— *Southern China.* We will focus on reduction of pesticide and fertilizer application, red soil improvement, control of soil erosion, promote ecological agriculture and specialized agriculture for a safe and better quality production system in tropical and sub-tropical

region. We will promote professionalized pest and disease control, appropriate use of pesticide and fertilizer, control of soil erosion, and red soil improvement to develop a production base for tropical fruits and winter vegetables. We shall restore forests and grassland, increase water conservation forests, timber forests and economic forests to reduce surface runoff and avoid soil erosion. We shall improve mountain meadows and promote livestock and poultry breeding with local specialty. We shall strengthen protection of natural fishery resources, and aquatic protospecies, expend fisheries enhancement and release, and extend healthy aquatic culture. By 2020, efficient use of agricultural resources and ecological agriculture will have made remarkable progress.

## **( 2 ) Moderate development region**

This includes northwestern China, areas along the Great Wall, and southwestern China characterized with fragile ecology, severe water shortage, limited resource and environmental capacity, and poor agricultural facilities. We will highlight not only development but also conservation, based on the nature of local resources and environment. We will further tap potential, make effective and intensive use of resources to improve efficiency.

——*Northwestern China and areas along the Great Wall.* We will focus on efficient use of water resource and balance between livestock and grassland, highlighting its function of ecological barrier, specialized products and income increase. We will promote rainfed agriculture and herbivorous animal husbandry moving towards ecological and recycled agriculture, strengthen low yield farmland and saline land improvement. For rainfed agriculture region, we will reduce the planting areas of wheat while increasing yield, increase planting areas of corn, potato and pasture, extend plastic film mulching technique and establish mechanism for collecting used plastic film. We will build up shelterbelt forest to strengthen water conservation. For oasis agriculture region, we will strive to develop efficient and water-saving irrigation system, improve existing facility and field channel system to increase irrigation area. By 2020, water saving irrigation will cover the whole region, and groundwater exploitation will be controlled strictly where water shortage is seen as a serious issue. For transition zone between agriculture and animal husbandry, we will promote coordination of cropping and grazing, improve forage productivity for herbivorous animal husbandry development by returning farmland to grassland, rotational cropping and readjustment of cropping structure. For grazing region, we will continue to implement the program of returning grazing land to grassland to protect natural grassland, promote rotational grazing, no-grazing, stall feeding to control grassland rodent and pest, and restore grassland ecology.

——*Southwestern China.* We will focus on integrated watershed management, utilization of grassland resource and addressing water shortage by engineering works. We will strive to achieve the unity of ecological and economic benefit while developing specialized agriculture with ecological protection in mind. We will promote control of stony desertification by terrace building, soil replacement and building rain collecting tanks. By 2020, at least 40% of the stony desertification areas will have been controlled. We will strengthen the protection of forests and grassland, increase forests for soil and water

conservation, and economic forests. We will encourage rational use of grassland resources and artificial pasture heading toward ecological animal husbandry. We will strictly protect rice paddy in Pingba county, stabilize the planting area of rice and corn while increasing the planting area of potato, and develop specialized products with mountain feature.

### **( 3 ) Protected development region**

This include Tibetan plateau and marine fishery region, has critical importance in ecological conservation. Being the birthplace of many big rivers and as the important ecological barrier, Tibetan plateau has rich agricultural resource with plateau feature but fragile ecology. Marine fishery region is facing issues such as declined fishery resource and prominent pollution with rapid development. We will stick to the principle of “protection taking priority and development being restricted”, develop ecological and specialized agriculture to allow grassland and sea to rest and ecosystem to be restored.

——*Tibetan plateau.* We will highlight the ecological protection of Sanjiangyuan natural reserve and three parallel rivers area to build solid ecological barrier and improved grassland ecology. We will protect prime farmland, stabilize the planting area of local grain and oil crops including highland barley to ensure ration security, and develop potato, rape seed and vegetables moderately. We will continue to implement the program of returning grazing land to grassland, and subsidy mechanism for grassland ecological protection to conserve natural grassland. We will promote stall feeding to keep balance between livestock and forage, and control grassland rodent, pest and poisonous weed to mitigate grassland decline. We will promote highland featured animal husbandry (e.g. yak, cashmere goats, Tibetan sheep) in an appropriate way, enhance animal epidemic prevention system, and protect unique highland fishes.

