



# Technical Assistance Report

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Project Number: 43068  
Policy and Advisory Technical Assistance (PATA)  
July 2009

## People's Republic of China: Policy Study on Government Public Expenditure in Agricultural Production (Cofinanced by the Climate Change Fund)

Asian Development Bank

## CURRENCY EQUIVALENTS

(as of 07 July 2009)

Currency Unit	–	yuan (CNY)
CNY1.00	=	\$0.1463
\$1.00	=	CNY6.8335

## ABBREVIATIONS

ADB	–	Asian Development Bank
EA	–	executing agency
MOA	–	Ministry of Agriculture
MOF	–	Ministry of Finance
NDRC	–	National Development and Reform Commission
PRC	–	People's Republic of China
TA	–	technical assistance
TASF	–	Technical Assistance Special Fund

## TECHNICAL ASSISTANCE CLASSIFICATION

<b>Type</b>	–	Policy and advisory technical assistance (PATA)
<b>Targeting Classification</b>	–	General intervention
<b>Sector (subsector)</b>	–	Agriculture and natural resources (agriculture and rural sector development)
<b>Themes (subthemes)</b>	–	<b>Economic growth</b> (promoting economic efficiency and enabling business environment), <b>environmental sustainability</b> (global and regional transboundary environmental concerns), <b>capacity development</b> (institutional development)
<b>Climate Change</b>	–	Climate change adaptation
<b>Location Impact</b>	–	National (high)

## NOTE

In this report, "\$" refers to US dollars.

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## I. INTRODUCTION

1. During the 2008 Country Programming Mission, the Government of the People's Republic of China (PRC) requested Asian Development Bank's (ADB) assistance to prepare the Policy Study on Government Public Expenditure in Agricultural Production. The policy and advisory technical assistance (TA) will review the central and local governments' agricultural expenditures in terms of their efficiency, effectiveness, and interagency coordination; and provide decision makers policy recommendations and the necessary tools to strengthen the agriculture sector. ADB fielded a reconnaissance mission on 10 January 2009, and a fact-finding mission in Beijing during 30–31 March 2009. The missions held discussions with representatives of the Ministry of Agriculture (MOA), the National Development and Reform Commission (NDRC), and the Ministry of Finance (MOF). During the discussions, the need for and the scope of the proposed TA were confirmed.<sup>1</sup>

## II. ISSUES

2. The PRC agriculture sector made impressive advances through the 1990s and into the new millennium, including marked gains in land and labor productivity and food output. In 2006, agriculture accounted for 11.7% of the PRC's gross domestic product, and agricultural cropland reached 157 million hectares. Growth in agricultural production has enabled the country to feed more than a fifth of the world's population from an eighth of the world's arable land.

3. Acknowledging the strategic importance of agricultural production to the country's food security and economic development, the Government is committed to modernizing its agriculture sector by improving the policy environment and steadily increasing government expenditures. The agricultural law was amended in 2002 and the Government set the national policy to accelerate agricultural production in 2004. The Government's agricultural policy, which focuses on agricultural subsidies and rural infrastructure investments, has become one of the cornerstones of the PRC's new countryside development strategy.

4. A comprehensive public expenditure review is needed to examine factors that constrain agricultural production in the PRC. There is a lack of quantifiable targets of government expenditures in current agricultural legislation and policies. Although a general national target is often set, it is unclear how much expenditure is required at the different levels of government. There is no clear policy on subsector prioritization. Huge regional and provincial differences also prevent a national agricultural expenditure policy from being formulated. There are also unclear mandates and responsibilities of different government agencies that prevent the establishment of an integrated agricultural expenditure system to streamline the decision making, and monitoring and supervision processes. There is also a need to formulate clear strategies so that private investment can complement public expenditure to increase farmers' incomes, promote small farms and agribusiness, and strengthen food production and quality.

