

ASIAN DEVELOPMENT BANK

TAR: PRC 34464

TECHNICAL ASSISTANCE
(Financed from the Japan Special Fund)

TO THE

PEOPLE'S REPUBLIC OF CHINA

FOR

OPTIMIZING INITIATIVES

TO COMBAT DESERTIFICATION IN GANSU PROVINCE

June 2001

CURRENCY EQUIVALENTS

(as of 14 May 2001)

Currency Unit	–	Yuan (Y)
\$1.00	=	Y8.27
Y1.00	=	\$0.1209

ABBREVIATIONS

ADB	–	Asian Development Bank
CAREERI	–	Cold and Arid Regions Environmental and Engineering Research Institute
CCICCD	–	China National Committee for the Implementation of the Convention to Combat Desertification
GDCRI	–	Gansu Desert Control Research Institute
GDMC	–	Gansu Desert Monitoring Center
GEF	–	Global Environment Facility
GIS	–	Geographic Information System
MWR	–	Ministry of Water Resources
PMO	–	project management office
PRC	–	People's Republic of China
TA	–	technical assistance

NOTES

- (i) The fiscal year of the Government ends on 31 December.
- (ii) In this report, "\$" refers to US dollars.

I. INTRODUCTION

1. During the Country Programming Mission in July 2000, the Government of the People's Republic of China (PRC) requested the Asian Development Bank (ADB) to provide advisory technical assistance (TA) to optimize initiatives to combat desertification in Gansu Province. This report is based on the ADB Fact-Finding Mission that visited the PRC on 7-18 August 2000 to confirm with the Government the objective, scope, cost estimates, financing plan, and implementation arrangements of the TA.¹

II. BACKGROUND AND RATIONALE

2. The March 2000 session of the National People's Congress endorsed the Western Development Strategy to promote growth and development in western PRC.² The strategy has two main objectives: (i) reduce economic disparities between the western and other regions, and (ii) ensure sustainable natural resource management. The strategy recognizes: (i) the fragility of natural systems in the western region, and (ii) the risk of increasing environmental deterioration if appropriate policies and incentives are not put into place.

3. A significant factor leading to deterioration of the environment in the western region is desertification,³ which manifests itself as loss of stabilizing vegetation cover and nutrients, and destruction of the soil's structure and moisture-holding capacity. Impacts are (i) encroachment of sand dunes onto arable land and infrastructure, (ii) curtailment of productivity due to loss of soil and nutrients, (iii) degradation of ecosystems, (iv) loss of biological resources and regenerative capacity, (v) increased incidence of sandstorms and downstream flooding and erosion, (vi) loss of biodiversity, and (vii) diminished potential for carbon sequestration. Desertification is a major cause of rural poverty.

4. Gansu, one of the poorest provinces in the PRC,⁴ has more than 14 million hectares of desert (32 percent of its total area). In the last three decades, the rate of desert expansion has increased due to an evergrowing population, whose needs result in land conversion for agriculture, deforestation, destruction of natural vegetation, overgrazing, unsustainable levels of groundwater exploitation, accelerated construction of reservoirs to supply water for towns and irrigated agriculture, continued use of wood as domestic fuel, and inappropriate farming systems. Overexploitation of natural resources, although of short-term benefit to many farmers and herders, has undermined the ability of vulnerable members of rural communities to maintain reasonable living standards.

5. The worsening of land degradation in Gansu in recent decades owes much to the development policies and strategies of the last half century. Among the well-intentioned policies that had negative environmental impacts are those relating to (i) relocation of people from densely populated areas to frontier regions of the north and west, (ii) food self-sufficiency and enforcement of grain quotas, (iii) conversion of grasslands for cropping and intensification of grazing in marginal areas, and (iv) expansion of irrigation and introduction into unsuitable areas of crops that require much water. Inappropriate land tenure arrangements and restrictions on labor mobility have also had negative impacts.

¹ The TA first appeared in the *ADB Business Opportunities* (Internet edition) on 14 July 2000.

