1. Country and Sector Background

China’s agricultural sector has entered a phase of an urgent and challenging structural transformation. Four major developments dictate this transformation.

- **Agricultural Output and Incomes.** Agricultural production has been growing rapidly since the reforms of the agricultural economy that started in 1978. China’s agricultural sector has been moving from a production deficit economy to a surplus in most agricultural commodities with a downward trend in farm output prices. Farm income growth has fallen alarmingly behind overall income development. Policy priorities have shifted from concerns over food self-sufficiency and low consumer prices towards serious concerns about income growth for the farming population and the growing income disparity between rural and urban areas.

- **Natural Resource Pressure.** During the phase of rapid expansion of output, agricultural production encroached into more and more fragile ecological environments and adopted unsustainable production practices. These include food production on steep and highly erosive slopes, arid and semi-arid areas, or even environmentally sensitive floodplains and wetlands. Natural resources have been put under heavy pressure and are deteriorating rapidly. At the same time the demand for those resources from the non-agricultural population has grown steadily. Competition over water has increased, sand storms are affecting populations in major cities, floods are threatening record values of assets and
lives of people, and the perception of a clean environment and nature as a resource for recreation has gained high value among Chinese people.

• **Changing Demand and Consumer Preferences.** The rapid growth in the non-agricultural economy and a growing urbanization has caused changes in food preferences and in food consumption patterns. Demand for meat, fruits, vegetables, and other high-value commodities including ‘green’ and organic food are rising rapidly. Growing urban incomes will continue to put upward pressure on the demand for highly processed and high quality foods.

• **New Market Challenges and Opportunities.** China’s accession to the WTO commands a fast liberalization of trade practices and further opening up of the border. While this offers important new opportunities for the agricultural sector, it also adds pressure to reshape China’s agriculture. Without rapid adjustments, there is a risk of foreign companies of capturing more and more of the traditional as well as important new markets in the area of high value agricultural products. With appropriate adjustments, however, China’s farmers have a realistic chance to: a) stay competitive in most of the traditional commodities, b) serve China’s increasing demand for high value products, and c) gain a significant share in important new export markets, particularly in the fruit and vegetable industry.

A critical bottleneck for the needed transformation of the agricultural sector is the slow transfer and adoption rate of modern science, technology and knowledge-intensive agriculture. The current farming environment in China is characterized by a highly fragmented production structure. China has some 250 million rural households farming on average about 0.5 hectare of land -- with a non-existent or very low degree of coordinated farmer organizations. The existing farm structure makes it difficult: a) to expand the use of new technologies and or supply high value markets which need a critical mass, farm size, or contain other critical elements to reach economies of scale, b) to reach farmers by the traditional extension system, because of the poor fit of the model of a national extension system to reach the large numbers of farmers and to meet their increasingly individualized demands on knowledge and information, and c) for farmers to know of and respond effectively to market signals.

The current government-based research and extension system is not sufficiently responsive to the new challenges and opportunities, neither of agricultural technologies and markets, nor to the demand of farmers. It is supply-oriented, as it was traditionally extending the government’s programs and production targets, and has no effective means of dealing with the constraints faced by small farmers in the adoption of new technologies. Consequently it has turned out to be biased in favor of those technologies for which it was designed. Public sector technologies were generally quantity- not quality-oriented. The resulting shift in the supply function and decreasing food prices made the consumers the primary and sometimes the exclusive beneficiaries of agricultural research. An important type of technologies, which would target new or higher quality products, and address a changing preference structure of consumers, has been neglected on the public sector research and extension agenda. However, precisely the modern technologies have the potential to benefit both consumers and producers alike. Shifting demand functions, differentiating consumer preferences, generating new products and addressing new markets has the potential to create significant welfare gains attributed to consumers and suppliers alike (‘win-win-technologies’).
The Government has responded to the structural problems in the agricultural sector by a bundle of policies and measures:

- **Agricultural Policy:** China’s agricultural policy has changed significantly over the past few years. China’s accession to WTO marks a fundamental shift in focus from achieving grain self-sufficiency towards diversified agricultural production based on market forces. This change in paradigm is accompanied by a shift from quantity to quality of production; an increasing reliance on science and technology in agriculture; a new focus on green/organic production; and the promotion of production and marketing models based on lead companies or ‘dragon-heads’, scientists, and farmers.