——*Marine fishery region.* We will strictly control marine fishing intensity, restrict the number and power of marine fishing vessels, and enhance supervision during closed fishing season. We will stabilize the areas of marine culture, improve the quality of coastal waters, promote enhancement of hydrobios resources to enhance fishery development. We will vigorously develop marine ranching and protect marine fishery ecosystem. By 2020, the number and power of marine fishing vessels will have dropped down remarkably.

### **Part E. key programs**

Framing around key tasks, with urgent, critical and weak links and fields as focus, we will make budgetary and financial funds from central government available. Meanwhile, we will adjust unpaid fund for supporting agriculture and encourage local and private investment, to implement a series of key programs for laying a solid foundation for sustainable agriculture development.

### **( 1 ) Soil and water conservation program**

*High standard prime farmland project.* Focusing on major grain producing area, and key counties in non-major grain producing area, taking account of key producing area for cotton, oil and sugar, we will carry out the following key activities: land leveling,

constructing irrigation and drainage canal and wells, facilities for water-saving irrigation, rain collecting, and compost making. We will build working road, farmland shelter belt, and power transmission and transformation facilities, extend advanced and appropriate farming techniques.

*Arable land quality improvement project.* The following activities shall be carried out according to site-specific principle: soil amelioration, soil fertility improvement, nutrients balance, to improve land capability and productivity. In Northeastern China, we will carry out following activities: deep tillage, returning stalk back to field, compost making and rotational cropping to protect black soil. We will control soil and water erosion through changing range, planting along contour, and establishing farmland shelter belt. In Yellow-River and Huai-River region, we will carry out the following activities: returning straw to field, deep tillage, soil improvement, adjusting cropping structure, and salinity management. In middle and low reaches of Yangtze River and southern China, we will carry out the following activities: planting green manure, application of organic fertilizer, winter plowing, and application of lime. We will implement pilot project to demonstrate separate removal of top soil of construction land for land reclamation and low yield farmland improvement.

*Management of heavy metal contaminated soil project.* In Southern China's rice producing area where heavy metal contamination is seen as key issue, we will modify existing canal system, build plant isolation strip or artificial wetland to reduce the heavy metal content in irrigation water. For lightly contaminated area, we will adopt agronomic technique for remediation, e.g. planting rice or corn of low accumulation. For heavily contaminated area, inedible crops or highly sensitive tree species are recommended. We will improve facility for soil amelioration, build workshop for organic fertilizer and passivator making, and provide equipment for comprehensive use of crop residues of heavily contaminated area.

*Soil conservation and sloping land improvement project.* With focus on protection of water source, we will build reservoirs and tanks to enhance watershed management, accompanied with other small water storage and soil conservation works. For regions like Guanzhong basin, Sichuan basin, and other part of southern China characterized by serious soil erosion, dense population, and concentrated sloping land, terrace building and associated measures will be carried out.

*Water-saving irrigation project.* The key irrigation schemes in large and middle-sized irrigation district shall be upgraded and modified for water saving purpose. In northwestern China, we will upgrade existing drip irrigation system, install new drip and spray irrigation systems for corn and fruit trees, and promote plastic film mulching technique to save water. In northeastern China, we will promote drip irrigation and controlled irrigation in rice producing area. In Yellow river-Huai river region, we will promote pipe irrigation while extending drip, spray irrigation and integrated management of water and fertilizer. In southern China, we will promote pipe irrigation and speed up construction of water-saving and pollution proof irrigation district.

*Ground water overexploitation management project.* We will promote integrated management of water and fertilizer where surface water is adequate. In regions where both surface water and ground water is over exploited, we will reduce irrigation areas,

adjust cropping structure to reduce the planting area of water consuming crops. We will take further steps to save water, close down wells, adjust surface water intake, and monitor water use. We will replace ground water with surface water for irrigation where possible.