² The western region encompasses eight provinces (Gansu, Guangxi, Guizhou, Qinghai, Shaanxi, Shanxi, Sichuan, and Yunnan), four autonomous regions (Inner Mongolia, Ningxia Hui, Tibet, and Xinjiang Uygur), and one municipality (Chongqing).

³ Desertification is defined in the Convention to Combat Desertification as land degradation in arid, semiarid, and dry subhumid areas resulting from various factors, including climatic variations and human activities.

⁴ Gansu's per capita gross domestic product in 1998 (Y2,301) ranked second from the bottom among the PRC's 31 provinces.

6. Through research programs begun in the 1950s, the PRC has developed and successfully demonstrated over large areas various techniques of soil stabilization and revegetation (para. 10). The Gansu Desert Control Research Institute (GDCRI), based in Wuwei Prefecture, undertakes applied research, establishes and maintains demonstration areas, and conducts training in techniques for sand stabilization and controlling the spread of deserts. The Gansu Desert Monitoring Center (GDMC) undertakes ecological planning of forest resources and desert-control programs. These efforts are supported by work programs run by the Desert Control Office of the Gansu Provincial Department of Forestry, including the Three Norths Shelterbelt System, which began in 1978. Since 1999, the Desert Control Office has been implementing a management information system with German bilateral assistance. The Cold and Arid Regions Environmental and Engineering Research Institute (CAREERI) of the Chinese Academy of Sciences, based in Lanzhou, has a highly qualified professional staff engaged in research on desertification, including the relationship between desertification rate and capture of surface water and groundwater resources.

7. Gansu has two broadly distinct regions of land degradation. The Loess Plateau, renowned for its highly erodible deep aeolian soils, covers parts of the province's south and southeast. Although this region's annual rainfall is only 350-600 millimeters (mm) on average, runoff from short, intense storms causes severe soil erosion on steep slopes with little vegetative cover. However, a successful model combining engineering and biological techniques to solve this serious problem has been developed for large-scale replication.⁵

8. In the Hexi Corridor, a 1,600-kilometer band extending across the province's north and northwest, average annual rainfall ranges from only 40-50 mm in the west to 200 mm in the east. Here desertification is caused by severe water shortage and wind-induced soil erosion. The phenomenon is strikingly evident at the desert fringes of the Hexi Corridor's three major oases: (i) Wuwei-Minqin in the Shiyang River basin, (ii) Zhangye-Jiyuquan in the Hei River basin, and (iii) Yumen-Anxi-Dunhuang in the Shule River basin. Due to the high solar radiation levels, large number of frost-free days, and marked temperature difference between day and night, the area favors a wide range of crops, particularly fruit trees. Snowmelt from the Qilian mountains along the Hexi Corridor's southern boundary provides reliable river base flow, which, before the development of extensive irrigation, helped maintain high groundwater levels in the oases and supported a highly self-sufficient agricultural economy.

9. Almost 30 percent of the Hexi Corridor is hyperarid desert. Of the rest, about 6 percent is devoted to crops, 5 percent to forests, and 59 percent to grasslands. Continued expansion of the irrigated area (currently about 13,240 square kilometers) and increasing groundwater extraction have caused the water table to drop from 8-12 meters (m) below ground level in the 1950s to as much as 100 m at present. Results of water-level monitoring show a trend toward a further drop of 100 m by 2020. Trees that formerly blocked sand dune encroachment and helped reduce evapotranspiration by reducing wind velocity, have disappeared from nonirrigated parts of the oases. The situation has been exacerbated by excessive grazing of fringe-zone vegetation by livestock, the major source of cash income for many of the herders who now lead a sedentary life in these oases. About 130,000 ha of farmland have been abandoned to drifting sand, and 4,000 villages are under threat.

