Country Sector Overview

THE COTTON SECTOR IN CHINA

the sustainable trade initiative

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Content

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Acronyms and abbreviations

ADBC	Agricultural Development Bank of China
ACFSMC	All-China Federation of Supply and Marketing Cooperatives
CCA	China Cotton Association
CFC	China Farmer's Cooperative
CNCE	China National Cotton Exchange
CNCGC	China National Cotton Group Corporation
CRI	Cotton Research Institute
DRC	Development Research Center
GHG	Greenhouse gases
MoA	Ministry of Agriculture
MEP	Ministry of Environmental Protection
NDRC	National Development and Reform Commission
RDI	Rural Development Institute
R&D	Research and development
SD	Sustainable development
SMC	Supply and Marketing Cooperative

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This overview presents basic information on the general governmental sustainability vision and strategy, current situation, supply chain, sustainability issues, relevant stakeholders, policies and food security issues in the cotton sector in China. As part of IDH's goal to capture and disseminate the latest knowledge on sustainability, this overview aims to serve as a starting point for general understanding of the sector's status quo, and present complementary information for organizations, governments and companies involved in the Chinese cotton sector. The analysis is based on a desk research of publicly available sources solely. This initial report was completed in July 2011.

1. Governmental vision and strategy towards sustainability

The concept of sustainable development (SD) had its first official appearance in China in 1991, when China initiated the "meeting of the environment and development ministers from developing countries", after which the Beijing Declaration was generated. At the United Nations Conference on Environment and Development in 1992, China signed the Declaration on Environment and Development. In 1994, the State Council passed the China's Agenda 21 and formulated the "priority projects plan for China's Agenda 21" in order to support the implementation of the Agenda. China's Agenda 21 white paper marked the beginning of the SD process in China (News of the Communist Party of China, 2011). In 2003, the Program of Action for SD in China in the Early 21st Century was developed to help implement the SD strategy. The program specifies the objectives, principles, priority areas and safeguard measures for SD in the early 21st century, based on past achievements and experiences and taking into account new requirements for SD in the new century (NDRC, 2007a).

1.1 China's Agenda 21

The Program of Action for SD in China in the Early 21st Century (thereafter referred to as "the Program") outlines China's achievements in the previous decade, particularly in sustainable economic growth, population growth, science, technology and education, social security, poverty eradication, disaster relief and prevention, medical care, regional gap reduction, environmental protection, energy consumption, and the incorporation of SD in programs and plans by central and local governments, in laws and regulations, and in public awareness. Nevertheless, the Program recognizes the challenges that are still faced, namely the conflict between economic growth and resource consumption/ecological deterioration, social development lagging behind economic development, regional disparity, large population and scarce resources, and inconsistencies between some existing laws, regulations and policies and actual needs for SD (NDRC, 2007a).

Taking into account the achievements and challenges, the main objective of the Program is to achieve growing capacities for SD, progress in economic restructuring, effect population control, improvement in ecological environment, sustainable path of development characterized by rising productivity, prosperous livelihood and a well-preserved environment. The priority areas are as follows (ibid):

Economic development	• Industrial restructuring
	• Regional development and poverty alleviation
	• Urbanization and small-town development
	• Economic globalization
Social development	• Population management
	• Social security
	• Health care
	• Disaster management
Resource allocation, utilization and protection	• Water resources
	• Rational use of land
	• Energy efficiency
	• Forest resources

	• Grassland resources
	• Mineral resources
	• Marine resources
	• Climate resources
	• Strategic mineral resources reserves
Ecological conservation and development	• Ecological monitoring and security evaluation
	• Key ecological projects
	• Nature reserves
	• Ecological conservation zones
	• Anti-desertification
	• Soil conservation
	• "Green" agriculture
	• Scenic spots protection
	• Urban environment
Environmental protection and pollution control	• Water pollution control
	• Marine pollution control
	• Air pollution control
	• Urban traffic management
	• Solid waste control
	• Environmental protection industry
Capacity building	• Legislation and enforcement
	• Indicator system, monitoring and evaluation
	• Information sharing

1.2 Five-year plans and sustainable development

SD measures were introduced into national strategies, particularly the 5-year plan (Wang and Chen, 2011). The 5-year plan for national economic and social development mainly aims to arrange national key construction projects, manage the distribution of productive forces and individual sector's contributions to the national economy, map the direction of future development, and set targets (Chinese government portal, 2006).

11th 5-year plan

Energy conservation and emissions reduction were the principles guiding SD activities in the 11th 5-year plan (2006-2010) (Wang and Chen, 2011). The main goals were to (Central People's Government of the PRC, 2007):

- reduce energy consumption per 10,000 yuan of GDP by 20%;
- reduce water consumption per unit of industrial added value by 30%;
- reduce main pollutants by 10%;
- increase the sewerage discharge treatment rate in cities to ≥ 70%;
- utilization rate of solid industrial waste to > 60%.

Provincial governments are required to report fulfillment status of the targets annually to the State Council, who then reports to the National People's Congress annually. Local governments are required to report to their peer-level People's Congress. An emphasis is placed on the monitoring of the enterprises classified as "important energy users". Enterprises that have signed an agreement with the government stating their energy conservation and emissions reduction targets are required to achieve the targets. For those that have not achieved their targets, mandatory audits on energy and clean production will be executed. For the enterprises that have not constructed or started operating pollution reduction facilities, a public notification will be sent and a deadline will be issued for rectification. Illegal sewerage discharge will be penalized heavily (ibid).

A leading group was created to distribute work and coordinate problem-solving. The office of the leading group is set up within National Development and Reform Committee (NDRC). However, for work related to pollution and emission reduction, the Ministry of Environmental Protection (MEP) is responsible for the leading group.
Energy conservation and emissions reduction do not only apply to the industrial and urban sector, but also to agriculture and rural areas. The Ministry of Agriculture (MoA) has already announced 3 measures to facilitate energy conservation and emissions reduction in rural areas, namely: energy conservation, renewable energy development, and clean agricultural production (see overleaf) (Xinhua news, 2007).

It is expected that the measures will have a large scope for achievement in agriculture. At present, the utilization rate of fertilizer, pesticide and water in agriculture is only 35%, 30% and 45%, respectively. Moreover, there is a large amount of manure currently left unused (Sun, 2007).

Energy conservation	• Facilitate energy conservation in county/town-level enterprises
	• Energy conservation in agricultural machinery
	• Energy-efficient cultivation
	• Energy-efficient livestock grazing
	• Energy conservation in homes
Renewable energy development	• Biogas development
	• Efficient utilization of straws
	• Energy crops development
Clean agricultural production	• Reduced use of fertilizer and pesticide
	• Ecological livestock grazing
	• Healthy aquaculture

12th 5-year plan

The 12th 5-year plan (2011-2015) has two chapters that are particularly relevant for SD, namely Chapter 2 on "accelerating the construction of a 'new countryside'" and Chapter 6 on "green development: building a resource-efficient and environmentally-friendly society" (Xinhua news, 2007).

In Chapter 2, it is stated that the agricultural industry distribution should be developed with aims of high yield, high quality, high efficiency, ecology and safety. 7 geographical areas are listed as main production zones: northeast plain, Yellow-Huai-Hai river plains, Yangtze river basin, Fen Wei plain, Hetao irrigation areas, southeast, Gansu and Xinjiang. Food crops, cotton, oil and sugar crops are identified as main products (ibid).
To reduce environmental deterioration in rural areas, there are intentions to tackle non-point source pollution from fertilizer, pesticide, agricultural plastic films and livestock grazing, to protect drinking water sources, to implement integrated treatment of rural rivers and general polluted water, to strengthen monitoring and management of soil pollution prevention, to concentrate waste treatment for villages, and to restrict urban and industrial pollution from spreading to villages (ibid).

