

**ASIAN DEVELOPMENT BANK**

**TAR: PRC 33446**

**TECHNICAL ASSISTANCE**

**TO THE**

**PEOPLE'S REPUBLIC OF CHINA**

**FOR**

**PREPARING NATIONAL STRATEGIES FOR SOIL AND WATER CONSERVATION**

**November 2000**

## **CURRENCY EQUIVALENTS**

(as of 13 November 2000)

Currency Unit	–	Yuan (Y)
Y1.00	=	\$0.1208
\$1.00	=	Y8.2772

The exchange rate of the yuan is determined under a managed floating exchange rate system. In this report, a rate of \$1 = Y8.30 is used.

## **ABBREVIATIONS**

ADB	–	Asian Development Bank
EIA	–	environmental impact assessment
FAO	–	Food and Agriculture Organization of the United Nations
GIS	–	geographic information system
MWR	–	Ministry of Water Resources
PRC	–	People's Republic of China
SFA	–	State Forest Administration
TA	–	technical assistance
UNDP	–	United Nations Development Programme

## **WEIGHTS AND MEASURES**

ha (hectare)	–	10,000 m <sup>2</sup>
km (kilometer)	–	1,000 m
km <sup>2</sup> (square kilometer)	–	100 ha
mm (millimeter)	–	0.001 m

## **NOTE**

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

## I. INTRODUCTION

1. During the 2000 Country Programming Mission of the Asian Development Bank (ADB), the Government of the People's Republic of China (PRC) requested technical assistance (TA) to prepare national strategies for soil and water conservation. This report is based on an ADB fact-finding mission that visited the PRC from 21-26 August 2000 to confirm with the Government the objective, scope, cost estimates, financing plan, and implementation arrangements of the TA.<sup>1</sup>

## II. BACKGROUND AND RATIONALE

2. In 1998, the largest floods in the past 50 years on the Nen, Songhua and Yangtze rivers caused massive property damage (more than \$20 billion) and extensive loss of life. Dust storms in April-May 2000 affected a wide area, including Beijing, Hangzhou, Jinan, Nanjing, as well as wide swathes of Gansu, Inner Mongolia, Ningxia, and Xinjiang provinces. Nature and human existence in the PRC are far from being in a state of benign harmony, exacerbated by a legacy of mismanagement of land resources. Among all the natural and manmade disasters, land degradation (including water and wind erosion, chemical deterioration, and physical deterioration) is the most intractable. Of the total territorial area of 9.6 million square kilometers km<sup>2</sup>, soil erosion affects 3.67 million km<sup>2</sup>, or 38 percent of the national territory.<sup>2</sup> Food and Agriculture Organization (FAO) data show a slightly higher figure (4.66 million km<sup>2</sup>) for all forms of land degradation in the PRC.<sup>3</sup> Land degradation affects most provinces.<sup>4</sup> Annual soil loss is estimated at 5 billion tons (t). Economic damage is difficult to estimate,<sup>5</sup> but the annual loss from using land beyond its sustainable capacity is huge.

3. Land degradation is mostly due to poor land use decisions over a long period of time, rather than climate change or other natural factors. In the PRC, per capita arable land is 0.11 hectares. The shrinking arable land area pressures farmers to extract higher yields from their land leading to increased soil erosion. Almost 90 percent of rural people living in poverty are located in areas suffering from soil erosion. In arid areas, increasing livestock numbers exacerbate the spread of deserts. Over 90 percent of the 1.3 million km<sup>2</sup> of grasslands suffer from moderate to severe degradation, while demand for meat and other livestock products is rising.

4. For the past 50 years, the Government and the people have been battling to implement soil and water conservation.<sup>6</sup> By the end of 1998, 780,000 km<sup>2</sup> had been comprehensively treated, 180,000 programs for soil and water conservation were approved, and 36,000 cases of violation against soil and water conservation laws and regulations investigated. In 1999, the Ministry of Water Resources (MWR) prepared a 50-year master plan for soil and water conservation, approved by the State Development Planning Commission (SDPC), and a five-year action plan (2001-2005). The national Water and Soil Conservation Law 1991 has led to almost all provinces, municipalities, and autonomous regions issuing implementation regulations and instructions on collecting fees to cover the costs of erosion control facilities and works, as well as appropriate institutional arrangements. National regulations also cover erosion control

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<sup>1</sup> The TA first appeared in the Internet version of the *ADB Business Opportunities* on 25 August 2000.