10. Earlier programs to control and combat desertification in the PRC concentrated on biological and structural means of stabilizing desert fringe areas and halting erosion, with sectoral responsibilities separated according to the predominant factor (wind, water). The limited overall impact of such programs has reinforced the misconception that the major barrier to

⁵ The World Bank's first and second Loess Plateau Watershed Rehabilitation projects (1994, 1999) introduced sustainable use of land and water resources and helped reduce erosion in selected priority areas.

success is shortage of financial and human resources, and has distracted attention away from the underlying drivers of land degradation and its social and environmental consequences.

11. The Government's recent and growing awareness of the need to improve sectoral coordination and review policies and development priorities to ensure more sustainable natural resource use is encapsulated in the Western Development Strategy. In support of the strategy, the Government has requested ADB to help formulate the PRC-Global Environment Facility (GEF) Partnership to foster integrated ecosystem management in the western region.⁶ The PRC-GEF Partnership will describe necessary policy, legislative, and institutional reforms to create an enabling environment, and introduce an integrated, participatory, and cross-sectoral approach to counter the root causes of land degradation. In support of such national initiatives, the proposed TA will assess the constraints to better land-use management in Gansu and thereby develop provincial integrated ecosystem management approaches. The TA will thus help develop an integrated and holistic approach to environmentally sustainable management of natural resources, incorporating safeguards to help the poor make the transition to alternative livelihoods.

III. THE TECHNICAL ASSISTANCE

A. Objective

12. The TA's goal is to optimize initiatives to combat desertification in Gansu. The TA's objective is to help the Gansu provincial government develop policies and supporting strategies and projects to improve natural resource management and foster sustainable development by controlling and preventing desertification and enhancing oasis ecosystems in the Hexi Corridor. The TA aims to ensure that such policies and strategies will encompass the range of conditions in desertified areas as to generally apply to the entire Hexi Corridor. The TA framework is in Appendix 1.

B. Scope

13. The TA's scope includes preparing (i) a review of available data covering (a) socioeconomic indicators; (b) desertification-control technology from Gansu and other provinces; (c) annual and five-year plans related to poverty reduction, desertification-control, agriculture, forestry, water-resource and land use, rangeland and livestock management, and watershed conservation; (d) environmental regulations and habitat conservation and monitoring practices; and (e) the legal, institutional, and regulatory frameworks for resource management; (ii) reconnaissance surveys of the Shule, Hei, and Shiyang basins in the Hexi Corridor to (a) identify their common features and (b) prepare inventories of their significant characteristics (landforms, vegetation, water-resource status, biodiversity status, environmental conditions, socioeconomic and sociocultural aspects, soil-nutrient status, agricultural systems, and current practices in the use of natural resources); (iii) a detailed study of a selected priority river basin to assess the impacts of various policies and development plans, programs, and projects on the environment and communities; (iv) a geographic information system (GIS) based on satellite images to help delineate areas of pressure on resources; (v) strategies to improve social development, land-use planning, water-resource and agricultural management, and

⁶ TA 3657-PRC: *PRC-GEF Partnership on Land Degradation in Dryland Ecosystems*, for \$1,150,000, approved on 25 May 2001, is the second phase of preparation of the Partnership begun under TA 3497-PRC: *GEF Partnership on Land Degradation in Dryland Ecosystems*, for \$100,000, approved on 5 September 2000. Another recent ADB initiative is TA 3548-PRC: *Preparing National Strategies for Soil and Water Conservation*, for \$800,000, approved on 20 November 2000. This TA will help the Ministry of Water Resources develop a strategic approach for national soil and water conservation programs. TA 5941-REG: *Combating Desertification in Asia*, for \$450,000, approved on 29 September 2000, also provides limited assistance to the development of the partnership.

desertification control; (vi) recommendations to revise policies and strategies and implement institutional reforms to support cross-sectoral natural resource management; and (vii) proposals for increased community participation in resource management supported by provision of basic services and assured income for people whose livelihoods are likely to be adversely affected by changes in land-use policies and strategies.