Chapter 6 states the main goals of SD in China, which are to perfect the "carrot and stick" system surrounding energy conservation and emissions reduction, and to accelerate the establishment of a resource-conservative, environmentally-friendly mode of production and consumption. The main measures to be taken are shown below (ibid).

Actively respond to global climate change	• Control greenhouse gases emission
	• Increase the capacity to mitigate climate change
	• Development international cooperation
Strengthen resource conservation	• Facilitate energy efficiency and reduce

and management	resource consumption
	• Strengthen water resources conservation
	• Conserve land
	• Strengthen mineral resources exploration, protection and rational development
Development renewable economy	• Facilitate a renewable mode of production
	• Perfect a recycling system for resources
	• Promote a green mode of consumption
	• Strengthen policy and technology support
Strengthen environmental protection	• Strengthen the reduction and treatment of pollutants
	• Reduce environmental risks
	• Strengthen environmental monitoring
Facilitate ecological protection and repair	• Construct ecological safety buffer zones
	• Strengthen ecological protection and treatment
	• Establish an ecological compensation system
Strengthen hydraulic and disaster-prevention system construction	• Increase safeguard capacity of water supply
	• Increase flood prevention capacity
	• Strengthen prevention and forecast of natural hazards

1.3 National Climate Change Program

The National Climate Change Program was prepared under the NDRC in 2007. It is the first policy document in China for addressing climate change and clarifies the goals, principles, fields and policy measures for climate change until 2010. It is China's way of showing determination of not hiding behind the fact that the Kyoto Protocol does not obligate developing nations to reduce greenhouse gases (GHG) emissions (Chinese government portal, 2007). There are 6 principles in addressing climate change in China (NDRC, 2007b):

- Address climate change within the existing SD framework;
- Common but differentiated responsibilities;
- Equal emphasis on mitigation and adaptation;
- Integrate climate change policy with other inter-related policies;
- Rely on advancement and innovation of science and technology;
- Participate in international cooperation actively and extensively.

There are four main components of the national climate change policy: energy conservation, energy structure optimization, ecological preservation and construction, and overall agricultural productivity advancement. Policies and measures to address climate change in agriculture include (ibid):

- Strengthen the establishment and implementation of laws and regulations that can lead to improved agricultural production, increased agricultural system carbon storage, and strictly-controlled land use in areas with fragile ecosystems;
- Intensify the construction of ecological agriculture in highly-intensive production areas, through e.g. prevent non-point source pollution, reasonable use of chemical fertilizers and pesticides, and implementing fertile soil programs.

There are four key areas for agricultural adaptation to climate change, including: improving agricultural infrastructure, adjusting agricultural structure and cropping system, breeding stress-resistant (resistant to drought, water-logging, high temperature, pests and diseases) varieties, and strengthening R&D of new

technology. To elaborate, the first area entails measures such as water-saving irrigation facilities, improved field engineering, restoration of middle- and low-yield fields prone to alkalinization and salinization. The second area involves optimization of regional distribution arrangement of agriculture, centralization of preponderant agricultural products to main production areas, extension of planting areas of cash and forage crops to promote a ternary structured system with food, cash and forage crops (ibid).

2. Current situation

China is arguably the most important country in the world of cotton. In 2010/11, it was ranked No.1 in terms of production (33 million 480-lb bales), import (16 million 480-lb bales) and consumption (48 million 480-lb bales) volume (National Cotton Council of America database). With 50,000 bales being exported, 32.95 million bales were traded internally. While production and consumption have increased dramatically since 1970 (Figure 1 and 4), import and export have been fluctuating during the 40 years (Figure 2 and 3). In general, the years with a high volume of import coincide with the years with low export, and vice versa. In 2010, China accounted for 25.76% of the world's production, 40.65% of the import, 40.13% of the consumption and only 0.13% of the export (ibid). In 2009/10, around half of China's export was towards India (265,000 tonnes), 21.1% was towards the US and 11.7% to Uzbekistan. Privately-owned enterprises contributed 34.6% of the total export, state-owned enterprises made up 32.9% and foreign invested enterprises exported 19.6% of the total (http://www.hxbgw.com/qydt/2011-1-5/181154.asp).

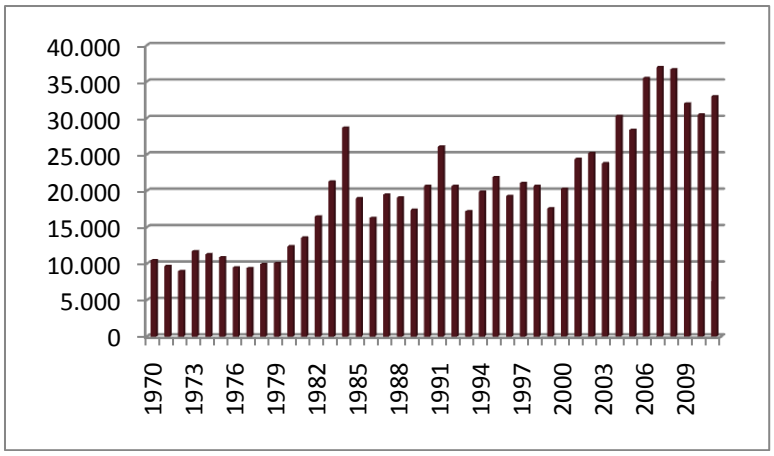

Figure 1 Production volume of cotton in China from 1970 to 2011, in 1000 480-lb bales (Data source: National Cotton Council of America).

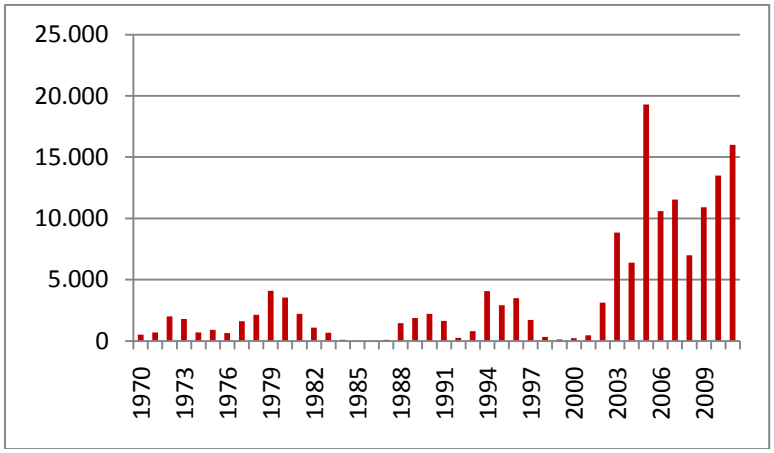

Figure 2 Import volume of cotton in China from 1970 to 2011, in 1000 480-lb bales (Data source: National Cotton Council of America).

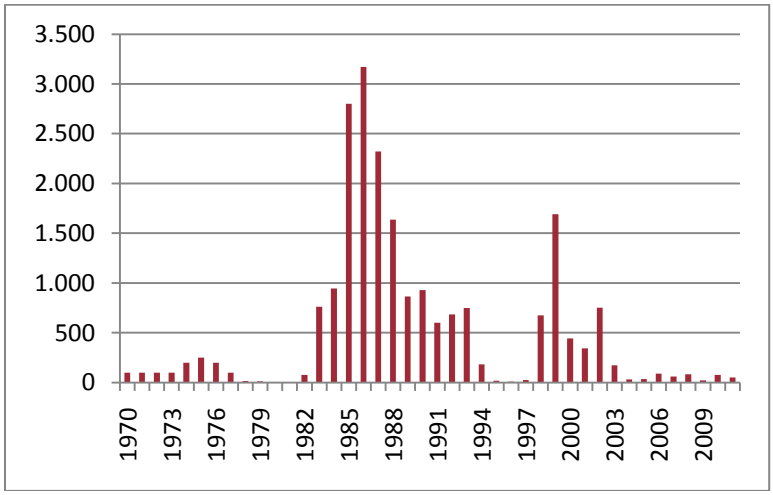

Figure 3 Export volume of cotton in China from 1970 to 2011, in 1000 480-lb bales (Data source: National Cotton Council of America).