<sup>2</sup> The statistics are unreliable. The *China Statistical Yearbook* (1999) gives an equivalent figure of 1.8 million km<sup>2</sup>, but this is believed to exclude wind erosion.

<sup>3</sup> Lynden, G.W.J. and L. R. Oldeman. 1997. *The Assessment of the Status of Human-Induced Soil Degradation in South and Southeast Asia*. United Nations Environment Programme and FAO.

<sup>4</sup> The United Nations defines desertification as "land degradation in arid, semiarid, and dry subhumid areas resulting from various factors, including climatic variations and human activities."

<sup>5</sup> Ning Datong. (undated). *An Assessment of the Economic Losses Resulting from Land Degradation in China*. estimated ¥59.3 billion (\$7.1 billion) per year.

<sup>6</sup> Ministry of Water Resources 2000. *A Great Cause for Centuries – 50 Years in Water and Soil Conservation in China*. Beijing.

related to mining, railways, power stations, highways, pipelines, and hydraulic engineering works, as well as urban areas.

5. Since 1990, steps to control desertification include development of the National Planning Program for the Control of Desertification 1991-2000 and the National Action Plan for the Control of Desertification, and establishment of the Chinese Research and Development Center for Control of Desertification, as well as several training and monitoring centers. To counter different types of desertification, the Government focused on 20 major counties, in which 9 experimental areas and 22 experimental and demonstration bases were established. From 1991 to 1995, 4.29 million hectares were brought under control, of which 1.22 million hectares were subject to sandy land enclosure,<sup>7</sup> afforestation, and grass planting. Another 470,000 hectares were subject to sandy land control, cultivation, and low-yield farmland transformation.

6. In 1999, 10 cities, 100 counties, and 1,000 small watersheds were selected for soil and water conservation demonstration projects. In that year, 50,000 km<sup>2</sup> were brought under control, bringing the total controlled area to 830,000 km<sup>2</sup>. Despite these achievements, at the current pace it will take 60-70 years to completely restore degraded lands throughout the PRC. More than 100,000 workers, 6,000 scientists, and 100 research institutes are engaged in water and soil conservation work. The 1998 National Plan on the Ecological Environment considers water and soil conservation as one of the main rehabilitation tasks and a fundamental measure for river control. The plan's goal is to bring soil erosion under preliminary control within 15 years, and permanent control within 30 years. The Tenth Five-Year Plan (2001-2005) places high priority on water and soil conservation, especially in the western PRC, which suffers the greatest extent of soil erosion. In addition to a nationwide logging ban, the State Forest Administration (SFA) has announced plans to double the forest coverage from 13.9 percent to 27 percent over the next 50 years, involving 1,100 counties in 24 provinces.

7. A wide range of externally assisted projects related to soil and water conservation have been undertaken in the PRC. Apart from ADB, the sources of external assistance include FAO, United Nations Development Programme (UNDP), World Bank, and the World Food Programme; providers of bilateral assistance include Australia, Canada, Germany, Japan, and United Kingdom. The World Bank has completed the first Loess Plateau Watershed Rehabilitation Project (\$150 million) and the second phase (\$150 million) is being conducted from 1998 to 2003. The China-Japan Cooperation on Combating Desertification started in the 1980s. The German Government has been supporting the Shelterbelt Development of the Upper and Middle Yangtze River and the Three Norths Shelterbelt Development Programme since 1995. The National Action Program to Combat Desertification has received support from UNDP and is now receiving support from the Global Mechanism of the Convention to Combat Desertification.

8. ADB projects relevant to the TA include Northeast Flood Damage Rehabilitation in Jilin and Heilongjiang provinces, and Inner Mongolia Autonomous Region;<sup>8</sup> Fujian Soil Conservation and Rural Development;<sup>9</sup> Strategic Options for the Water Sector;<sup>10</sup> Soil and Water Conservation in the Upper Yangtze River Basin;<sup>11</sup> Monitoring and Management of Fragile Ecosystems in Shanxi, Shaanxi, and Inner Mongolia;<sup>12</sup> Policies and Strategies for the Sustainable Development of the Lancang River Basin;<sup>13</sup> and Yellow River Flood Management Sector

<sup>7</sup> Sandy land enclosure and sandy land control involve establishing a checkerboard pattern of trees and straw to reduce the wind velocity at ground level, sufficiently to allow vegetative cover to grow and persist.

<sup>8</sup> Loan 1685, 1686, 1687-PRC, for \$330 million, approved on 22 April 1999.

<sup>9</sup> Loan 1386-PRC, for \$65 million, approved on 28 September 1995.