5. The lack of awareness and understanding of the impacts of global climate change and water scarcity on agricultural production has also prevented the formulation of an effective adaptation policy and its integration into the planning of government agricultural expenditures. Climate change is expected to cause a rise in temperature, rainfall redistribution, and more frequent flooding and droughts. These could exert considerable impacts on the agriculture

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<sup>1</sup> The technical assistance first appeared in the business opportunities section of ADB's website on 14 April 2009.

sector. Recent studies<sup>2</sup> show that the overall impact on crop production, assuming there is no increased carbon dioxide fertilization,<sup>3</sup> is a 7%–14% reduction in rice, a 9%–10% reduction in maize, and a 2%–9% reduction in wheat. Assuming an average reduction of 7%, or about 40 million metric tons of food grain due to climate changes, this represents about 20% of the global grain trade. Such a loss would undermine food security in the PRC and the world, with serious consequences for the poor. The situation is even more complex below the provincial level, depending on geographical conditions.

6. Strategy 2020<sup>4</sup> is consistent with the Government's plans in three strategic areas: (i) investing in rural productivity improvement and inclusive growth, (ii) investing in sustainable natural resource use and conservation, and (iii) strengthening the enabling environment and local institutional capacity for decentralized and participatory rural investments. All these areas call for an active government expenditure policy that should be efficient, effective, and well coordinated among different government agencies.

### III. THE TECHNICAL ASSISTANCE

#### A. Impact and Outcome

7. The impact of the TA is enhanced sustainable agricultural production and food security in the PRC. The outcome of the TA is the enhanced ability of concerned government agencies to adopt effective public expenditure policies and plans for increasing agricultural production. The design and monitoring framework is in Appendix 1.

#### B. Methodology and Key Activities

8. To attain the expected impact, four outputs or components have been identified: (i) review of the central and local governments' agricultural production and public expenditure policies, (ii) assessment of the institutional and operational mechanisms of the central and local governments' public expenditures on agricultural production, (iii) assessment of the impact of climate change and its implications on food security, and (iv) policy recommendations and advocacy.

9. **Component 1: Review of the Central and Local Governments' Agricultural Production and Public Expenditure Policies.** This component will (i) review agricultural expenditures and policies; (ii) assess the experiences, challenges, and lessons learned; (iii) conduct field studies; (iv) assess the potential for adoption of international practices and experiences; (v) assess the future position of the agriculture sector in the national economy; and (vi) recommend future priorities for the PRC's agricultural public expenditure policy and strategy.

10. **Component 2: Assessment of Institutional and Operational Mechanisms of the Central and Local Governments' Public Expenditures on Agricultural Production.** This component will (i) assess the effectiveness and evolution of the management and supervision mechanism of the central and local governments' agricultural investments, (ii) assess the efficiency of the decision-making process and the institutional constraints of the Government's

<sup>2</sup> Xiong Wei, Conway Declanc, Lin Erdaa, Xu Yinlonga, Ju Huia, Jiang Jinhed, Holman lane, and Li Yan. 2008. *Future cereal production in China: The interaction of climate change, water availability, and socio-economic scenarios*. Beijing.

<sup>3</sup> A higher-than-normal carbon dioxide concentration in the environment might increase plant growth.

<sup>4</sup> ADB. 2008. *Strategy 2020: The Long-Term Strategic Framework of the Asian Development Bank 2008–2020*. Manila.

agricultural investments for further improvement, and (iii) provide recommendations for enacting the agricultural investment law.

11. **Component 3: Assessment of Climate Change Impact and its Implications on Food Security.** The component will (i) assess the impact of climate change on crop productivity and its implications for food security at the national and subnational levels; (ii) study the implications for subnational agricultural specialization and government planning, including transportation networks and intra-national trade patterns; and (iii) collect and analyze adaptation and mitigation practices at the local level.

12. **Component 4: Policy Recommendations and Advocacy.** The findings of the above three components will be disseminated through (i) a series of policy notes, (ii) journal articles, (iii) academic books, (iv) high-level policy forums, and (v) recommendations on government action plans in order to advocate an enabling investment strategy for a revitalized agriculture sector. These findings will be submitted to key stakeholders including the MOA, MOF, NDRC, and possibly the State Council, which will also be considered in the preparation of the 12<sup>th</sup> Five-Year Plan (2011–2015).