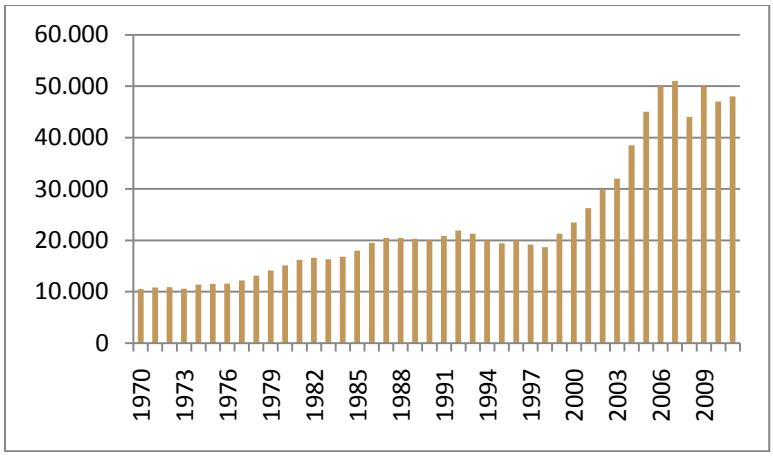

Figure 4 Consumption volume of cotton in China from 1970 to 2011, in 1000 480-lb bales (Data source: National Cotton Council of America).

3. Supply chain geography

There are three main cotton-growing areas in China: the Yangtze River basin, Yellow River basin and the northwestern inland areas. These areas encompass 13 provinces, autonomous regions and direct-controlled municipalities: Tianjin, Hebei, Shanxi, Jiangsu, Anhui, Jiangxi, Henan, Shandong, Hubei, Hunan, Shaanxi, Gansu and Xinjiang. In 2007, the three areas (see Figure 5) represent 99.85% of the total cotton-growing areas in China (for characteristics of each area, see Appendix 1).

Despite a production being concentrated in 13 provinces, 8 other provinces also plant cotton, albeit on a smaller scale. For these provinces, cotton plots are scattered and are unsuitable for planting food crops. Cotton is only planted as a supplement to the principle (food) crops in these areas. As a result, both the varieties and the acreage of cotton planted in these areas can vary significantly between the years (Zhao and Tidsell, 2009).

Main cotton-processing plants are located near the production areas for transport efficiency and raw cotton sufficiency. The main processing provinces are Xinjiang, Hubei, Hebei and Shandong (Jinrongjie, 2011).). Before the cotton circulation system reform in the 1990s, there were only 3000 cotton-processing units. After the reform, due to the entry of hot money, the number of units increased dramatically to 18,000 in 2004 (China Textile Web, 2008). Because of the rapidly increasing market demand associated with the development of the textile industries, the number of cotton-processing units is still on the rise despite some small-scale units being

eliminated continuously (GDCCT, 2011). Nevertheless, it is expected that there will be a sharp drop in the units again in the near future due to more intensive market competition and deepening of the reform of the cotton quality inspection system (China Textile Web, 2008).

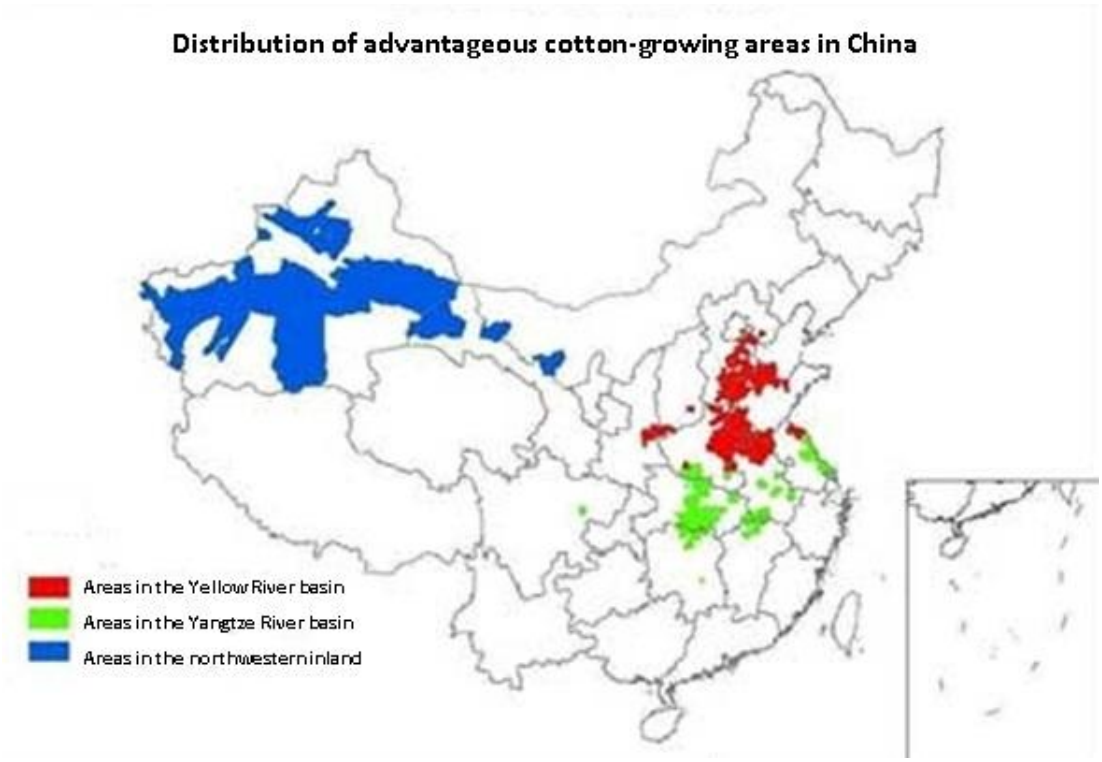

Figure 5 Main cotton-growing areas in China (Source: adapted from figure by MoA).

Figure 6 Main textile manufacturing regions in China (Adapted from map obtained on: www.map-of-china.net)

Currently, the processing capacity is greater than the annual production. For example, in Xinjiang, there were 820 certified facilities in 2006 with an aggregate processing capacity of 5.26 million tonnes, which was more than twice of the production tonnage. The overcapacity not only causes a waste of resources, but also stimulates malignant competition that can in turn cause price fluctuations (Jingrongjie, 2010). The status quo of the cotton-processing industry is that there is a co-existence of large- and small-scale units, 50% of which have backwards equipments that need modernizing (China Textile Web, 2008). The outdated equipments are especially of concern because most cotton in China is hand-picked (with the exception of some production areas in Xinjiang[i]), and the extensive-processing indicates a waste of resources (ibid).

Textile manufacturing plants are concentrated near large cities along the eastern coast (Chinese Apparel Web, 2005). This is because they are close to the market and have access to readily available low-cost labor. The relevant provinces can be divided into the northeastern region (Beijing, Hebei, Shandong, Liaoning), eastern region (Jiangsu, Zhejiang, Shanghai) and southeastern region (Guangdong) (see Figure 6).