<sup>10</sup> TA 2817-PRC, for \$1,180,000, approved on 26 June 1997.

<sup>11</sup> TA 3069-PRC, for \$99,000, approved on 16 September 1998.

<sup>12</sup> TA 1615-PRC, for \$600,000, approved on 27 November 1991.

<sup>13</sup> TA 3139-PRC, for \$660,000, approved on 22 December 1998.

Project.<sup>14</sup> However, to date no external financing has been available to support development of a national strategy for soil and water conservation.

9. Land degradation threatens (i) the ability of the PRC to feed its population; (ii) life, property, and infrastructure from landslides, mudslides, shifting dunes, and floods; (iii) urban populations and transportation from increasingly frequent sand and dust storms; (iv) reservoir functions such as hydroelectricity, irrigation supplies, and flood detention; and (v) continued progress in poverty reduction, as arable land shrinks and water supplies dry up. Recognizing these threats and the inadequacy of past control strategies, and encouraged by the scenario planning approach adopted by TA 2817 (which recommended this follow-up TA as a priority project), the Government requested ADB assistance with formulating new strategies for soil and water conservation. Earlier strategy plans developed by the Government did not attempt to relate possible future social, economic, and environmental conditions with the selection of appropriate strategies for soil and water conservation, nor did they make the explicit linkage with poverty reduction strategies. The TA will remedy these inadequacies.

### III. THE TECHNICAL ASSISTANCE

#### A. Objective

10. The TA will address soil and water conservation in a comprehensive manner, rather than the narrow demarcations under existing institutional arrangements, and map out a strategic approach to control all forms of land degradation throughout the PRC. The TA's objective is to assist the Government in developing national strategies for soil and water conservation. The TA will help to improve land and water resources management, and will contribute to poverty reduction and economic development. The relationships between the TA's goals, objectives, risks, and assumptions are shown in the TA framework in Appendix 1.

#### B. Scope

11. The TA will identify the extent and severity of land degradation throughout the PRC, assess past soil and water conservation projects to determine the lessons learned, evaluate alternative options to accelerate rehabilitation and protection of land, identify appropriate international models that can be applied to soil and water conservation projects in the PRC, recommend a pipeline of priority projects for future investment (studied at the prefeasibility study level), and design a progress monitoring and evaluation system.

12. In addition to the ADB projects (para. 8), the TA will take into account the relevant findings of the following ADB-funded TAs: Study on Ways to Support Rural Poverty Reduction Projects;<sup>15</sup> Policy Support for the PRC 2020 Project, Phase III,<sup>16</sup> and other relevant studies. The TA will be complementary to, and provide an overarching strategic framework for, simultaneous ADB-funded TAs on (i) Combating Desertification in Asia,<sup>17</sup> (ii) Optimization of Initiatives to Combat Desertification in Gansu Province,<sup>18</sup> and (iii) GEF Operational Program 12 Partnership on Land Degradation in Dryland Ecosystems.<sup>19</sup>

13. **Document current status of soil erosion and land degradation.** The TA team will document the current status of land degradation (wind and water erosion, chemical, and physical deterioration), consistent with international norms. Where national statistics appear to

<sup>14</sup> TA 3259-PRC, for \$930,000, approved on 22 September 1999.

<sup>15</sup> TA 3150-PRC, for \$715,000, approved on 31 December 1998.

<sup>16</sup> TA 3648-PRC, for \$900,000, approved on 14 July 2000.

<sup>17</sup> TA 5941-REG, for \$450,000, approved on 29 September 2000.

<sup>18</sup> TA \_\_PRC: currently being processed.

<sup>19</sup> TA \_\_PRC: currently being processed.

depart from these norms, the TA team will examine the basis of such estimates and attempt to explain the reasons for any anomalies. The status report will be prepared on the basis of agro-ecological zones (thus enabling the causal relationships to be identified) as well as administrative zones, which better explain the institutional responses and relationship to poverty. Particular reference will be made to the recently completed nationwide survey of soil erosion undertaken by the Institute of Remote Sensing Applications on behalf of MWR.<sup>20</sup>

**14. Identify economic losses associated with soil erosion and land degradation.** The TA team will systematically document the economic and financial losses associated with land degradation in the PRC, with a view to justifying the necessary level of expenditure for future control programs. The analysis will examine the extent to which such losses impact more on the poor and the role that land degradation plays in creating and sustaining poverty in the PRC.