*Agricultural resource monitoring project.* We will make full use of existing resources to establish and improve resource monitoring system, combining remote sensing, site observation and mobile monitoring. We will establish network for monitoring soil quality and moisture, heavy metal contamination, non-point pollution, and soil environment. We will establish soil sample chamber, information center and data platform for land quality, and improve monitoring system for irrigation water, surface water and ground water use as well. We will establish data center for agricultural resource and environment to promote data sharing.

## **( 2 ) Agricultural and rural environment management program.**

*Integrated management of animal manure project.* Facilities shall be made available in large scale pig, dairy and beef farm to collect, store, transport and process animal manure, solid manure can be made into compost or organic fertilizer, and sewage shall be biologically treated. In those provinces where livestock and poultry farms are dominant, we shall set up a number of demonstration sites to demonstrate treatment and resourceful use of waste produced by large scale farm. For intensive breeding area, facilities shall be made available to demonstrate how to process sewage and produce organic fertilizer.

*Control and management of pollution sources (mineral fertilizer, chemicals, nitrogen and phosphorous).* We will promote targeted fertilization and application of organic fertilizer, extend compound fertilizer and deep application of fertilizer in relevant watersheds; we will clean canals, reinforce slopes, choose appropriate water plants community, and install filtering check dams to purify farmland nitrogen and phosphorous. We will build runoff collecting facilities and ecological strips on sloping land to collect and reuse nitrogen and phosphorous. We will reduce the amount of agro-chemicals, promote integrated pest and disease control and ecological control, extend effective but low toxicity pesticide and efficient plant protection machinery.

*Management of plastic film and pesticide package project.* We will promote the use of thick film and degradable film in regions where plastic film is widely used, and demonstrate techniques to pick up and retrieve used film. We will build networks and factories for collecting and recycling films, and implement demonstration projects in a number of counties. In regions where agro-chemicals are heavily used, we will set up number of stations for collecting and harmless treatment of agro-chemical package, and establish a platform for treatment of agro-chemical package and hazard management.

*Comprehensive use of crop straw project.* We will implement the following projects: returning straw to field; silage making; straw gasification; densified corn stover briquette fuel (DCBF) and straw densification. We will provide machinery for deep plowing, straw chopping, picking and packing, and establish a system for collecting, storing and transporting crop straw.

*Integrated management of rural environment.* We will promote integrated management of



rural environment by a clustered strategy. Facilities and equipment shall be made available to treat sewage, rubbish and manure to protect drinking water source. We shall enforce concentrated gas supply, promote energy-saving stoves and *Kang*, extend clean stoves, renewable energy and products.

### **( 3 ) Agricultural ecosystem protection and remediation program**

*Converting farmland to forests and grassland project.* We will continue to implement the project of converting farmland to forests and grassland on sloping farmland over 25 degree, or between 15-25 degree in important water source area, and desertification area. Farmers are encouraged to plant trees and grasses on a voluntary base. Woody crop/oil plants are strongly recommended according to the site-specific principle.

*Grassland conservation project.* We will continue to implement the following projects: returning grazing land to natural grassland; control of sandstorm source of Beijing-Tianjin; ecological protection of Sanjiangyuan natural reserve. We will strengthen grassland natural reserves and integrated management of southern grassland, establish systems for grassland disaster monitoring, alarming and prevention to achieve the goal of 900 million mu of improved pasture and 450 million mu of artificial grassland by 2020. We will improve the management of existing grassland in transition zone between agriculture and animal husbandry to restore grassland ecology and make it a rainfed forage base. We will combat desertification, protect existing vegetation, allocate water resource properly, and fix mobile and semi-mobile sand dunes.

*Control of stony desertification.* In southern China region, the focus will be mountain closure, planting trees and grasses, sloping land improvement, and installing irrigation systems. For regions where stony desertification is serious, we will promote rural new energy and poverty alleviation through resettlement, control further desertification caused by human activities.