4. Sustainability issues

4.1 Environmental issues

The environmental issues in cotton production in China are water- and soil-related. For water, the problem is not necessarily one of lack of precipitation but is sometimes about the temporal distribution of precipitation (Zhao and Tidsell, 2009). The Yangtze River basin receives sufficient precipitation but is prone to flooding and droughts. Drought also prevails in the Yellow River basin. As for Xinjiang, there is low water availability in spring, autumn and winter and frequent flooding in the summer. Hence irrigation is often used with already-scarce water from above and under ground. To make matters worse, the efficiency of water use is low, mainly due to the ageing irrigation works from 1950-60s with hardly any maintenance (Zhao and Tidsell, 2009).

One of causes of soil problems is the plastic films used to mulch the soil and suppress weeds. Plastic residues are often left behind in the soil and degrade soil quality. Furthermore, the practices of continuous cropping also contribute to the problems. Last but not least, the increasing use of chemical fertilizer instead of organic fertilizer reduces the organic matter in the cultivated land, leads to deteriorating soil structure, and provides favorable conditions for the multiplication of pests.

4.2 Economic issues

Low quality of cotton is one of the main economic concerns. A large proportion of the farms are small with multiple varieties planted within one farm. Consequently there is cross-pollination, which leads to low cotton quality and fiber strength, highly-variable bale quality and poor spinnability (Zhao and Tidsell, 2009). The quality is also lowered by impurity (e.g. traces of chemical fibers, plastic films and wires, cloth, paper, feathers and animal hairs) introduced through careless picking. The impurity problem is mainly due to low education and awareness by the cotton-pickers (mostly from non-major cotton-producing provinces) (Jingrongjie, 2010). The low quality of cotton may persist when cotton price is high, as then even the low-quality cotton can sell easily, thus no attempt to increase the quality is made (China Cotton Association, 2010a).

As mentioned above, many cotton farms are small and fragmented. Purchase of agricultural means of production is done on an individual household level, which not only means that farmers have to spend more money but they also have no guarantee of good-quality products. In addition, the small-scale farmers often do not receive updated market information and need to go through a large number of intermediaries to access the market, which has implications for the profits they receive (ibid). Cooperatives to organize farmers and connect them to the market do exist, but are few in numbers and are developing slowly (ibid).

4.3 Social issues

No information on the social issues specifically applicable to the cotton and textile sectors was found. CottonConnect (2010) provides a summary of child labor issues from China Labour Bulletin, which states that child labor occurs at farm level and textile manufacturing level.

5. SWOT analysis of cotton production

The following SWOT analysis of the cotton (-growing) sector on the national level has been summarized from the 'Planning for the development of advantageous cotton-growing areas 2008-2015' (MoA, 2009) (Table 1).

Strengths: • Backup cultivable land • Potential to increase unit yield • Potential to increase quality of fibers	**Weaknesses**: • Worsening conditions of cotton fields • Too many cotton varieties • Labor-intensive production • Backwards technological innovation and promotion • Slow development of industrialized management
Opportunities: • Large scope for market development	**Threats**: • Increasing harm from pests and diseases

Table 1 SWOT analysis of cotton production in China.

As a first strength, China has 5 million mu (1 mu ≈ 666.6 m^2) of backup land cultivable for cotton, of which 2 million mu can be developed in the saline and alkaline soil in the Yellow River Delta, 2 million mu can be developed in the northwestern inland areas through implementing drip-irrigation under plastic films, water conservation cultivating currently unused land, and finally 1 million mu come from utilizing small fragmented land and adjusting current planting structures and so on. Secondly, there is potential to increase the unit yield of cotton. Between 1970s-2000s, the unit yield on average increased by 1.2kg (2.2%) annually. It is estimated that it can be increased to 92kg/mu in 2010 and 95kg/mu in 2015, by means of improving soil production capacity and promoting high-yielding varieties. Finally, a strength lies in the potential to increase the quality of fibers, in terms of consistency of fibers, impurity and relative strength of fibers.

The first weakness is the worsening conditions of the cotton fields. This is mainly due to 1) lack of maintenance of the field infrastructure; 2) during the adjustment of planting structures, some cotton fields were moved to hilly areas with limited soil production capacity and resistance to natural hazards; and 3) in order to improve profitability, farmers plant fruits and vegetables alongside cotton in the same field, which worsens the growing conditions for cotton.

The second weakness is the proliferation of cotton varieties, namely the "too many and too few" problem: 1) too many varieties pass validation and too few varieties with obvious merits; 2) too many varieties are promoted and too few varieties are grown on a large scale; 3) too many enterprises manage varieties and too few enterprises are of a large scale; and 4) too many varieties are grown but too few have high yields.

The third weakness is the labor-intensiveness in production due to lack of mechanization. On average, 24 laborers are needed per mu, which is much more than the 13 laborers for rice and 15 for corn. The severity of problem is heightened by the large number of rural laborers migrating to manufacturing industries.

The fourth weakness is the backward technological innovation and promotion. Because of limited investment, there is a loss of capable personnel from R&D and technological promotion. Some new technologies with great potential are unable to be further developed due to limited funding.

The fifth weakness is the slow development of industrialized management of the cotton sector. The effects of a leading enterprise or brand are weak, order-based production still remains small and there is a slow development of cotton cooperatives.

One opportunity for cotton production is the scope for market development. There has been rapid development of the Chinese textile industry in recent years, corresponded with an increase in cotton demand. Many advantageous cotton-growing areas also happen to have a conglomerate of processing industries, so the circulation stages are reduced, which means shorter transport distances, lower costs, fast arrival and swift

market response. Furthermore, there are national policies regarding importing cotton in order to speed up the domestic cotton production and sales. A main threat is the increasing pest damage. The types of pests that are most harmful to each cotton-growing area are different but are all increasing yearly. Moreover, because of continuous cropping, the soil is depleted and there is a higher rate of diseases in cotton.

6. Stakeholder analysis

6.1 Administrative units

Waldron and Brown (2003) present an overview on the decision-making structure in China. The State Council is the executive agency of the state system. Subordinate central government ministries act as implementing agencies. Provincial governments are on the same rank level as ministries, and both have vertical hierarchies down to local levels. Administrative units implement policies and regulations. At the local level, administrative units are structured similarly to the structures within the central government. Local governments are the local executive and administrative bodies of state authority. Responsibilities are allocated to the governor, mayor, county leader, district leader, township leader and town leader. For the autonomous regions, the authorities are the people's congresses and governments at the prefectures, counties and towns (see "Constitution").

In the agricultural sector, fiscal reform has allowed localities to generate and retain more revenues and for higher levels of government to reduce local funding. This has led to greater economic autonomy and decision-making powers at local levels, which only strategically comply with higher levels (Waldron and Brown, 2003). The fiscal reforms have therefore changed the way localities interact with higher state levels in 3 ways: 1) localities with an agricultural base are relatively reliant on higher levels of the state for funding, projects and investments; 2) poor localities are often agriculture-based and thus interface closely with the Ministry of Agriculture (MoA) through agricultural programs (e.g. demonstration sites, poverty alleviation programs, development of particular industries, land improvement) or top-down extension of hierarchy onto villages and farmers; and 3) local officials have the capacity to organize farmers in production and mobilize resources (e.g. collective land or enterprise participation) and "fast-track" development in targeted programs. There is a long list of governmental stakeholders with roles in cotton[ii]. The most important ones are the MoA, and the NDRC.

Ministry of Agriculture

The main responsibilities of the MoA are to: 1) develop strategies and plans for agriculture and rural economy; 2) develop agricultural policies regarding structural adjustment, allocation of resources, commodity pricing, rural credit, taxation and subsidies; 3) draft laws and provisions; 4) research into rural economy reform; 5) organize sustainable agricultural development; and 6) devise technical standards and organize implementation.