- **Agricultural Research System Reform:** Consistent with its large geographical size, diverse agro-environments, and its large population China has one of the world’s largest agricultural research systems, comprising over 1,100 research institutes and over 100,000 staff – plus about 50,000 retirees whose pensions are financed through research institutes’ budgets. The research focus is heavily crop oriented, 60 to 70 percent of MOA’s research institutes and research staff focus on crops. China’s agricultural R&D including the existing system of transferring technologies is not in a position to effectively respond to the challenging structural transformation of the agricultural production, input supply and processing sectors. China has gone through several stages of reform of the agricultural research system, which have been partially successful in improving research efficiency. Critical reform issues remaining to be addressed in further reform include: a) the low rate of farmer adoption of the new technologies generated, b) under-funding and overstaffing of research institutes, c) low level of training of researchers, and c) duplication of research efforts in too many research institutions. The conceptual proposals to modernize agricultural research institutes include a gradual privatization of those institutes which produce marketable technologies combined with a strong staff reduction, and increased funding for public sector type research institutes.

- **Agricultural High-tech Industries Development Zones:** In recognition of the need to speed-up the agricultural transformation and the growing regional disparities, the State Council has chosen the fragile dry and poor area of North-West China to establish by Decree in 1997 the Yangling Development Zone as the first national level agriculture high-tech zone in China. Located in Shaanxi province close to Xian, Yangling is a focal point of agricultural research and development for China’s North-West region. The key idea of the Yangling high tech zone is to demonstrate the positive role technology can play for sustainable economic development and rural poverty reduction in Shaanxi and in North Western China. Key steps towards this goal were the consolidation of 10 scientific institutes into the comprehensive North West University and three technical training colleges (water, forestry, agriculture) into Yangling Technical training college. These changes pooled a resource of 4,000 scientists into Yangling area giving it the initial critical mass to embark on developing the high tech demonstration zone. To capture the value of the discoveries a strong effort to commercialize innovations became necessary. Yangling adopted a series of policies and targeted funding to facilitate this process. These policies include tax reduction for
companies in the area, availability of funds for small and medium size companies and company incubators to provide good facilities and business and legal assistance to new companies. Interaction between university scientists and the business community have been facilitated. This interaction is also supported by the national policies of pushing for commercialization of public sector innovations. Similar high tech demonstration zones are planned in other regions.

2. Objectives

The objective of the Project would be to develop and test innovative models for agricultural technology generation, transfer and application aimed to generate additional farm income with a potential for scaling up. This objective would be achieved by supporting the restructuring and modernization of agricultural production, processing and marketing through viable models featured by a high science and technology content, and a sustainable and efficient use of natural resources.

Specifically the project would: 1) help to improve the efficiency and speed of transfer of agricultural technologies, 2) support the emergence, inclusiveness and sustainability of new institutional and public-private partnership arrangements, and 3) pilot the establishment of farmer managed producer organizations.

The key performance indicators would be:

- Number of successfully implemented pilots by company/farmer arrangement, farmer groups and product/technology types.
- Relative superiority of pilots in terms of Total Factor Productivity (TFP) (% above country average): (i) net income per ha, (ii) income per labor day, and (iii) returns per m³ of water.
- Adoption or replication rate of pilots outside the project.
- No. of companies awarding shares or sharing profits with farmers’ associations.
- No. of products/companies reaching export markets.
- Share of SOCAD/POCAD’s overall investments into company-farmer partnerships.
- Share of SOCAD/POCAD’s overall investments managed by farmers’ associations, and
- Number of quality assurance tests (pesticide residues; organic certification, patents) performed by the public sector regulatory, certification and testing services.