*Conservation of wetlands.* We will further strengthen management and conservation of wetlands to set up international/national wetlands, wetland parks, wetland natural reserves, and multi-purpose wetland district. We will improve degraded wetland through returning farmland to wetland, vegetation restoration, habitat remediation, and water transfer.

*Water ecosystem remediation project.* For freshwater fishery region, we will promote reduction of pollutants emission, upgrade fish ponds, provide environmentally friendly cage for cage culture in lake and reservoirs, set up facilities for collecting and processing waste water and rubbish. For marine fishery region, we will deploy marine fishery resource survey vessel, built artificial reef, sea grass bed and sea weed farms, promote deep water cage culture. We will continue to implement fishery transition and fish vessels replacement project to strengthen reduction of fishing vessels. For water conservation region, we will regulate rivers and rural ponds, naturalize river course to promote ecosystem restoration through sewage intercepting, desilting and ecological measures. We will carry out survey on aquatic organism resource and environment, and fishery resource enhancement and release.

*Agriculture genetic resource conservation project.* We will establish a number of *in situ* conservation zones for wild relatives of crops, national protection zone for genetic

resource of animal, poultry and aquatic products, natural reserves for aquatic organisms, and integrated management area for alien invasive species. We will establish monitoring and alarming center for agriculture wild plants, identification and assessment center for genetic resources, and monitoring net work for alien invasive species to enhance the protection of agriculture wildlife resources.

#### **( 4 ) Experiment and demonstration program**

*Experiment and demonstration garden (area) for sustainable agriculture development.* We will establish 10 experiment and demonstration gardens (area) based on the selecting criteria of foundation for development, nature of resource, and environmental capacity. They are: protection of black soil in northeastern China; sustainable development of agriculture and animal husbandry in northwestern China; integrated management of ground water overexploitation in Yellow River-Huai River region; integrated management of heavy metal contaminated soil in the middle and low reaches of Yangtze River; stony desertification management in Southern and Southwestern China; herbivorous animal husbandry in transition zone between animal husbandry and agriculture in northwestern China; ecological animal husbandry in Tibetan Plateau; fishery resource and ecosystem remediation in aquatic culture region; integrated management of breeding pollution; recycled use of agricultural waste. We will strengthen the link between demonstration areas, launch experiment and demonstration project in existing national modern agriculture demonstration area, and national agricultural science and technology gardens whenever possible. We will explore management and operation mechanisms for sustainable agriculture development which are suited to different regions, through demonstrating advanced and appropriate techniques for efficient use of agricultural resources, integrated environmental protection, and effective ecological conservation. We will summarize those replicable and extendable models to set up good examples for sustainable agriculture development.

#### **Part F. Supporting measures**

##### **( 1 ) Enforcement of laws and regulations**

*Improving relevant laws, regulations and standards.* Develop and revise law on prevention and control of soil contamination, and regulations on protection of arable land quality, protection of black soil, pesticide management, fertilizer management, grassland protection, agricultural environment monitoring, integrated management of obsolete and used plastic film, safety management of production source, and protection of agricultural wild plants. Regulation system on energy saving and emission reduction in agriculture and rural areas shall be improved, and technical standards on energy saving and emission reduction throughout all agricultural industries shall be upgraded. Standards on arable land quality, soil environment quality, agricultural film, and content of heavy metals in feed additives shall be developed or revised to safeguard ecological and environmental protection.

*Strengthening law enforcement and supervision.* Law enforcement team shall be improved and law enforcement power shall be integrated. Laws and regulations on agricultural

resource protection, environmental management and ecological protection shall be carried out strictly, law enforcement across provinces in the field of resource and environment shall be strengthened to punish any act in violation of laws. The effect of law enforcement shall be monitored and inspected, responsibility investigation system for serious pollution accident and compensation system for damage or injury shall be improved.