Particularly of relevance in the MoA is the Department of Crop Farming Administration, whose main responsibilities of the department are to draft and implement development strategies, policies, planning documents, laws and regulations. More specifically, cotton-related responsibilities also include the standard and technology regulation of production, supply/demand and quality and pricing management, advising on R&D, management of land and water resources and chemical inputs, and engagement in international knowledge exchange and cooperation (MoA, 2011a). The other relevant departments are listed in Table 2.

National Development and Reform Commission

The main responsibilities of the NDRC are to: 1) formulate and implement strategies of national economic and social development, annual plans, medium and long-term development plans; 2) research and monitor macroeconomic and social development trends; 3) formulate, supervise and implement price policies of important commodities; 4) formulate and implement plans for import, export and state reserve together with other relevant ministries; 5) promote sustainable development; and 6) organize the formulation of key strategies, plans and policies in addressing climate change. The NDRC is divided into sub-departments (Table 3).

Sub-division	Cotton-related responsibilities
Department of Market and Economics Information (MoA, 2011b)	• Advise flows of products, means of production and pricing; • Draft plans for agricultural market system and rural economy; • Publish agricultural statistics.
Department of Industry Policy and Law (MoA, 2011c)	• Organize research on agricultural policies, security and development and draft plans accordingly; • Advise the deepening of system reform of rural economy (e.g. yield improvement, labor migration, rural finance, insurance); • Draft laws for agricultural production; • Guide establishment of a legal executing system in agriculture.
Department of Development and Planning (MoA, 2011d)	• Research on sustainable development strategy for rural economy and agriculture and draft implementation proposals; • Coordinate product growth and structural adjustment; • Analyze the development situation of rural economy and agriculture in China and abroad and provide policy advice; • Guide the zoning of agricultural resources area.
Department of Rural Economic System and Management (MoA 2011e)	• Advice on stabilizing and perfecting the management system of rural areas and implement the advice once they are approved; • Research on industrialization of rural management and the development of farmers' cooperatives.

Table 2 Departments of the MoA and their main cotton-related responsibilities.

Sub-division	Cotton-related responsibilities (NDRC, 2011a)
Office of Policy Research	• Draft important policy documents; • Organize research on socio-economic development, international economy and reform and opening up; • Publish press releases and guidance information.
Department of Development and Planning	• Advise national strategy on socio-economic development and production distribution, goals and policies regarding mid-/long-term development; • Monitor and assess implementation; • Suggest urbanization policy measures; • Coordinate planning and zoning of socio-economic development.
Department of National Economy	• Set goals for key commodities; • Advise on policies and planning of reserves of important resources.
Department of Regional Economy	• Draft policies and planning for regional economic development; • Coordinate policies on remediation, development, utilization and protection of land resources; • Draft plans for land and water resources and environmental protection.
Department of Rural Economy	• Analyze economic development of agriculture and rural economy; • Advise on strategic development, system reform and related policies; • Link and balance agri-, forest, water and meteo-plans and policies; • Advise on distribution of key projects and coordinate the implementation.
Department of Development of the West	• Draft planning and policies for development of the western parts; • Advise on infrastructure construction, environmental protection, project distribution and coordinate the implementation of the advice.
Department of Economics and Trade	• Monitor and assess the national and international market situation; • Exert macro control on key commodities: total quantity of import/export and monitor the implementation; • Manage the reserve of food crops, cotton, sugar and so on.
Department of Pricing	• Draft price policies and laws and price policies of key commodities; • Investigate costs of key agricultural products.

Table 3 Departments of the NDRC and their main cotton-related responsibilities.

6.2 Service units

The purpose of service units is to "serve the society" in education, technology, culture, etc. They can be considered "not-for-profit" or "non-governmental" organizations. Some service units are attached to administrative units from which they derive funds. Others are established within society or by enterprises. The former is more common.

Research institutes

The Cotton Research Institute (CRI) (under the Chinese Academy of Agricultural Sciences) focuses on resolving technological problems in cotton production, engages in international cooperation and knowledge exchange, trains technical personnel and promotes the adoption of advanced planting technologies (CRI, 2011).

The Rural Development Institute (RDI) (under the Chinese Academy of Social Sciences) has the following research directions: analyzing and forecasting rural economic situations, rural public policies, rural economic organizations and institutions, rural industrial structure and regional economics, rural ecological, environmental and resource-related problems, rural poverty and development strategies (RDI, 2005).

The Development Research Center (DRC) of the State Council is involved in research, consulting and advice on socio-economic development and reform, industrial policy, technological innovation and development policy, regional development policy, mid- and long-term development policy and environmental policy (DRC, 2011).

Supply and Marketing Cooperatives

The All-China Federation of Supply and Marketing Cooperatives (ACFSMC) provides services for supply and marketing cooperatives (SMCs) and drafts development and reform strategies and plans for the SMCs; organize, coordinate and manage agricultural means of production and products; protect the rights of SMCs; guide SMCs' business activities and facilitate urban-rural supplies exchange; promote and implement national rural-economy policies; and engage in international knowledge exchange and cooperation (ACFSMC 2011).

SMCs were historically established by the government as a tool to control agriculture, rural areas and farmers, with roles to promote rural-urban goods interflows, ensure adequate market supplies, accelerate industrialized agricultural management and provide services to farmers and agricultural production. Currently, the roles have expanded into fulfilling additional supply procurement and farm product marketing (Guo et al., 2007).

Based on the "advice on accelerating reform and development of cooperatives" by the State Council, the ACFSMC established the China Co-op Group Ltd. in 2010 (China Co-op Group, 2011). The Group was created with existing enterprises in the ACFSMC as the basis, with functions spanning over trade, business, information, services and research (ibid). Cotton is included in the scope of the Group.

China Cotton Association

China Cotton Association is a non-profit organization voluntarily established by cotton farmers, farmers' cooperatives, cotton enterprises, textile enterprises, research institutes and other organizations. It is supervised by the Ministry of Civil Affairs and guided by the ACFSMC. The functions are of service, coordination, self-discipline and interest-guarding according to the requirements of a socialist market economy; to bridge enterprises, farmers and the government; and to promote the sustainable development of cotton (China Cotton Association, 2011).

China Farmer's Cooperatives

China Farmers' Cooperative (CFC) are formed and managed by the suppliers and utilizers of agricultural products/industries. CFCs provide services in production, technology, information, purchase, storage, transport, sales, and processing (CFC, 2011). They play an important role in increasing farmers' income, developing modern agriculture and transforming the countryside (ibid).

Since the implementation of the Farmers' Cooperatives Law in 2007, CFCs grew rapidly. Members are mainly farmers, but also include town dwellers and corporate members. Large-scale farmers and corporations often play a leading role in investment and small farmers contribute only a small amount. Governments higher than the county-level are required to provide guidance, support and services for the CFCs. The agricultural administrative units are mainly responsible, but many other departments are also responsible[iii].

6.3 State-owned enterprises

Agricultural Development Bank of China

The Agricultural Development Bank of China (ADBC) is a policy bank[iv]. The cotton-related business scope includes providing loan services for the purchase, reserve and distribution of cotton and means of agricultural production, for upgrading processing facilities, for supporting small enterprises and science and technology projects, for supporting rural infrastructure projects (including irrigation and water conservation). ADBC also engages in disbursing governmental aids to agricultural projects and farmers (ADBC, 2011).

China National Cotton Group Corporation

The China National Cotton Group Corporation (CNCGC) was established in 1993 as a governmental policy enterprise. As a circulation enterprise, CNCGC is responsible for the allocation, transport, storage and sale of state-reserved cotton, Xinjiang cotton and imported cotton, as well as state macro regulation (ACFSMC, 2005a). CNCGC has expanded its operating areas and set up 14 wholly-owned enterprises and holding enterprises in the main producing and distributing areas, invested in >30 ginning factories, established share-holding or cooperative companies in main producing provinces, created purchasing and processing bases, and owns a nationwide network of cotton distribution (ibid).