### C. Cost and Financing

13. The total cost of the TA is estimated at \$1,122,000 equivalent. It is proposed that ADB provide \$500,000 equivalent on a grant basis from its TA funding program (Technical Assistance Special Fund-others), and \$500,000 equivalent from its Climate Change Fund.<sup>5</sup> The Government will finance the remaining \$122,000 equivalent in kind covering office space, counterpart staff, site transportation, and other services. Details of the cost estimates for the TA are in Appendix 2.

### D. Implementation Arrangements

14. MOA will be the Executing Agency (EA) for the TA. MOA has been the EA of several ADB lending and TA projects, and has a proven record of staff capacities. A leading group will be established, chaired by the Director General of the Department of Development Planning in MOA. The leading group will provide overall guidance on the TA's direction. Its members will meet and provide guidance through several TA workshops.

15. A TA management office will be established in the Department of Development Planning to carry out day-to-day TA operations. The Department's Deputy Director General will serve as the head of the office and function as the overall TA coordinator. The office will be responsible for day-to-day communications and operational matters among ADB, consultants, and related government agencies.

16. An advisory committee will be established in Beijing to ensure the overall quality and acceptance of the TA outputs. The committee will include senior experts from key research institutes, including the Chinese Academy of Agricultural Sciences and China Agricultural University. The findings of the TA will be discussed with a group of senior policy makers from various key ministries, including MOF and NDRC.

17. TA implementation will take 24 months, from August 2009 to July 2011. Implementation progress will be monitored through inception, interim, draft final review meetings, workshops,

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<sup>5</sup> Established by ADB.

and conferences. The leading group of the EA and the advisory committee will meet with the consultants on a quarterly basis to monitor TA implementation progress. ADB will participate in the workshops. The research achievements of various stages will be circulated internally for perusal in the form of brief reports and research papers. The TA outputs will be publicized and discussed in journals, books, and seminars. The summarized policy recommendations will be submitted to high-level government policy makers, including the State Council.

18. TA funds will be used to engage two international consultants for 9 person-months and five national consultants for 98 person-months. The outline terms of reference for consultants is in Appendix 3. Consultants will be selected on an individual basis and engaged in accordance with ADB's *Guidelines on the Use of Consultants* (2007, as amended from time to time). Equipment (notebook computers, facsimile machines, and photocopiers) will be procured by the EAs in accordance with ADB's *Procurement Guidelines* (2007, as amended from time to time). The consultants will submit (i) an inception report 4 weeks after their services start, (ii) interim progress reports at appropriate stages of TA implementation, (iii) a draft final report, and (iv) a final report 2 weeks after incorporating the EA's and ADB's comments.

#### **IV. THE PRESIDENT'S DECISION**

19. The President, acting under the authority delegated by the Board, has approved the provision of technical assistance not exceeding the equivalent of \$1,000,000 on a grant basis to the Government of the People's Republic of China for Policy Study on Government Public Expenditure in Agricultural Production, and hereby reports this action to the Board.