## **( 2 ) Improving supporting policies**

*Increasing investments.* Input supporting system for agriculture sustainable development shall be improved to guide investment towards both production and ecology, with key focus on national food security, supply of main agricultural products and sustainable agricultural development. The decisive role of market in resource allocation shall be fully played to encourage banks and private sector to invest in agricultural resource utilization, environmental management and ecological protection, and develop a diversified funding mechanism. Financial and tax policies shall be improved, other measures such as third party operation, procurement of service by government and formation of farmers' cooperatives shall be taken to encourage stakeholders to input in rural resource and environmental protection. Treatment of agricultural environment issues should be included in key fields for foreign investment and bond issue to broaden funding channel. Supervision and performance evaluation as well as responsibility investigation systems shall be improved for better funds management and use efficiency.

*Improving supporting policies.* Policies concerning the following aspects will be continued and improved: subsidy for grassland ecological protection; targeted fertilizer application; arable land quality improvement; integrated pest and disease control and ecological control; subsidy for agricultural machinery; animal disease prevention and control; subsidy for innocent treatment of died animal body; and subsidy for primary processing of agricultural products locally. Agriculture water price has to be reformed in a comprehensive way, and policies will be made and improved on agricultural resource and ecology reclamation and protection. We will support the following activities: rotational cropping of corn(for silage making) with lucerne, grain with bean and grass; returning straw to field, deep tillage, soil improvement by biochar; making and applying compost, growing green manure; using high standard agricultural film, collection and reuse of pesticide pack and agricultural film. Fisheries enhancement and release will be continued, compensation policy for public benefit forests shall be fully carried out, eco-compensation system for forests, wetland, soil and water conservation shall be improved. Eco-compensation mechanism for source area of rivers, important water source area, aquatic ecosystem remedying area, and flood detention basin shall be set up and improved. System for quality checking and certification of agricultural products shall be improved and the platform for tracing back the quality of agricultural products shall be strengthened.

## **( 3 ) Enhancing the role of technology and talents**

*Promoting institutional innovation of science and technology.* Collaborative research shall be promoted on seed breeding, soil fertility improvement, reduced chemical fertilizer and

pesticide application, efficient water use, agro-ecosystem, reuse of agricultural waste, environmental protection, climate change, grassland protection, and fishing waters ecological remediation. Key science and technology programs and projects shall be organized carefully. National union on agricultural science and technology innovation shall be established as a base to combine the funding and resources of research institutes, universities and enterprises. Appraising and incentive mechanism shall be improved for agricultural science and technology innovation to attract social capital and resources for sustainable agriculture development.

*Promoting commercialization of research findings.* A trading platform shall be established for commercialization of research findings. Mode of commercialization (e.g. project +production base + enterprise, research institutes +universities +producing unit +key enterprises) shall be tested based on the principle of sharing benefit and risks. Local agriculture extension system will be further reformed. Appraising system for scientific achievement will be innovated to reward those who made outstanding contribution for agricultural sustainable development.

*Reinforcing Talent cultivation.* Training of talents shall be strengthened in the field of resource and environmental protection by existing agricultural research, extension programs and training program. Practical technicians shall be trained in rural environment monitoring and ecological remediation through high education and agriculture vocational training. The concept of sustainable development and practical training shall be highlighted in the “New Type of Professional Farmers Training” program and “Rural Practical Talents’ Leadership Training” program to provide sound backstop for sustainable agricultural development.

*Strengthening international exchange and cooperation.* We will strengthen international exchange and cooperation on agricultural resource and ecology through bilateral/multi-lateral and regional cooperation mechanism, and actively introduce, absorb and re-innovate advanced technology on environmental management.

#### **( 4 ) Deepening reformation and innovation**

*Promote moderate large-scale farm operation.* We will stick to and improve rural operating system with farmer household being key players, and guide orderly land use rights transfer. We will support new agricultural business entities such as major breeding/planting household, family farm, farmer’s cooperatives, and dragon-head-enterprises, to promote moderate large scale operation in various forms. At present, we will provide support to those who run a farm with size being 10-15 times of average, farming income being equivalent to that of secondary and tertiary sector. Rural land tenure system will be reformed steadily to allow conversion of farmer’s land use rights into shares.