China National Cotton Exchange

The China National Cotton Exchange (CNCE) was established in 1998 by the government to organize trade, discover prices, avoid risks and transfer information (ACFSMC, 2005b). It provides services in trading settlement, physical delivery, quality inspection, storage and logistics, information, consultation and training, etc (ibid). Cotton firms, textile mills and import and export companies can become member dealers or traders.

Chinatex Corporation

Chinatex Corporation (http://www.chinatex.com/tabid/160/Default.aspx) has developed from a traditional textile import and export company into a cotton and wool textile and edible oil company that covers the whole value chain. Within the corporation, several subsidiaries are of interest to the cotton sector. Chinatex Cotton Import and Export Corporation (http://www.chinatex.com/tabid/172/Default.aspx) is the largest company in China that is engaged in international trade and domestic cotton businesses. Its business scope includes import, export, import agency, domestic procurement and trade, cotton processing, warehousing, cottonseed oil processing and production.

Chinatex International Apparel Co. Ltd (http://www.chinatex.com/tabid/171/Default.aspx) is another subsidiary. It has invested in 2 production enterprises with a current capacity of 30 million garments per year. Chinatex Knitwear Trading Co. Ltd (http://www.chinatex.com/tabid/174/Default.aspx) handles the export of home textiles. Finally, Chinatex Industry Trade United Co. Ltd (http://www.chinatex.com/tabid/170/Default.aspx) is one of the Top 30 enterprises in the China textile industry, with a spinning capacity of 460,000 spindles and 622 sets of shuttleless looms. In 2009, it produced 54,000 tonnes of yarn and 43 million meters of grey fabric. It also produces military textiles.

Xinjiang Agricultural Bank of International Cooperation Co. Ltd

The Xinjiang Agricultural Bank of International Cooperation Co. Ltd is a trading enterprise under direct supervision of the Xinjiang Production and Construction Corps. Its main business is the production, processing, import and export of cotton (Xinjiang local cotton, production and construction corps cotton, Indian and Uzbek cotton), but is also involved in cotton yarn and textile, machinery, nonferrous metals, tomatoes, canned fruits

and vegetable, etc. Its quantity of cotton import and export is ranked No.1 in China for the past 5 years (http://www.xinjiangcotton.com/gsjj1.asp).

7. Cotton policies and food security issues

7.1 Existing policies

The Department of Development and Planning of the MoA has issued a notice to further develop the construction of "national modern agricultural demonstration areas", in order to develop "high production, high quality, high efficiency, ecological and safe agriculture" (MoA, 2011h). In line with the goal, China issues plans for advantageous areas for economically-significant crops/livestock. The 2003-2007 cotton plan resulted in higher production concentration, higher production capacity, improved fiber quality, lengthened value chain and increased profitability (MoA, 2009). The current plan (2008-2015) devises development goals, missions, area-specific plans, emphasis and safeguard measures based on the lessons learnt from previous years and a SWOT analysis. The plan can be viewed as a guide for the following policies, some of which are cotton-specific and some apply to the whole agricultural sector.

Subsidy for improved varieties

Subsidy for improved varieties applies to many agricultural commodities. The goal is to encourage farmers to increase the coverage of improved varieties in order to improve the quality and unit yield and standardize agricultural management. Cotton is incorporated in the subsidy in all regions, at ¥15/mu in 2011 (MoA 2011f). At the start of a year, agricultural bureaux in each city sets the area of improved varieties to be subsidized. The areas are broken down by district- or county-level agricultural bureaux into towns, villages, and households.

The actual improved varieties planted and their areas are then registered per village and publicized. The results are reported to the town-, county-/district-level agricultural bureaux for approval. The results of approval are distributed back to the village level, on which a household can claim the subsidies. The subsidy has decreased the cost of seed purchasing for cotton farmers. Nevertheless, it has not changed the problem of "too many varieties" at its root, since currently it is not linked directly to whether improved varieties were used but rather with the planting area (China Textile Commerce Association, 2011).

Measures to create high production

Since 2009, cotton has been included in the "measures to create high production". The measures aim to create high-quality high-yield demonstration areas. For cotton, the measures aim to strengthen technological support for production, accelerate the promotion of high-production technology, increase the unit yield and profitability, and facilitate consistent development (Central People's Government of the PRC, 2009).

MoA planned to develop 200 demonstration points in 198 (200 according to Li, 2011) counties and production and construction corps[v], with point greater than 10,000 mu (ibid). The main cotton production counties are given priorities. The aim was to achieve unit yields of 100kg/mu in the Yellow River areas, 120kg/mu in the Yangtze River areas and 150kg/mu in the northwestern areas. The overall aim was 20% more yield per unit than the non-demonstration areas. The measures are based on that Chinese cotton production can only be expanded in terms of intensity rather than of land area. The measures are combined with the subsidy for improved varieties, measurement-based fertilization (see below), integrated pest management (IPM) and so on. As part of the measures, there are plans to train a number of "technological leadership households" as well as large cotton households, which can then train 10-20 rural households themselves (Li, 2011).

Shandong is the province with the most demonstration points (39) and receives a project investment of ¥42.88 million. Henan follows closely behind with 34 demonstration points and ¥59.42 million investment. Xinjiang ranks No.3, with 30 points and ¥11.54 million investment. And there are 25 demonstration points in Hebei with an investment of ¥31.34 million (ibid).

Overall the measures achieved positive results. In Huangmei, Hubei, which is an important cotton planting area with high-quality varieties, some measures taken included: reasonable increment in density, measurement-

based fertilization, IPM, unified seed supply, more use of organic fertilizer, and more technical support. The measures resulted in an average yield of 102kg/mu over a planting area of 220,500 mu. Average profit was ¥1500/mu, which was ¥950 more than the previous year, reaching a historical high. 39 demonstration points were set up in Shandong among the counties in Jinan, Dezhou, Binzhou, Heze, Liaocheng, Jining, Weifang, Dongying and Zibo. Despite a decrease in the average yield in the province overall, the demonstration areas achieved yields 53.4% higher than the provincial average, at 95.7kg/mu (ibid).

Li (2011) remarked on a potential shortcoming of the measures to create high production, which was the unified strategy used regarding seed variety, fertilization, production mode, and IPM. The different soil type, hydrological environment, vegetation cover and so forth in different cotton planting areas require different treatments. In the future, research needs to be strengthened to adapt the measures to local conditions.

1:1 corresponding measures

Due to slow sales and high warehouse pressure in Xinjiang, the NDRC implemented two measures (China Textile Commerce Association, 2011). The first is that processing enterprises' import quotas are allocated according to the amount of Xinjiang cotton they use. The second is that processing enterprises that receive loans from the ADBC can enjoy discounted interest rates if they use Xinjiang cotton. Despite the contribution of the measures to relieving warehouse pressure and accelerating the purchase and sales of Xinjiang cotton, they are questioned due to their temporality and unfairness to other production provinces (ibid).

Rail transport subsidies

The rail transport subsidies apply to cotton grown in Xinjiang. Historically there are difficulties in transporting cotton out of Xinjiang (Jingrongjie, 2010). One reason is that Grade-I supplies (e.g. food, natural gas and coal) have rail priority. Another reason is that some of the months during which cotton needs to be transported coincide with the peak transport period during the spring festival, thus for the cities whose rail capacity is stretched, cargo trains are stopped to make room for passenger trains. Aside from logistical difficulties, there is also a lack of incentive for mainland enterprises to use cotton from Xinjiang due to high transport costs.