This project is designed to support all three central themes of the Bank's country assistance strategy (CAS): (1) improve the business environment and help accelerate the transition to a market economy; (2) address the needs of the poorer and disadvantaged people and lagging regions; and (3) facilitate environmentally sustainable development.

**Improve business environment and help accelerate the transition to a market economy.** The project will develop and test novel models of strategic partnerships between private companies, farmers individually or organized in associations and public sector institutions for agricultural technology development and application. These partnerships are an immediate response to the market requirements and designed to address the new market developments and emerging consumer preferences for agricultural products in a liberal post-WTO entrance environment.

**Addressing the needs of the poorer and disadvantaged people and lagging regions:** The project is placed in a sector and regions where income growth significantly lags behind overall economic development of the country. The project addresses the rural sector in these areas with
the objective to find opportunities for generating truly additional rural income by choice of technologies and organizational settings characterized by strong farmer benefits.

Facilitate environmentally sustainable development: After a period of strong output growth China’s agricultural sector has put severe pressure on its fragile natural resource base. Within a more liberal trading environment and a high level of self-sufficiency or even surplus production reached by now, the project would take advantage of these new opportunities and focus on development directions and sources of income growth in the agricultural sector building on the application of sound resource management practices through appropriate technologies as a key element for long-term efficiency and sustainability. Not resources destructive production increases, but capitalizing on value addition would be at the center of the project. In addition the project would largely capitalize on growing consumer preference for environmentally friendly and sound food production methods.

3. Rationale for Bank Involvement

This project builds on and supports the Chinese on-going agenda for restructuring and modernization of the agricultural sector. It pilots new approaches for setting an enabling environment for agricultural technology development and transfer. The present project is designed as a response to shortcomings of a small-holder production structure and will invest in a set of new forms of technology transfer mechanisms, which: a) address the problem of a fragmented production by testing different models of stakeholder organizations and contractual systems creating economies of scale, which are necessary for efficient supply chains to enable new products to reach the markets, b) shorten the chain of actors between technology development and application, c) give a strong role and create an enabling environment to the private sector and for private-public partnerships in technology development and application, and d) facilitate functioning of market mechanisms giving farmers small scale access to new income opportunities.

The project is designed as a technology support rather than an agricultural research project. This allows for focused support to explore novel public-private partnerships in commercializing research results and in extending technological innovations through commercial channels and targeted advisory systems. These institutional arrangements are well in line with the new national sector policies and are expected to yield valuable experiences in transforming China’s agricultural sector. These experiences will also feed into the on-going reform processes of the national research and extension systems. It is also envisioned that the impact of Bank investment in the North-West China Agricultural Development Zone in Yangling and the four provinces will be much greater than an investment in the national agricultural research or extension system. The project introduces desired reforms of technology generation and transfer at a sustained pilot scale. Piloting of reforms is a model accepted and preferred by the national authorities to guide subsequent scaling up. The unique intellectual capacity and emerging commercial strength of Yangling development zone is a solid foundation to build the new approaches on and to gain experience on reform elements that could be scaled-up in a relatively short time. It is in the nature of China that innovative approaches once successfully pilot tested spin-off on a country-wide scale very quickly.

Without such a project the risk is high that large national and international companies would capture attractive technologies and markets from the emerging national private sector without involvement and participation of the majority of the 230 million Chinese smallholders. Farmers
would be crowded out by such companies and would at best be employed in large estate production. This would not only defer poor and small farmers from important new and lucrative rural income growth prospects, but at the same time sustainability of such development would be at high risk. Such company-type agriculture would pay highest attention to short-term financial returns. Social acceptance and environmental sustainability would play a secondary role.