**15. Document previous control strategies and programs.** The TA team will document the key policies, programs, and projects undertaken since enactment of the 1991 Water and Soil Conservation Law, as well as provide a brief historical context of former strategies. Emphasis will be placed on the role of foreign aid-assisted projects and the extent to which international best practices have influenced soil and water conservation strategies in the PRC. The TA team will document both internal and external best practices, and examine the extent to which PRC officials may benefit from closer relationships with international efforts to combat soil erosion and desertification, such as through the United Nations Convention for Combating Desertification (UNCCD) regional thematic program networks.<sup>21</sup>

**16. Prepare future scenarios, alternative strategies, costs, and outcomes.** The TA team will attempt to predict the likely outcomes if current strategies, existing programs, and recent levels of funding (i.e., business as usual) form the basis of the PRC's future national strategy for soil and water conservation. An envelope of possible scenarios and their outcomes, covering optimistic and pessimistic assumptions, will be presented to decision makers, so that they can evaluate whether any change in approach is necessary. Assuming that the current strategies are suboptimal, the TA team will develop alternative strategies, based on international best practices (para. 15), to enable the Government to accelerate control of land degradation throughout the PRC. The costs of implementing these accelerated strategies, as well as specific goals and targets for each five-year period, will be documented. A revised set of strategies is unlikely to be implemented unless the key stakeholders take strong ownership of the outcomes and feel that they have been adequately involved in the formulation process. The TA will provide for national and local level workshops to engage policymakers, practitioners, and other stakeholders in an analysis of the alternative strategies. This participatory process will aim to develop a consensus on the optimal set of strategies accepted by all stakeholders.

**17. Recommend strategies, action plan, and institutions.** Once there is adequate consensus on the preferred strategies, the TA team will compile a short-term action plan, which will be presented to an international workshop for external financiers. Priority projects will be studied to a prefeasibility level, and a short-term public investment plan will be developed for adoption by the Government. The current separation of functions between biological and structural measures for soil and water conservation may not be optimal. In addition, international experience indicates that grassroots stakeholder partnerships with Government may be more effective in combating land degradation, than heavy reliance on Government programs. The TA will examine alternative institutional models, evaluate strengths and weaknesses of the current

<sup>20</sup> As this survey has details at the county level, an extra geographic information system (GIS) coverage related to poverty incidence will demonstrate the assumed high correlation between poverty and soil erosion.

<sup>21</sup> The PRC hosts the network on desertification monitoring and assessment, while India hosts the agroforestry and soil conservation network.

institutional arrangements in the PRC, and propose future directions for institutional reform, if warranted.

18. **Design monitoring and evaluation system.** Evaluation of former projects and programs to determine what works best has been minimal. Nationwide surveys at 5-10 year intervals do not provide adequate input for annual programming. Reports from grassroots organizations are constrained by inadequate training, insufficient equipment, and simple monitoring techniques, and often state that predetermined targets have been achieved. The TA will prepare a preliminary design of a more comprehensive monitoring and evaluation system, based on a nationwide network of monitoring stations and simple monitoring techniques,<sup>22</sup> combined with national level remote sensing and geographic information systems.

### **C. Cost Estimates and Financing Plan**

19. The total cost of the TA is estimated at \$1,060,000 equivalent, consisting of \$380,000 in foreign exchange costs and \$680,000 equivalent in local currency costs. ADB will finance \$800,000 equivalent to cover the entire foreign exchange cost plus \$420,000 equivalent of the local currency cost. The TA will be financed by ADB on a grant basis from the ADB-funded TA Program. The Government will finance the remaining local currency cost of \$260,000 equivalent. The Government's financing will cover remuneration and per diem of counterpart staff, office accommodation and supplies, local inland travel costs, local communications and reports, and surveys, investigations, and plans to be carried out by local design institutes during the course of the study. The cost estimates and financing plan are given in Appendix 2.

### **D. Implementation Arrangements**

20. The TA will be implemented by a team of international consultants in association with domestic consultants. The consultants, to be engaged through a firm, will be selected by ADB in accordance with its *Guidelines on the Use of Consultants* and other satisfactory arrangements for the engagement of domestic consultants. The methodology and terms of reference are specific and clearly identified. Hence, ADB's procedure for simplified technical proposal will be used to select the consultants (*Project Administration Instructions*, 3.01). A total of 58 person-months (10 international and 48 domestic) of consulting services will be required. Outline terms of reference are given in Appendix 3. TA implementation is expected to commence in January 2001 and end in December 2001.