*Perfecting market-oriented resource matching mechanism.* Mechanism for agricultural water use pricing and compensated use of agricultural resource shall be established to save water. Agricultural carbon trading system shall be established to promote low carbon development. Professional enterprises and organizations specialized on reuse of

agricultural waste and treatment of polluted agricultural environment shall be brought up to achieve market oriented service provision.

*Awareness raising on energy saving and emission reduction.* The entire society shall be guided to follow the concept of diligence and frugality, and change unreasonable way of life and consumption. Low carbon economy shall be developed and scientific development shall be practiced. Healthy and scientific diet structure shall be advocated to reduce waste of food. Enterprises and farmers should be encouraged to reduce energy consumption and pollutant emission, make full use of agricultural waste so as to fulfill their responsibilities in green development and building a conservation-minded society.

*Establish social surveillance system.* News media plays important role in publicity and social surveillance, its right to know about, participate in and surveil agriculture ecological environment should be guaranteed. The public and NGOs shall be encouraged to participate in protection and surveillance. Notification system on agriculture ecological environment will be implemented gradually, and reporting system for agricultural environment pollution will be improved and subject to public supervision.

#### **( 5 ) Rational use of international market and resource**

*Rational use of international market.* Self sufficiency rate and prioritized list of agricultural products to be imported shall be determined, based on resource and environment capacity, production potential, and demand for agricultural products, to keep domestic market stable, and release pressure on domestic environment and resource. Quality supervision, inspection and quarantine of imported agricultural products shall be strengthened, and risk assessment mechanism for agricultural damage and loss shall be improved. Active participation in developing regional and international agricultural policy and standard shall be promoted.

*Improved quality of opening to the outside world.* Enterprises shall be encouraged to invest in overseas agriculture and enhance their international influence. Large enterprises specialized in grain, cotton and oil with international competitiveness shall be supported to cooperate with other countries particularly neighboring countries on mutual benefit and win-win term, relevant supporting policy system shall be improved accordingly.

#### **( 6 ) Strengthening planning and guidance**

*Establishing cross-sector coordination mechanism.* A coordinating mechanism comprising of representatives from relevant departments shall be established to strengthen communication and coordination, and make a clear division of responsibilities to each department. Provincial government shall focus on above described targets and tasks, develop local sustainable agriculture development plan, and actively promote the implementation of key programs and policies.

*Improve performance assessment system.* Develop evaluating indicator system for sustainable agriculture development, incorporate arable land red line, resource use and saving, environmental management and ecological protection into performance assessment of local governments. Off-office auditing of natural resource asset and life-long responsibility investigation system shall be established for government leaders

who bear legal responsibility for ecological destruction and environmental pollution to safeguard sustainable agriculture development.

Attachment 1 map of functional zoning for sustainable agriculture development



Attachment 2 functional zoning for sustainable agriculture development

<b>Zones</b>		<b>Contents</b>
<b>Optimized development region</b>	<b>Northeastern China</b>	Heilongjiang, Jilin, Liaoning; eastern part of inner Mongolia
	<b>Yellow River-Huai River region</b>	Beijing, Tianjin, middle and south part of Hebei; Henan, Shandong, Anhui, north part of Jiangsu
	<b>The middle and low reaches of Yangtze River</b>	Jiangxi, Zhejiang, Shanghai, Jiangsu, middle and south part of Anhui, Hubei, most of Hunan.
	<b>Southern China</b>	Fujian, Guangdong, Hainan
<b>Moderate development region</b>	<b>Northwestern China and region along the Great Wall</b>	Xinjiang, Ningxia, most of Gansu, Shanxi, middle and north part of Shanxi, middle and west part of inner Mongolia, north part of Hebei
	<b>Southwestern China</b>	Guangxi, Guizhou, Chongqing, south part of Shanxi, east part of Sichuan, most of Yunnan, west part of Hubei and Hunan
<b>Protected development region</b>	<b>Tibetan plateau</b>	Tibet, Qinghai, Tibetan region of Gansu, west of Sichuan, northwestern part of Yunnan
	<b>Marine fishery region</b>	Sea areas under China's governance