4. Description

The project is designed to pilot novel approaches for setting enabling environments for agricultural technology development and transfer, as well as for creating partnerships between technology generating institutions, private sector industrial/marketing concerns and small farmers for the purpose of increasing rural incomes. The project would include the following three components:

1) **Technology transfer and information markets and services (US$ 16.6 million)**
   Financing for this component would include the building of a set of large scale technology transfer markets in or near the Yangling Development Zone to be used for exhibition and/or trade of agricultural technologies and information. The proposed technology market concept builds on modern communication technologies and is designed to respond to farmers’ demand for new ideas, technologies and business opportunities.

2) **Promotion of Commercially Attractive Key Technologies and new institutional arrangements (US$182.2 million)**
   a) **Researcher-Investor-Farmer Technologies (US$154.7 million)**
      which would involve the partial financing of typical tripartite joint ventures with the objective of designing successful investment models in which researcher-investor-farmer partnerships are tested
   b) **Targeted Technology Transfer (US$1.3 million)**
      which would finance technology transfers targeting farmer groups who do not have adequate access to information, capital or decision making power to enable them to adopt technologies on their own.
   c) **Public Sector Support Programs (US$4.5 million)**
      This component is dedicated to: a) financing activities that enable the private sector to realize its role in commercializing innovative technologies; and b) directing public funds to technologies that do not appeal to the private sector on commercial grounds, but have a clear public goods nature.
   d) **Innovation Support Fund (US$21.7 million)**
      This fund would be available for supporting a second generation proposals under the sub-components 2a) and 2b) above. Fund would be allocated on a competitive basis with a fixed share going to farmer groups and organizations.

3) **Capacity Building, Project Management, Monitoring and Evaluation (US$8.1 million)**
   Under this component, the Project would finance a range of capacity building and training activities at all levels including improved policy support, the provision of vehicles and equipment, as well as detailed M&E activities. In addition, the project would pilot several insurance schemes for farmer owned assets (e.g. livestock)
5. Financing

Source: ($m.)

| BORROWER | 100 |
| INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT | 100 |
| Total | 200 |

6. Implementation

Implementing agency: The State Office for Comprehensive Agricultural Development (SOCAD) is the implementing agency for this project. Established in 1988 by the State Council, its objectives are to support agricultural development and restructuring in all provinces in China. Its annual budget in 2002 was $440 million with a growing trend. Typically, SOCAD provides between $50 million to $100 million per year to each province for three major activities a) Land Rehabilitation and Development (60-70%), b) Agricultural Diversification, including processing (20-30%) and c) Agricultural Technology Support (3-10%). SOCAD has a complete institutional structure from the state level, provincial level (POCAD) down to the counties (COCAD). In three of the project provinces in Hunan, Anhui and Heilongjiang it is attached to the Finance Department, while in Shaanxi it is integrated with the Poverty Alleviation Office. The proposed project will significantly strengthen SOCAD’s and POCADs’ ability to support technology transfer and institutional innovation in the participating provinces and at the national level.

The Project management structure will include Project Leading Groups (PLGs) and Project Management Offices (PMOs). Project leading groups will be established at the central, and provincial levels and will be retained throughout project implementation. The central PLG will be headed by a vice minister of MOF and composed of project representatives from MOA, MOF and NDRC, one vice governor from each of the project provinces and several directors from the SOCAD. Provincial PLG are headed by a vice governor in charge of the POCAD and include representatives from the planning commission, finance bureau, agricultural, forestry, animal husbandry, poverty alleviation office, All China Women’s Federation and possibly others. The main responsibility of the provincial PLGs will be to work out detailed measures for implementing the policies and plans formulated by the central PLG, approve project feasibility studies, organize project counterpart funds, support the distribution and repayment of the loan and enlist the support of other relevant agencies.

The Central Project Management Office (CPMO) will be located at SOCAD in Beijing. Main responsibilities of the CPMO will be to supervise the project, prepare progress reports including the project completion reports, arrange combined procurement under ICB contracts, coordinate institutional development aspects, particularly overseas training, study tour and technical assistance, receive copies of the provincial applications for withdrawal of the proceeds of the loan and conduct regular field checks on project implementation and physical quality.