21. The Executing Agency will be MWR. A steering committee will be established comprising senior staff of MWR, Ministry of Finance, Ministry of Agriculture, State Environment Protection Administration, SDPC, and SFA. An expert panel comprising 6-8 senior academics and officials will provide guidance to the TA consultants. Panel members will be paid a lump sum honorarium. Three workshops will be organized by, and held in, renowned PRC research institutes, and involve a wide spectrum of stakeholders to consider alternative strategies and reach consensus on the national strategies. The TA will also provide funding for up to five scientists to prepare peer-reviewed, commissioned papers for publication in international journals and present them at relevant international conferences or workshops.

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

22. The President, acting under the authority of the Board, has approved the provision of technical assistance, on a grant basis, to the Government of the People's Republic of China, in an amount not exceeding the equivalent of \$800,000 for the purpose of Preparing National Strategies for Soil and Water Conservation, and hereby reports such action to the Board.

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<sup>22</sup> The new Soil and Water Conservation Monitoring Center associated with MWR and the National Desertification Monitoring Center under SFA will need to combine forces and share monitoring data.

## TECHNICAL ASSISTANCE FRAMEWORK

Design Summary	Performance Targets	Monitoring Mechanism	Assumptions/Risks
<b>Project Goal</b> Reduce the economic, social, and environmental costs of widespread land degradation in the People's Republic of China.	<ul style="list-style-type: none"> <li>The loss of productive land due to wind and water erosion reduced to the rate of creation of newly productive land</li> <li>The costs of land degradation reduced to a level that does not detract from gross domestic product (GDP)</li> </ul>	<ul style="list-style-type: none"> <li>Remote sensing and geographic information monitoring systems combined with on the ground surveys conducted at the community level</li> <li>Natural resource accounting</li> </ul>	<ul style="list-style-type: none"> <li>The Government continues to recognize the damage to the national economy caused by land degradation.</li> <li>Communities are prepared to work with the Government in controlling and monitoring rates of land degradation.</li> </ul>
<b>Project Purpose</b> Prepare a national strategy plan for soil and water conservation.	<ul style="list-style-type: none"> <li>A comprehensive set of strategies to guide soil and water conservation over the medium term</li> <li>Consensus achieved on the key strategies by all stakeholders</li> <li>Government accepts and commits funding to the short-term action plan</li> <li>Preliminary design of a national monitoring network</li> </ul>	<ul style="list-style-type: none"> <li>Reviews of the final report of the technical assistance (TA) and its acceptance by Asian Development Bank (ADB) and the Government</li> <li>Feedback from a series of regional workshops and acceptance of the strategy plan by decision makers</li> <li>Budgets for soil and water conservation programs</li> </ul>	<ul style="list-style-type: none"> <li>Sufficient participation can be achieved during and after the TA.</li> <li>The Government continues to develop appropriate legislation and regulations compatible with the strategy plan.</li> <li>Central and local governments remain committed to funding key national soil and water conservation projects.</li> </ul>
<b>Component/Output</b> <ol style="list-style-type: none"> <li>Assessment of losses due to all forms of land degradation</li> <li>Assessment of best practices for soil and water conservation</li> <li>Feasible alternative strategies, their costs, and probable impacts</li> <li>Stakeholder consensus on preferred strategies</li> </ol>	<ul style="list-style-type: none"> <li>Financial and economic costs of soil erosion defined and estimated for the latest survey (Start January 2001-Finish June 2001)</li> <li>Collection of case studies demonstrating proven best practices (Jan-Mar 2001)</li> <li>Internally consistent sets of alternative strategies (Jan-Sep 2001)</li> </ul>	<ul style="list-style-type: none"> <li>Midterm, draft final, and final reports</li> <li>Commissioned papers</li> <li>Proceedings of regional workshops</li> <li>ADB review missions</li> </ul>	<ul style="list-style-type: none"> <li>Domestic consultants will be capable of conducting an international quality strategic planning study.</li> </ul>