14. Workshop participants, including all stakeholders, agencies, and community representatives, will be invited to discuss and refine the recommendations, which will then be compiled to demonstrate an integrated ecosystem management approach applied to a whole river basin.

15. Selected provincial and national staff will go on a study tour of desertification control to be conducted in an ADB member country with arid climatic conditions similar to those of the Hexi Corridor. The study tour will demonstrate the successful application of desertification-control programs and related strategies to (i) reestablish vegetation on degraded land, (ii) enhance biodiversity, (iii) increase the efficiency of water use in irrigated and rainfed agriculture, (iv) develop sustainable livestock enterprises, and (v) improve the profitability of rural livelihoods.

C. Cost Estimates and Financing Plan

16. The total cost of the TA is estimated at \$765,000, of which \$450,000 will be in foreign exchange and \$315,000 equivalent in local currency. ADB will finance \$610,000 equivalent to cover the entire foreign exchange cost of \$450,000 and \$160,000 equivalent of the local currency cost. The TA will be financed by ADB on a grant basis from the Japan Special Fund, funded by the Government of Japan. The Gansu provincial government will contribute the balance of the local currency cost of \$155,000 equivalent. This will include costs of (i) office accommodation and transport; (ii) remuneration and per diem of counterpart staff; and (iii) surveys and investigations to be carried out by domestic consultants, workshops, and local support staff. A detailed cost estimate and financing plan is in Appendix 2.

D. Implementation Arrangements

17. The TA will be implemented in two phases of three months each, with an expected completion date of end-February 2002. The Executing Agency will be the Gansu Provincial Finance Bureau, which will ensure financial support for the TA and coordinate the participation of relevant provincial agencies. The technical aspects of TA implementation will be the responsibility of the Gansu Provincial Department of Forestry, which will establish a project management office (PMO) in the Department of Forestry in Lanzhou. The Department of Forestry will also chair the Technical Leading Group, comprising senior representatives of the provincial Planning Commission, Forestry Department, and bureaus of finance, agriculture, water conservancy, poverty reduction, and environmental protection.

18. The TA will be implemented by the relevant agencies, but most field work will be the responsibility of the Department of Forestry through GDCRI at Wuwei, with support from GDMC. Reference will be made to CAREERI in Lanzhou for data and technical support. The Bureau of Water Conservation is expected to play an important role in conducting water-balance studies and in formulating recommendations related to irrigation methods and water allocation and pricing policies. The Provincial Planning Commission will help coordinate the participation of relevant agencies and ensure that suitably qualified and experienced counterpart staff are appointed to work with the consultants.

19. The TA will include 22.75 person-months of domestic consulting and 15 person-months of international consulting. Consultants will work under the guidance and supervision of PMO and will be recruited in accordance with ADB's *Guidelines on the Use of Consultants* and other arrangements satisfactory to ADB for the engagement of domestic consultants.⁷ The international consultants will have expertise in (i) arid-zone forest ecology, biodiversity conservation, and protected-area management, 5 person-months; (ii) water-resource planning, 3.5; (iii) rural sociology, 3.5; (iv) agricultural economics, 2; and (v) natural resource policy analysis, 1. The domestic consultants will have expertise in (i) arid-zone forestry, 4.75 person-months; (ii) land-use assessment, 3; (iii) design and installation of GIS, 3; (iv) water-resource planning, 3.25; (v) formulation of poverty reduction strategies, 3; (vi) analysis and design of farming systems, 2.25; (vii) rangeland management, 2; and (viii) legal and institutional aspects of land-use planning, 1.5. Outline terms of reference for consulting services and an indicative schedule for the consultant inputs and key milestones are in Appendix 3.

20. Equipment and software to be used during the TA will be procured by the consultants in accordance with procedures acceptable to ADB.

21. The Gansu Provincial Finance Bureau will finance surveys and investigations conducted by local design institutes, universities, or other suitable organizations acceptable to ADB. The surveys and investigations will examine (i) socioeconomic and poverty characteristics (including an analysis of the links of poverty with land degradation); (ii) farming systems (including farmer attitudes and preferences, and community awareness of desertification); and (iii) status of surface and groundwater resources. The consultants will prepare terms of reference for and supervise implementation of the surveys and investigations.