Provincial PMOs (PPMOS) are responsible for project implementation. They are located at POCAD and operate under the guidance under the provincial Leader Groups with full support by the provincial Finance Bureaus. In Yangling the POCAD and the Yangling Administrative Committee would jointly manage the project. PPMOs draw up annual work plans and budgets, review and approve lower level project work plans and designs, undertake procurement and distribute procurement documents, monitor quality and quantity of physical, social and economic progress, verify disbursement applications from the lower level PMOs and combine them into
periodic applications to the provincial finance bureaus. They will also organize research, local training and project supervision.

7. Sustainability

Firstly, the project concept is fully integrated into the overall context of sustainable development in China. Sustainability for the project requires it to be financially and economically attractive, socially accepted, and environmentally sustainable. Through the various forms of researcher-company-farmer and company-farmer arrangements and supportive investments the project pilots an important window for poor and small farmers to overcome their structurally disadvantaged position and to enter into financially attractive technologies and markets. This is socially highly desirable and contributes to the income growth urgently needed in poor rural areas. Many farmers who currently are forced to infringe on ecological fragile areas to survive would be provided with technological and product alternatives they would otherwise not have access to.

Secondly, the sustainability of this pilot type project will need strong monitoring and self-evaluation with a high degree of stakeholder participation. This way the project would not only maximize the lessons to be drawn from the project pilots, but also provide the necessary analytical foundation for the design and replicability or scaling up in other areas.

Thirdly, the positioning of the project within SOCAD allows ownership beyond project areas and beyond the project implementation phase. SOCAD is the Chinese Government’s investment arm in agricultural restructuring and modernization, channeling large amounts of funds to all provinces and regions in China. Successful ideas and concepts would be internalized in SOCAD’s policies and funding program.

8. Lessons Learned from Past Operations in the Country/Sector

The forces of urbanization, diversification and globalization are acting to qualitatively and quantitatively change agricultural value chains and necessitate new ways of thinking about research and development support. International experience shows that three trends are emerging: 1) Institutionally the culture of innovation is changing from a sector limited linear pattern from research to a product to a complex network of public private partners engaged in innovation, product development, and marketing. The present proposal aims at exploring different options for researcher-company-farmer linkages in the context of transformation of the rural sector in selected provinces in China. 2) Before, the agricultural research agenda was set largely by the researchers within the sector; today the consumers and society at large influence the content of research. In particular, concerns over the environment are enhancing integration of agricultural production and environmental sustainability agendas. Other concerns relate to food safety, bio-safety and socio-economic and gender impact. There is clear interest in these issues also in China as well as expertise in sustainable systems such as IPM. The proposed project aims to support integration of the environmental, socio-economic and quality control concerns as cross-cutting themes in the technologies and product chains promoted. 3) Lastly, the public sector is defining its new role in the liberalizing and commercializing agricultural sector divesting its interest from productive activities but enhancing its presence in setting regulatory frameworks and quality standards and their enforcement. The present project proposes to support
the public sector in these new roles through support to IPR enforcement, product quality control, quality assurance for niche markets and natural resources management.