Design Summary	Performance Targets	Monitoring Mechanism	Assumptions/Risks
5. Preparation of strategy plan and short-term action plan 6. Institutional reform model 7. Monitoring and evaluation network 8. Commissioned papers on priority issues	<ul style="list-style-type: none"> <li>• Feedback from at least 300-400 stakeholders at 3 regional workshops (Jun-Aug 2001)</li> <li>• Strategy plan for 30-50 years, and 5-year action plan acceptable to Government (Jun-Nov 2001)</li> <li>• Institutional reform plan</li> <li>• Preliminary design of a viable monitoring and evaluation network</li> <li>• 5-6 peer reviewed papers published internationally (Mar-Nov 2001)</li> </ul>		<ul style="list-style-type: none"> <li>• The Government is receptive to considering further institutional reform, after just completing major reforms in the past two years.</li> <li>• The International aid community is prepared to back an action plan supported by a comprehensive national strategy.</li> </ul>
<b>Activities/Inputs</b> 1. International consultants (10 person months) 2. Domestic consultants (48 person months) 3. Expert Panel (6-8 experts) 4. Steering committee 5. Counterpart staff 6. Workshops (3 regional, 1 international) 7. Commissioned papers	<ul style="list-style-type: none"> <li>• 4 international experts, 11 domestic experts working together over 12 months</li> <li>• Experts drawn from a wide range of disciplines</li> <li>• Steering committee comprising senior officials from key agencies</li> <li>• 10-20 staff from Water and Soil Conservation Department and other Ministry of Water Resources departments</li> <li>• Three regional research institutes hosting the feedback workshops</li> <li>• 5-6 commissioned papers on critical issues</li> </ul>	<ul style="list-style-type: none"> <li>• Inception report, midterm report, draft final report</li> <li>• ADB review missions</li> <li>• Performance contracts with expert panel members, research institutes, and commissioned academics</li> </ul>	<ul style="list-style-type: none"> <li>• Counterpart involvement is supported by the Government.</li> <li>• Full-time inputs are provided by domestic consultants.</li> <li>• Research institutes are willing to host regional workshops.</li> <li>• Expert panel members have sufficient time to contribute to the strategic planning process.</li> <li>• The steering committee is sufficiently senior to resolve any interdepartmental problems and to provide policy guidance.</li> </ul>

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

Item	Foreign Exchange	Local Currency	Total Cost
<b>A. Asian Development Bank Financing</b>			
1. Consultants			
a. Remuneration and Per Diem			
i. International Consultants	200	0	200
ii. Domestic Consultants	0	240	240
b. International and Local Air Travel	45	15	60
c. Reports and Communications	35	15	50
d. Translation Services	0	25	25
2. Training, Workshops, Expert Panel	50	80	130
3. Government Observers to Contract Negotiations in Manila	5	0	5
4. Contingencies	45	45	90
<b>Subtotal (A)</b>	<b>380</b>	<b>420</b>	<b>800</b>
<b>B. Government Financing</b>			
1. Office Accommodation and Field Transport	0	45	45
2. Remuneration and Per Diem of Counterpart Staff	0	50	50
3. Fees of Institute/Center Staff Engaged by Executing Agency	0	60	60
4. Plans, Surveys, and Investigations	0	25	25
5. Local Communications and Reports	0	80	80
<b>Subtotal (B)</b>	<b>0</b>	<b>260</b>	<b>260</b>
<b>Total</b>	<b>380</b>	<b>680</b>	<b>1,060</b>

## **OUTLINE TERMS OF REFERENCE**

1. The technical assistance will comprise studies to (i) document the current status of land degradation in all areas of the People's Republic of China (PRC); (ii) assess the economic losses associated with land degradation; (iii) assess the market, policy, and institutional failures that contribute to land degradation, and the incentives and disincentives facing land users; (iv) review the extent and success rates of previous control strategies and programs; (v) document best practices of soil and water conservation internationally and within the PRC; (vi) propose future scenarios if current strategies are retained; (vii) suggest a range of alternative strategies and their likely costs and outcomes; (viii) subject current and alternative strategies to intensive analysis by professionals, decision makers, and other stakeholders; (ix) recommend the most suitable combination of strategies for soil and water conservation during 2000-2050; (x) develop a priority action plan of key projects for 2002 to 2006, studied to a prefeasibility level; and (xi) prepare a preliminary design of a progress monitoring and evaluation system, to enable periodic review and improvement of the strategy plan.