Currently, 70% of the cotton in Xinjiang is exported. The subsidies for out-of-province cotton and yarn transport aim to incentivize mainland enterprises to use Xinjiang cotton and yarn. The subsidy is ¥400/tonne for cotton (China Cotton Web, 2010) and ¥200/tonne for 32-roll yarn and greater and ¥100/tonne less-than-32-roll yarn (China Cotton Association, 2010b). Procurement and processing, management and textile enterprises are all eligible. The enterprises need to submit registration and declaration forms with a list of certificates and receipts to the Office of the Ombudsman of the Ministry of Finance in Xinjiang, which has the authority to finalize the details of the verification procedure, and which has to send a record to the Ministry of Finance (China Textile Web, 2008). The subsidies for state-owned enterprises are directly paid out by the central Ministry of Finance, whereas the other enterprises receive their subsidies from the local departments of finance, which are allocated the money from the central Ministry of Finance.

The rail transport subsidies are viewed as only solving a part of the problem. The transport situation is still pessimistic. The double-tracked railway in southern Xinjiang is not completed as of 2010. Southern cotton has to be first transported to rail stations in the north by road. Thus the subsidies only cover a part of the transport costs (China Cotton Web, 2010). Secondly, there are great differences in transport distance to other provinces between the north and south of Xinjiang, which is not reflected in the subsidies (ibid). Thirdly, since 2009, there has been an expansion of chemical industries in Xinjiang. Together with agricultural products such as tomatoes and sugar, the chemical products take up a large proportion of the cargo trains, leaving little capacity for cotton (China Cotton Association, 2010c). Finally, the subsidies have reached or come close to expiration (August 2011 for ginned cotton and December 2010 for yarn) and there is no attempt to extend them.

In most of Xinjiang, transport costs are covered by buyers. When transport is not covered by the subsidies (e.g. for competitiveness reasons, the processing enterprises do not want to wait for the next available cargo capacity for their cotton), buyers have to pay for road transport, which is 4 times as much as rail (Chinese Apparel Web, 2010). Such costs have implications for the competitiveness and profitability for the enterprises. When road transport is not used, cotton is stocked up due to delay in rail transport, causing a reduction of

supply from Xinjiang and hence fluctuations in cotton prices. Based on the above-mentioned problems, many suggest an improved (and extended) railway transport subsidy, or even a road transport subsidy.

Financial support to develop cotton industry in Xinjiang

In addition to the measures to get cotton out of Xinjiang in its original or upstream form, there are also policies to encourage more processing in Xinjiang itself. The policies are laid out in the "Implementation measures for financial- and tax-related policies to accelerate the development of the cotton-processing industries in the Xinjiang autonomous region", made upon the collaboration among the Xinjiang departments of finance, economics and information, taxes and so on. Financial support and temporary tax exemption or discounts are provided for processing enterprises that adopt technology adaptation and innovation and develop downstream products. The tax benefits are expected to be used for increasing the salary of employees at the enterprises, technological innovation and new product development. The measures are in line with the national government's goal to "develop the west".

Temporary collection and reserve policy

The temporary collection and reserve policy is implemented when needed, the latest one being for September 2011-March 2012 (NDRC, 2011b). The policy will be implemented in the 13 provinces, autonomous regions and direct-controlled municipalities mentioned in Section 2.2. The buying price has been set to ¥19,800/tonne for the standard ginned cotton. However, some question the timeliness of this policy, since wheat has already been planted in the autumn of 2010, which leaves little scope for cotton expansion even if farmers want to respond to the pricing (Jingrongjie, 2011a).

Import control measures

The NDRC (2010) announced the new principles regarding the import tariff quota. Enterprises need to apply for a quota before importing agricultural products for normal trade, processing trade, barter, border trade, aid and donation. Agricultural products that are imported into free trade zones, free trade warehouses and export processing zones are exempt from the rules. Cotton enterprises that want to apply need to be state trading enterprises with at least 50,000-ingot spinning capacity. The enterprises also need to demonstrate historical import performance. The quotas are distributed according to the applied amount, historical import performance, production capacity and other commercial standards. For cotton imported outside the quota, sliding duties are applied to adjust the price of imported cotton to a range that will avoid impact on the domestic cotton prices. Sliding duties on cotton vary between 5-40%, the actual rate depends on the price of the imported cotton[vi]. The basic principle is that when the price is high, the tax is low and vice versa.

The sliding duties have the function of controlling the price of imported cotton to a certain range, in order to avoid too much impact on the domestic cotton prices and prevent a sudden rise or drop in the quantity of imported cotton. However, quota allocation could lead to "rent-seeking". Moreover, the changes in quota quantity are unpredictable, bringing uncertainty into the market (China Textile Commerce Association, 2011).

Measurement-based fertilization

Measurement-based fertilization ("cetupeifangshifei") is a measure by the MoA to improve agricultural production and is being promoted extensively all around China. In a nutshell, it means to fertilize the fields scientifically under the guidance of technological experts. The aim is to achieve a balance between various soil nutrients, increase the efficiency of fertilizer use (and therefore reduce the amount of fertilizer used), improve the yields and quality of agricultural products, and reduce labor and costs for farmers. The measure entails 5 steps: 1) soil measurement; 2) formulation of fertilizer ratio; 3) develop formulae for fertilizer; 4) fertilizer supply; and 5) guidance of fertilization (MoA. 2011g).

Subsidy for increasing organic matters in soil

The subsidy for increasing organic matters in soil is derived from the above subsidy. In 2009, for example, ¥300 million was set aside from the latter subsidy. ¥240 million was used for deploying the method of rice straw decomposition in field ("daotianjugankuaisuhuantian"), ¥44 million was used for upscaling the use of green manure, and ¥16 million was used to encourage the use of organic fertilizer. The subsidies only apply to the

"project counties" designated by the provincial agricultural administrative departments. The method to be used, actual subsidy levels (¥20/mu for all methods in 2009), implementation areas and so on are determined by the MoA and Ministry of Finance. While the former two are mainly used in southern China, the latter are often used in the north (MoA, 2010). Along with the subsidy for measurement-based fertilization, these measures have the aim of "accelerating the sustainable development of agriculture" (ibid).

Construction of high-standard agricultural fields

As mentioned in Section 4, the agricultural infrastructure in many parts of China is outdated and lacks maintenance, causing problems in production. The measures to construct high-standard agricultural fields aim to improve production conditions through flattening the ground, building inter-field hydro projects and roads, and planting shelterbelt. The budget for the 11th 5-year plan period was ¥200 billion, with a focus on main food crops production areas (it is not mentioned that cotton is excluded) (MoA, 2011i).

7.2 BCI and existing policies

Some of the existing policies are consistent with some of the principles of BCI. For example, the measures to create high production and subsidies for improved varieties are in line with BCI's principles to adopt management practices that maximize the fiber quality and to harvest, manage and store seed cotton in a way to minimize trash, contamination and damage (BCI, 2009). Another example is the measurement-based fertilization, which is consistent with the principle to maintain and enhance the structure and fertility of the soil and to optimize timing, placement and quantity of nutrients applied (ibid).

7.3 Factors affecting the cotton/food crops balance

Proactive policy measures

Being a cash crop, cotton never received the market support available for food crops. The buying price in the temporary collection and storage policy arguably resembles a protection price that exists for food crops (Jingrongjie, 2011a). Nevertheless, food crops receive subsidies for the purchase of means of production, which are no longer available for cotton (Yu, 2011). The 2011 draft plan for national economic and social development shows that cotton production in 2010 was 5.97 million tonnes (6.1% lower than 2009). To reach 6.8 million tonnes in 2011, cotton needs to be more competitive. The protection price may influence the cotton/food balance in the future.