## DESIGN AND MONITORING FRAMEWORK

Design Summary	Performance Targets and/or Indicators	Data Sources and/or Reporting Mechanisms	Assumptions and Risks
<p><b>Impact</b></p> <p>Enhanced sustainable agricultural production and food security in the PRC.</p>	<p>Grain production stabilized at about 500 million metric tons level during the 12th Five-Year Plan (2011–2015).</p>	<p>Government statistics</p>	<p><b>Assumption</b></p> <p>Government committed to its agricultural production targets and implementing the policy.</p> <p><b>Risk</b></p> <p>Major natural disasters or pest outbreaks may seriously interrupt the PRC's agricultural production.</p>
<p><b>Outcome</b></p> <p>Enhanced MOA ability to adopt effective public expenditure policies linked with the central and local governments' plans for increasing agricultural production.</p>	<p>Central and local governments' public expenditure policies on agricultural production streamlined with quantified targets by 2012.</p>	<p>Number 1 Administrative Order from the State Council every year</p> <p>Administrative orders from various related ministries and legislative documents from the People's Congress</p> <p>Annual report of MOA</p> <p>MOF and NDRC annual working reports on investment</p>	<p><b>Assumptions</b></p> <p>The leading group and steering committee ensure that the policy suggestions are conveyed to high-level policy makers.</p> <p>MOA and ministries concerned have a strong commitment and ownership, and will participate in the development of a national strategy on sustainable agricultural crops development.</p> <p>The recommended policy and measures will be adopted.</p>
<p><b>Outputs</b></p> <p>1. Reports on the PRC's agricultural expenditures, in terms of demand, supply, composition, subsector priorities, regional comparisons (with case studies from the western and coastal regions), and international experiences</p> <p>2. Reports on the decision-making process, management, supervision, and institutional development of the central and local</p>	<p><b>Components 1 and 2:</b></p> <p>Reports are submitted on time.</p> <p>At least eight policy notes and journal articles are published by 2010.</p> <p>The steering committees endorse the reports by the end of 2010.</p> <p><b>Component 3:</b> Comprehensive assessment of the</p>	<p>TA review missions and reports</p> <p>Reports/documents related to government expenditures on agricultural production for discussion at the four national workshops</p> <p>Consultants' reports</p>	<p><b>Assumptions</b></p> <p>High-level authorities within MOA to consider TA implementation as priority.</p> <p>The steering committee provides timely advice and guidance.</p> <p>Consensus reached through consultations among key stakeholders.</p>

Design Summary	Performance Targets and/or Indicators	Data Sources and/or Reporting Mechanisms	Assumptions and Risks
<p>governments' agricultural investments</p> <p>3. Reports on the impact of climate change on agricultural production and food security, and the central and local governments' response to mitigate it</p> <p>4. A synthesized policy recommendation note and advocacy for an enabling agricultural investment strategy for a revitalized agriculture sector</p>	<p>impact of climate change on agricultural production in the PRC is presented by 2010.</p> <p>Economic analysis of climate change impacts is published by 2010.</p> <p>Summary of recommendations for adaptation measures in the agriculture sector is published by 2010.</p> <p>At least four policy notes, four journal articles, and a book are published by internationally reputable publishers by 2010.</p> <p>At least two high-level policy forums organized by 2010.</p> <p><b>Component 4:</b> The findings of components 1, 2, and 3, especially on climate change adaptation concerns, are well integrated into the policy recommendations by 2010.</p> <p>Consensus on the policy recommendations reached among the stakeholders, and advocacy for an enabling agricultural investment strategy for a revitalized agriculture sector achieved by June 2011.</p>	<p>Dialogue with MOA, MOF, and NDRC</p>	

<p><b>Activities with Milestones</b></p> <p><b>Components 1 and 2:</b></p> <ol style="list-style-type: none"> <li>1. Review literature and submit inception report (week 4).</li> <li>2. Conduct first workshop (week 6).</li> <li>3. Review international practices and experiences (week 16).</li> <li>4. Review central and local governments' expenditure on agricultural production (week 16).</li> <li>5. Prepare analytical models (week 24).</li> <li>6. Visit key agricultural provinces in western and coastal regions of the PRC to collect data and information (week 32).</li> <li>7. Conduct pilot household and government agency surveys (week 32).</li> <li>8. Conduct second workshop (week 32).</li> <li>9. Prepare the four outputs based on the information collected during phases 1 and 2 (week 52).</li> <li>10. Conduct third workshop (week 68).</li> </ol> <p><b>Component 3:</b></p> <ol style="list-style-type: none"> <li>1. Review literature on the impacts of climate change on crop productivity and crop outputs, and provide revised estimates, if necessary (week 6).</li> <li>2. Assess the economic value of the expected impacts of climate change on agricultural productivity (week 30).</li> <li>3. Assess the potential costs and benefits of various adaptation and mitigation measures in the agriculture sector to climate change (week 48).</li> <li>4. Examine the effects of climate change via output redistributions on interprovincial trade and infrastructure investment, as well as on poverty, hunger, gender equity, etc. (week 60).</li> <li>5. Provide necessary policy recommendations on agriculture-related climate-change policy implications (week 72).</li> </ol> <p><b>Component 4:</b></p> <ol style="list-style-type: none"> <li>1. Distribute findings to various government agencies for comments (week 100).</li> <li>2. Hold policy consultation and advocacy with key ministries (week 100).</li> <li>3. Conduct the final workshop (week 100).</li> </ol>	<p><b>Inputs (\$'000)</b></p> <table> <tr> <td>ADB (TASF-Others)</td> <td>500</td> </tr> <tr> <td>Climate Change Fund</td> <td>500</td> </tr> <tr> <td>Government</td> <td>122</td> </tr> <tr> <td><b>Total</b></td> <td><b>1,122</b></td> </tr> </table>	ADB (TASF-Others)	500	Climate Change Fund	500	Government	122	<b>Total</b>	<b>1,122</b>
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ADB = Asian Development Bank, MOA = Ministry of Agriculture, MOF = Ministry of Finance, NDRC = National Development and Reform Commission, PRC = People's Republic of China, TA = technical assistance, TASF = Technical Assistance Special Fund.