### **A. International Consultants**

#### **1. Soil and Water Conservation Strategic Planner (Team Leader) (5 person-months)**

2. The strategic planner will take overall responsibility for guiding the development of the national strategies for soil and water conservation, assisted by a full-time deputy team leader for the duration of the TA. In addition to the team leader role, the strategic planner will undertake the following responsibilities:

- (i) Assess previous efforts to develop comprehensive plans for soil and water conservation in the PRC, identify the strengths and weaknesses of those plans, and use the analysis to design a robust strategic planning process that will lead to a widely accepted national strategy.
- (ii) Prepare a comprehensive, detailed work plan for all consultants and counterpart staff, and agree on scheduled inputs, work approaches, schedule and location of workshops, terms of reference for commissioned technical papers, and measurable output and performance targets.
- (iii) In conjunction with other team members, counterparts, and stakeholders prepare alternative soil and water conservation strategies, based on international best practices, which will enable the Government to accelerate control of land degradation.
- (iv) Evaluate feedback from stakeholder workshops, commissioned technical papers, and the advisory expert panel on the suggested alternative strategies and document in a simple, graphic manner the preferred set of strategies and their implications.
- (v) Prepare a short-term action plan, comprising priority activities, in a form suitable for consideration by international and national funding agencies.
- (vi) Maintain liaison with the Asian Development Bank (ADB) and the Government on behalf of the consulting team, prepare progress reports, and the final report, satisfactory to ADB and the Government.

(Reference in text: page 5, para. 20)

**2. Soil and Water Conservation Policy Analyst and Institutional Specialist  
(1 person-month)**

3. The institutional specialist will be responsible for the following tasks:

- (i) Document the key legislation, policies, programs, and projects undertaken since enactment of the 1991 Water and Soil Conservation Law, as well as provide a brief historical context of former strategies. Particular emphasis will be placed on the role of externally assisted projects in influencing institutional developments in the soil and water conservation field and the extent to which the introduction of international best practices has influenced soil and water conservation strategies in the PRC.
- (ii) Describe the mandates of all relevant national and provincial level agencies since the institutional reforms, introduced in 1998, were undertaken, and identify any overlap or gaps in coverage of these mandates, plus any inconsistencies in policies or institutional arrangements, which may have been inadvertently introduced through this reform process. Prepare a brief analysis of the level of staffing of relevant agencies, research institutes, and academics involved in soil and water conservation, and compare this with other country norms.
- (iii) Document internal and external best practices in soil and water conservation institutional development, and examine the extent to which PRC officials may benefit from closer relationships with successful international efforts on combating soil erosion and desertification.
- (iv) Based on the expected challenges facing soil and water conservation efforts in the PRC, propose alternative institutional models that could be considered by decision makers, pointing out the advantages and disadvantages of particular variations. In particular, examine the current separation between structural and biological control measures in the PRC, to assess whether this arrangement will remain appropriate in future.
- (v) Prepare a comprehensive report on the institutional analysis for incorporation in the draft final report.

**3. Remote Sensing and Geographic Information Systems Specialist  
(2 person-months)**

4. The remote sensing/geographic information systems (GIS) specialist will undertake the following tasks:

- (i) Assess the extent to which the PRC has optimally utilized remote sensing and GIS techniques to monitoring land degradation and rehabilitation programs, and the PRC's capacity to increase this use.
- (ii) Prepare a preliminary design of a more comprehensive monitoring and evaluation system, based on a nationwide network of monitoring stations and simple monitoring techniques, combined with national level remote sensing and geographic information systems.

#### **4. Macroeconomist (2 person-months)**

5. The macroeconomist will conduct the following activities, under guidance of the team leader, and in conjunction with the domestic microeconomist:

- (i) Systematically document the economic and financial losses to the nation associated with all forms of land degradation in the PRC, with a view to justifying the necessary level of expenditure for future control programs. Where the economic losses are due to market externalities, the emerging techniques in environmental economics outlined in ADB's *Economic Evaluation of Environmental Impacts – A Workbook*, will be followed.
- (ii) Prepare future economic development scenarios (covering optimistic and pessimistic assumptions) and analyze their relationship to soil and water conservation implications. Explain the scenarios in simple terms that can be presented to decision makers, so that they can evaluate whether any change in approach to soil and water conservation will be necessary. The business as usual scenarios will estimate the time required to achieve an appropriate level of control of land degradation at the current rate of progress.
- (iii) Develop a framework for financial and economic assessment of possible priority projects for the proposed short-term action plan, in a form that can be implemented by the domestic microeconomist.
- (iv) Prepare a report that can be incorporated in the draft final report.

#### **B. Domestic Consultants**

##### **1. Soil and Water Conservation Planner/Deputy Team Leader (12 person-months)**

6. The soil and water conservation planner will document the current status of various forms and locations of land degradation (wind, water, chemical, and physical), consistent with international norms. Where national statistics appear to depart from these norms, the consultant will examine the basis of such estimates and attempt to explain the reasons for any anomalies. The status report will be prepared on the basis of agro-ecological zones (thus enabling the causal relationships to be explained) as well as administrative zones, which better explain the institutional responses and relationship to poverty.