9. Safeguard Policies (including public consultation)

<table>
<thead>
<tr>
<th>Safeguard Policies Triggered by the Project</th>
<th>Yes</th>
<th>No</th>
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<tbody>
<tr>
<td><strong>Environmental Assessment (OP/BP/GP 4.01)</strong></td>
<td>[X]</td>
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<tr>
<td>Natural Habitats (OP/BP 4.04)</td>
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<tr>
<td>Pest Management (OP 4.09)</td>
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<tr>
<td>Cultural Property (OP 11.03, being revised as OP 4.11)</td>
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<td>[X]</td>
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<tr>
<td>Involuntary Resettlement (OP/BP 4.12)</td>
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<td>Indigenous Peoples (OD 4.20, being revised as OP 4.10)</td>
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<td>Forests (OP/BP 4.36)</td>
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<td>Safety of Dams (OP/BP 4.37)</td>
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<tr>
<td>Projects in Disputed Areas (OP/BP/GP 7.60)</td>
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<tr>
<td>Projects on International Waterways (OP/BP/GP 7.50)</td>
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The safeguard screening category of the project is S2. Both the social and environment safeguard aspects are unlikely to have major negative impacts. Applicable safeguard policies for the project are: a) Environmental Assessment, b) Pest Management, c) Indigenous populations, and d) Involuntary Resettlement.

The set of proposed project investments suggests no critical environmental issues and therefore the project would be categorized as an Environmental Risk Category B project. This rating is based on the Task Team’s environmental screening and stakeholders discussions with PMOs, companies, and farmers. An Environmental Assessment Report will be prepared before appraisal.

The following safeguard policy issues apply to the project:

**Environmental Assessment.** An Environmental Impact Assessment is currently being carried out for the project. So far no major negative environmental impacts of the project are foreseen. Each project proposal has already been screened for potential negative environmental impacts. Several project components clearly have a potentially positive effect, such as the production and propagation of organic products in many proposals or the Integrated Pest Management component.

**Pest Management.** The project directly addresses the reduction of toxic pesticide use in agricultural production through a range of project components. The project includes a Farmer-Centred Technology Development and Advisory Service for Integrated Pest Management (IPM). Several proposals are promoting organic production method as a promising key technology and it is expected that the project would stimulate the development of low-pesticide or zero-pesticide food production methods.

**Indigenous Populations.** In three of the project counties (one county in Heilongjiang and two in Hunan) the presence of significant minority nationality populations invoked the Bank’s Safeguard policy on Indigenous Populations, OD 4.20. Special Multi-Ethnic Groups Social

*By supporting the proposed project, the Bank does not intend to prejudice the final determination of the parties' claims on the disputed areas.*
Assessment Reports were generated for all three counties; such SA reports involved extensive consultations in the local areas with potential project beneficiaries. These reports formed the basis on which Multi-Ethnic Group Development Plans were prepared by the PPMOs in Heilongjiang and Hunan.

**Involuntary Resettlement.** No major resettlement is expected to become necessary under the project. However, a small number of people may be negatively affected by proposals, which require acquisition of land or other permanent or temporary impacts during construction. A draft Resettlement Policy Framework consistent with the Bank’s Operational Policy 4.12, Involuntary Resettlement, has been prepared and will be finalised and agreed upon before appraisal.

The borrower’s capacity to implement the safeguard policies recommendations is sufficient.

The safeguard studies were made available at the InfoShop at August xxx 2004. The borrower has advertised the availability of the safeguards studies in the provincial newspapers in August 2004. (Noureddine or Anis could you check this with SOCAD)

10. List of Factual Technical Documents

1. Draft Project Implementation Plan
2. Draft Environmental Impact Assessment
3. Social Assessment Report
4. Multi-ethnic Development Plan (MDP) for Heilongjiang Project Region
5. Multi-ethnic Development Plan (MDP) for Hunan Project Region
6. Procurement Capacity Assessment Report
7. Financial Management Assessment Report
8. Detailed Cost Tables
9. Detailed Procurement Plans
10. Mission Aide Memoires
11. Proposal on the Promotion of Professional Cooperative Associations of Farmers

11. Contact point
Contact: Iain G. Shuker
Title: Sr Agric. Economist
Tel: (202) 473-5519
Fax: (202) 614-1414
Email: Ishuker@worldbank.org

12. For more information contact:
The InfoShop
The World Bank
1818 H Street, NW
Washington, D.C. 20433
Telephone: (202) 458-5454  
Fax: (202) 522-1500  
Web: http://www.worldbank.org/infoshop