**COST ESTIMATES AND FINANCING PLAN**  
(\$'000)

Item	Total Cost
<b>A. Asian Development Bank (ADB) Financing<sup>a</sup></b> <b>(Components 1, 2, and 4)</b>	
1. Consultants	
a. Remuneration and Per Diem	
i. International Consultants	54.0
ii. National Consultants	248.0
b. International and Local Travel	35.0
c. Reports and Communications	10.0
2. Training, Workshops, and Conferences	
a. Resource Persons	30.0
b. Workshops and Conferences	40.0
3. Miscellaneous Administration and Support Costs	10.0
4. Translation and Dissemination	20.0
5. Data and Survey	35.0
6. Contingencies	18.0
<b>Subtotal (A)</b>	<b>500.0</b>
<b>B. Climate Change Fund<sup>b</sup></b> <b>(Components 3 and 4)</b>	
1. Consultants	
a. Remuneration and Per Diem	
i. International Consultants <sup>c</sup>	108.0
ii. National Consultants <sup>d</sup>	144.0
b. International and Local Travel <sup>e</sup>	50.0
c. Reports, Publication, and Communications	45.0
2. Training, Workshops, and Conferences	
a. Resource Persons	60.0
b. Workshops and Conferences	40.0
3. Contingencies	53.0
<b>Subtotal (B)</b>	<b>500.0</b>
<b>C. Government Financing</b>	
1. Personnel and Office Accommodation	72.0
2. Data Preparation and Processing	30.0
3. Others <sup>f</sup>	20.0
<b>Subtotal (C)</b>	<b>122.0</b>
<b>Total</b>	<b>1,122.0</b>

<sup>a</sup> Financed by ADB's technical assistance (TA) funding program (TA Special Fund–others).

<sup>b</sup> Established by ADB.

<sup>c</sup> Six person-months including remuneration and per diem.

<sup>d</sup> Thirty-six person-months including remuneration and per diem.

<sup>e</sup> Eight return trips for ADB project officers and the international consultants (\$5,000 per trip), and 10 return trips for national consultants (\$1,000 per trip).

<sup>f</sup> Contribution to the workshop is limited to the Executing Agency's in-kind office expenses such as printing and telecommunication costs. Any cash expenses (venue rental, translators, etc.) will be charged to the TA.

Source: Asian Development Bank estimates.

## OUTLINE TERMS OF REFERENCE FOR CONSULTANTS

1. The technical assistance (TA) will require 9 person-months of international and 98 person-months of national consulting services. A team of international and national consultants will be recruited on an individual basis by the Asian Development Bank (ADB).