##### **2. Soil Conservation Engineer (4 person-months)**

7. The soil conservation engineer will document the structural measures that have been undertaken in the PRC to manage and control land degradation, and evaluate the most successful practices and the circumstances in which they have been successful. The basic costs and density of structures under different types of soil erosion control will also be documented. The soil conservation engineer will examine the extent to which local authorities have the necessary information, training, and capabilities to carry out these best practices.

##### **3. Desertification Control Specialist (4 person-months)**

8. The desertification control specialist will be responsible for documenting previous desertification control programs, evaluate their effectiveness, and document the constraints that prevent some areas from being controlled. The desertification control specialist will examine the

relative advantages and disadvantages of direct in situ control of sandy and Gobi deserts versus containment on the fringes of deserts. The specialist will also articulate how the emerging soil and water conservation strategies will dovetail with the various initiatives being pursued in the context of the PRC's response to the Convention to Combat Desertification.

**4. Information Systems Specialist (4 person-months)**

9. The information systems specialist will work with the international remote sensing/GIS specialist to design a future monitoring and evaluation system that combines national level remote sensing and GIS technologies with a network of local level monitoring stations capable of undertaking simple but accurate on the ground assessments.

**5. Agriculture and Land Use Planning Specialist (3 person-months)**

10. The agriculture and land use planning specialist will examine the extent to which changes in land use and intensification of agriculture have affected the rate and severity of land degradation in the PRC. Based on future scenarios indicating a rapidly urbanizing population, the consultant will examine priority areas where changes in land use should be promoted as a soil and water conservation control measure. In particular, the consultant will examine the proposed changes in land use as part of the Great Western Development Program, and assess its likely impact on rates and severity of soil erosion in the western provinces.

**6. Social Scientist and Poverty Assessment Specialist (4 person-months)**

11. The poverty assessment specialist will examine the extent to which land degradation losses affect the poor, and the role that land degradation plays in creating and sustaining poverty in the PRC. The specialist will also examine suitable development models for application in at-risk agricultural areas, which could not only boost farm incomes but also enhance environmental protection.

**7. Environment Specialist (3 person-months)**

12. The environment specialist will examine the impact of land degradation on ecological conditions, and on air and water quality in the PRC. The consultant will work with the economists to assess the economic impacts of soil erosion, sedimentation, declining water quality, red tides, dust storms, and other impacts on human health and the ecology. The consultant will document the adequacy of existing national environmental plans (such as the Trans-Century Green Plan) in addressing soil and water conservation problems. In addition, the environment specialist will contribute to the assessment of the implications of the proposed alternative strategies and their evaluation.

**8. Watershed Management Specialist (3 person-months)**

13. The watershed management specialist will document the evidence that deforestation has been a major factor in causing soil erosion throughout the PRC over recent years, and that it has in some way contributed to increased damage from floods and sedimentation. The consultant will document best practices in watershed management, based on an evaluation of previous projects, and evaluate the probable outcomes of current bans on logging and increased investment in reforestation.

**9. Economist (4 person-months)**

14. The economist will focus predominantly on the microeconomic aspects of the TA, particularly on estimating the costs of rehabilitating degraded areas, the current budget resources devoted to soil and water conservation, increased investment required to implement the preferred strategies in future, and the economic and financial benefits from implementing best practices in soil and water conservation. In addition, the economist will prepare the costing for priority projects to be included in the short-term action plan and conduct prefeasibility level analysis of rates of return.

**10. Water Resources Specialist (3 person-months)**

15. The water resources specialist will be responsible for documenting the impacts of soil erosion on the nation's water resources, the relationship between desertification and water shortages, and the extent of damage caused by sedimentation of rivers and lakes. The consultant will also examine and evaluate past programs aimed at mitigating the effects of soil erosion on water resources and draw out the most effective practices. Based on consideration of the future scenarios, the water resources specialist will evaluate alternative strategies to protect water resources from the impacts of soil erosion and recommend appropriate strategies for adoption.

**11. Public Participation Specialist (4 person-months)**

16. The public participation specialist will be responsible for facilitating stakeholder participation in the strategic planning process. The consultant will work with the selected research institutes to conduct three regional workshops (northwest, central, and south) and one international workshop for external financiers in Beijing. The public participation specialist will examine the most appropriate methods of seeking feedback and consensus of participants, and will take responsibility for documenting these inputs and providing feedback on the outcomes of the workshops to the participants and decision makers.