Indirect factors

In early 1980s, there was an increase in cotton unit yield in Shandong and Hebei due to technological advance, new varieties promotion and modern planting methodologies. Cotton profitability was thus higher than that of food crops, which led to an increase in cotton growing areas. In late 1980s, improved varieties of wheat and rice proliferated in the Yangtze River basin. Meanwhile, there was no breakthrough in anti-pest and diseases technology in cotton. The relative profitability of cotton decreased, as did its growing areas (Liu et al., 2006).
Cotton is resistant to salty and alkaline soil and thus historically does not interfere significantly with food crops, which cannot grow well on such soil. However, due to soil amelioration since the 1970s, unit yield of food crops increased rapidly, which had a negative impact on the area where cotton was grown (Liu et al., 2006).

External factors

Light, temperature and water can influence the unit yield and the quality of cotton. For example, in early 1990s, there were low sunlight hours and accumulated temperatures in the Yellow River basin. Consequently, cotton had low yields. Which led to a rapid decrease in growing areas within the basin (Liu et al., 2006). Pest and diseases outbreaks can also lower the profitability of cotton. In 1992, the average yield in Hebei and Shandong was reduced to only 346.9kg/hectare and 454.6kg/hectare by an outbreak of cotton bollworms. The low or negative profitability led many farmers to grow other crops instead (Liu et al., 2006).

7.4 Cotton and food security

The proportion of land growing food crops and cotton in relation to the total agricultural land area is decreasing (76% in 1980s → 67% in 2000s for food crops, 3.5% in 1980s → 3.4% in 2000s for cotton)

(Jingrongjie, 2011a). Meanwhile, the proportion of land growing oil crops, fruits and vegetables is increasing. Such increases have more influence on the food crops planting areas than the adjustment of cotton-growing areas (ibid). Some argue that the relationship between cotton and food crops is not a competitive one so much as it is a complementary one (Hu and Cheng, 2008). The main reason was mentioned earlier, i.e. the salty and alkaline soil cotton is usually grown in. In the Yangtze River basin, multi-cropping involving cotton is common. Cotton is usually rotated with wheat, rape seed flowers, melons and vegetables. The same can be said about the Yellow River basin, where cotton is often rotated with wheat. Multi-cropping is possible due to soil improvement by growing cotton. If cotton planting is discontinued, then the yield of other crops would decrease[vii]. Another reason is the limited scope for increasing cotton-growing areas in China (Jingrongjie, 2011a). Firstly, food crops prices have been increasing in 2011. Secondly, growing cotton is less profitable than being a migrant worker and there is low labor availability for labor-intensive cotton production (ibid).

In 2010, profitability of cotton in general was not too low despite bad weather conditions, mainly thanks to the higher-than-average cotton prices (¥14-15/kg). However, in some areas, farmers encountered serious losses because of a completely disastrous harvest (Yu, 2011). Base on a survey of 2453 cotton-farming households in 13 provinces and autonomous regions, Cotton Association predicts a 10% increase in cotton-growing areas. Some farmers are still reluctant to increase their cotton-growing areas despite the high profitability in 2010, mainly for 3 reasons: lack of governmental subsidy, high cost of planting and unstable cotton prices (ibid).

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		Yellow River basin	Yangtze River basin	Northwestern Inland
Natural conditions		Dry in spring/summer, wet in autumn	Good precipitation and heat conditions, relatively low sunlight hours, flooding hazard	Long sunlight hours, needs irrigation, simple planting structure, medium soil production capacity, salinization, plastic mulch pollution
Characteristics of production		Mainly uses bi-annual breeds, centralized production, average unit yield, large potential to increase production land, pest hazard, relatively good quality fiber, high impurity, relatively developed textile industries locally, low transport costs	Stable increase of production area, centralized production, high unit yields, 90% growing areas alternate between food/oil crops and cotton, serious pest hazard, high quality fibers, high impurity c, extensive textile industries locally, low transport costs	Stable increase of production area, centralized large-scale production, high unit yields and mechanization, good quality fibers, low impurity content, weak local textile industry infrastructure, high transport costs
Goal	**2010**	42 million mu production area, unit yield >75kg/mu, production 3.2 million tonnes	18 million mu production area, unit yield 85kg/mu, production 1.5 million tonnes	25 million mu production area, unit yield 125kg/mu, production >3.1 million tonnes
	2015	42 million mu production area, unit yield 80kg/mu, production 3.3 million tonnes	18 million mu production area, unit yield 90kg/mu, production 1.6 million tonnes	25 million mu production area, unit yield 130kg/mu, production >3.2 million tonnes
Main development strategy		Improve infrastructure construction, increase soil production capacity and irrigation capacity, increase growing areas of genetically-modified cotton in areas with ample precipitation and heat, promote early-planting, simplify planting technologies, research in pest-prevention technology, improve unit yields and maturity of fibers	Increase the drainage capacity of fields, improve soil production capacity, increase pest- and disease- resistant breeds, centralize high-quality fiber production, increase planting density, improve unit yield	Increase soil production capacity, increase disease-resistant and salt-resistant breeds, develop drip-feed irrigation, promote early-planting, further mechanization to reduce production cost, research in pest-prevention technology, biodegradable plastic mulch

Appendix 1. Characteristics of main cotton production areas in China

Endnotes

[i] Xinjiang has issued a planning outline for the construction of a modern agriculture and animal husbandry for 2011-2020. In this document, Xinjiang plans to create 500,000 mu demonstration mechanization fields in 25 counties and cities, in order to increase the mechanization of agriculture (Yu, 2011).

[ii] Relevant stakeholders include: State Council; National Development and Reform Commission; Ministry of Commerce; State Administration of Taxation; Ministry of Finance; State Administration of Industry and Commerce; Statistics Bureau; General Administration of Customs; People's Bank of China; Ministry of Science and Technology; Ministry of Land and Natural Resources; Ministry of Environmental Protection; Ministry of Agriculture; State-owned Assets Supervision and Administration Commission of the State Council; Standardization Management Committee; China Textile Industry Association; General Administration of Quality Supervision, Inspection and Quarantine.

[iii] See http://www.cfc.agri.gov.cn/cfc/html/204/2011/20110412185226750790050/20110412185226750790050_.html for a complete list of relevant departments and their responsibilities.

[iv] Policy banks are not-for-profit banks with a business focus on sectors that commercial banks are not interested in for profit reasons. These sectors tend to require large-scale investment and are characterized by long return periods, e.g. key infrastructure construction projects and agricultural development projects. Policy banks were established with the purpose to engage in financing activities in order to implement the government´s socio-economic policies. The essence of policy banks is a management tool that assists with economic development and accelerates social development.

[v] Production and construction corps of Xinjiang is a special organization in which "military", "administrative" and "enterprising" characteristics are present, guided by the central government and Xinjiang autonomous region's government. They make up 1/7 of Xinjiang's population, produce 1/5 of Xinjiang's food crops, 2/5 of Xinjiang's cotton, 1/3 of Xinjiang's cotton yarn and cloths and sugar, and contribute 1/5 to Xinjiang's taxes. For more information, see http://www.bingtuan.gov.cn/

[vi] For more details regarding the tax calculation, see page 3 in the attachment of http://www.customs.gov.cn/publish/portal0/tab3889/module1188/info94158.htm (in Chinese)

[vii] This would only be the case if soil amelioration is not being carried out simultaneously for the same area. Otherwise cotton would become less profitable compared to other crops, see Section 5.1.2. Note that currently no research has been conducted for Xinjiang regarding multi-cropping with cotton, therefore this conclusion is restricted to the Yangtze River basin and the Yellow River basin only.