2. **Agricultural Development and Investment Specialist and Team Leader** (24 person-months, national). The consultant must possess at least 10 years of management and research experience in People's Republic of China's (PRC) agricultural investment policies, with considerable exposure to development issues in the PRC and other countries. In addition to sound knowledge on evolution of investment policies in agriculture in the PRC and elsewhere, the consultant must be familiar with the sources, allocation mechanisms, and associated administrative issues of agricultural investment in the PRC. The consultant must demonstrate management leadership, a research track record, and analytical competency and network capabilities. The consultant will

- (i) develop the study framework, coordinate the individual studies, and review and consolidate individual reports;
- (ii) coordinate research activities, monitor progress, compile and report project outcomes, and ensure the quality and timely dissemination of project outputs;
- (iii) coordinate with the project leading committee and technical steering committee;
- (iv) lead the research under all components and provide direction, guidance, and feedback on all components and all project activities;
- (v) organize workshops, field studies, and policy consultations;
- (vi) provide overall coordination among the team members, the Executing Agency (EA), and ADB to facilitate project implementation, including logistical support to ADB for reimbursement of individual consultants' work, workshops, and other expenses;
- (vii) assist the EA to coordinate potential public relations, including media events;
- (viii) review and provide timely supervision to national and international consultants for drafting and finalizing TA inception, midterm, and final reports; and revise chapters and sectors, if necessary, to ensure that TA outputs are adequate in scope and quality; and
- (ix) consolidate all consultant reports into an overall TA report summarizing findings and experiences into the policy recommendation note for ADB, the EA, and the Government; and lead the advocacy for an enabling agricultural investment strategy for a revitalized agriculture sector.

3. **Agricultural Economist** (3 person-months, international). The international consultant must possess at least 10 years of research and work experience in agricultural support policies and their evaluation. The international consultant will

- (i) conduct growth accounting and modeling, analyze the impacts of agricultural inputs, and assess the demand and supply of agricultural investments;
- (ii) model the impacts of different agricultural inputs;
- (iii) with the assistance of the national consultant, quantify sources of economic growth in the rural PRC, focusing on the relative contributions of physical capital versus human capital;
- (iv) assess the future position of the agriculture sector in the national economy;
- (v) analyze the demand and supply of agricultural investments;
- (vi) oversee all the work of the national consultant and ensure its quality;

- (vii) assist the project team leader in assessing the potential social and poverty impacts of the proposed policies; prepare two sub-reports—one on investment needs and priority setting for the Government, and the other on the social impacts of agricultural investments; and
- (viii) assist the team leader in preparing the final report.

4. **Agricultural Economist** (14 person-months, national). The national consultant must have a doctorate degree in agricultural economics with modeling experience, and demonstrate English proficiency and a research capacity, with a good publication record in the areas of economic growth, regional development, and human capital. The national consultant will

- (i) analyze the linkages between agricultural production and rural income;
- (ii) analyze the determining social and institutional factors that could potentially reduce farmers' income despite agricultural production growth;
- (iii) lead the field studies and surveys to rural household and communities;
- (iv) analyze the causes of regional inequality, poverty, and vulnerability in the rural PRC, with special attention to the agricultural investment and policy variables;
- (v) provide policy recommendations for addressing inequality, poverty, and vulnerability in the rural PRC, which must be provided with analytical backing; and
- (vi) assist the international consultant in preparing the report.

5. **Agricultural Policy Specialist** (18 person-months, national). The consultant must possess at least 10 years of research and work experience in the PRC's agricultural support policies, and must have extensive knowledge of the agriculture sector and the PRC's agricultural investments and policies. The consultant must be familiar with World Trade Organization rules and rural development policies in industrial and transition economies including Europe, Japan, Republic of Korea, and the United States. A doctorate degree in economic policy or related areas is needed. The consultant will

- (i) review and assess international experiences in the central and local governments' agricultural expenditures; and prepare a report on a comparative study of the evolution, characteristics, effectiveness, lessons, and experiences of agricultural investment policies in other countries and its implications for the PRC;
- (ii) provide an overall summary of the PRC's agricultural production by region, crop, and inputs;
- (iii) review agricultural expenditures and policies by different levels of government, with quantitative and comparable results across provinces and regions;
- (iv) summarize the experiences, challenges, and lessons from agricultural expenditures and policies in the past;
- (v) assist the team leader in conducting field studies in both the west and coastal regions of the PRC, and preparing case studies;
- (vi) independently produce a sub-report based on the above findings, focusing on the evolution, characteristics, effectiveness, lessons, and experiences of agricultural investment policies in the PRC;
- (vii) recommend reforms regarding mechanisms and investment priority setting (in consultation with other experts) in the PRC; and
- (viii) assist the team leader in developing policy recommendations.

6. **Fiscal Policy and Institutional Specialist** (18 person-months, national). The consultant must have extensive knowledge of the PRC's fiscal policy on agriculture and possess at least 5 years of research and working experience in the areas of fiscal system, fiscal policy, agricultural financing (both government investment and other forms of investment funding), and policy evaluation in the PRC and other countries. The consultant must have a thorough understanding of the organizational structure and institutional capacities of the governments (including local and all agriculture-related ministries). In addition to a reputable research record, the consultant must be familiar with the PRC's agricultural investment policies, and relevant rules and regulations. A doctorate degree in fiscal policy or agricultural economics is needed. The consultant will

- (i) assess the effectiveness and evolution of the management and supervision mechanism of the Government's agricultural investments,
- (ii) assess the efficiency of the decision-making process of the Government's agricultural investments and the institutional constraints for further improvement,
- (iii) assist the team leader in the field studies and gather information on (i) and (ii),
- (iv) lead in preparing sub-reports under component 2 and assist the team leader to prepare the sessions of the final report related to component 2 (the report will contain evidence-supported recommendations toward enacting the agricultural investment law of the PRC), and
- (v) assist the team leader in developing policy recommendations.

7. **Climate Change and Economic Modeling Specialist** (6 person-months, international). The international consultant must be a leading economist and climate change specialist with at least 15 years of experience working in climate change, trade, and related areas. The consultant must be familiar with the computable general equilibrium model and other analytical techniques and their applications. An outstanding publication record in trade and computable general equilibrium modeling, and demonstrated interests in climate change issues, are required. The international consultant will

- (i) review the literature on the impacts of climate (temperature, rainfall, and hydrology) change on crop productivity, crop outputs, and food security in the PRC and provide improved estimates, if necessary;
- (ii) assess the economic value of the expected impacts of climate change, both negative and positive (if any), on agricultural productivity with a special emphasis on the macroeconomic impacts of these changes in the agriculture sector;
- (iii) assess the potential costs and benefits of various adaptation and mitigation measures in the agriculture sector, and explore forms and sizes of agricultural investment that will facilitate adaptation (e.g., improved crop varieties) and mitigation (e.g., natural pest management in place of pesticides and higher manufacturing output, and more water-efficient irrigation) to climate change impacts;
- (iv) examine the effects of climate change via output redistributions on interprovincial trade and infrastructure investment, as well as on poverty, malnutrition, hunger, gender equity, and ethnic issues; and
- (v) provide the necessary policy recommendations, especially the investment implications of agriculture-related climate change policy initiatives, and produce publications in international and top PRC academic journals or books by leading publishers.

8. **Climate Change and Economic Modeling Specialist** (24 person-months, national).  
The national consultant will

- (i) review the PRC literature on the impacts of climate change and food security in the PRC and assist the international consultant to provide improved estimates, if necessary;
- (ii) collect and compile time series data, by region and province, on weather (temperature, rainfall, humidity, etc.); crop yields; sown areas; interregional trade; and other data needed for computable general equilibrium model building and calibration;
- (iii) conduct preliminary data analysis, including measurement of agricultural productivity and regional comparative advantages;
- (iv) assist the international consultant to assess the potential costs and benefits of various adaptation and mitigation measures in the agriculture sector;
- (v) assist the international consultant to examine the effects of climate change via output redistributions on interprovincial trade and infrastructure investment, as well as on poverty, malnutrition, hunger, gender equity, and ethnic issues; and
- (vi) assist the international consultant to produce publications in international and top PRC academic journals or books by leading publishers.