IV. THE PRESIDENT'S DECISION

22. The President, acting under the authority delegated by 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 \$610,000 for the purpose of Optimizing Initiatives to Combat Desertification in Gansu Province, and hereby reports such action to the Board.

⁷ The methodology and terms of reference for the consulting services are specific and clearly identified. Hence, ADB's procedures for simplified technical proposal will be used to select the consultants (*Project Administration Instructions*, 3.01, paras. 41-42, 1 July 1996).

TECHNICAL ASSISTANCE FRAMEWORK

Design Summary	Performance Targets and Indicators	Monitoring Mechanisms	Assumptions and Risks
<p>Goal</p> <p>Optimize initiatives to combat desertification in Gansu Province.</p>	<ul style="list-style-type: none"> • Full integration of policies and supporting strategies to control and prevent desertification and enhance oasis ecosystems into programs for natural resource management and sustainable development 	<ul style="list-style-type: none"> • Provincial and district government annual work plans • Asian Development Bank (ADB) review and country programming missions 	<ul style="list-style-type: none"> • The provincial government fully participates in and supports the technical assistance (TA). • All parties reach a consensus on the TA recommendations with respect to necessary policy, legislative, and institutional changes.
<p>Objective</p> <p>Help the provincial government develop rational policies and supporting strategies to improve natural resource management and sustainable development, emphasizing control and prevention of desertification and the enhancement of oasis ecosystems in the Hexi Corridor</p>	<ul style="list-style-type: none"> • Formulation of recommendations to revise policies and strategies affecting the management of natural resources in areas susceptible to desertification • Formulation of recommendations to implement institutional reforms to support cross-sectoral planning, design, implementation, and management of projects based on sustainable use of natural resources • Formulation of recommendations to ensure basic services and ensure adequate income for people whose livelihood could be adversely affected by changes in land-use policies and strategies 	<ul style="list-style-type: none"> • Final workshop • Draft final and final report • ADB review missions 	<ul style="list-style-type: none"> • The provincial government commits adequate funds for TA implementation. • Provincial government departments coordinate with each other to implement the TA. • All necessary data are made available to the TA team in a timely manner. • The provincial government is willing to discuss critical policy issues. • Suitable senior staff are available as counterparts and participate in the workshops and study tour.
<p>Components and Outputs</p>			
<p>Project management</p>	<ul style="list-style-type: none"> • Domestic and international consultants recruited and established at project offices in Lanzhou and Wuwei (two weeks of completion of contract negotiations) • Related studies by design institutes organized and implemented (within 2.5 months of consultant mobilization) 	<ul style="list-style-type: none"> • Inception report • ADB review missions • Study tour report by participants • Midterm and final reports 	<ul style="list-style-type: none"> • Relevant provincial government agencies cooperate in TA implementation. • The leading group and project management office guide the consultants. • All problems and potential delays are resolved quickly through consultation among the

Design Summary	Performance Targets and Indicators	Monitoring Mechanisms	Assumptions and Risks
	<ul style="list-style-type: none"> Midterm and final workshops organized and conducted (2.5 and 3.5 months from consultant mobilization) 		parties.
	<ul style="list-style-type: none"> Midterm and final reports prepared and accepted by the provincial government, central government, and ADB (draft reports submitted to ADB before the end of the third and fifth months) 	<ul style="list-style-type: none"> ADB review missions 	<ul style="list-style-type: none"> All parties reach a consensus on the TA recommendations with respect to necessary policy, legislative, and institutional changes.
Reconnaissance and detailed surveys	<ul style="list-style-type: none"> Identification and assessment, in terms of relevance to desertification, of the characteristics of the Shiyang, Hei, and Shule river basins in the Hexi Corridor, including landforms, vegetation, water-resource status, biodiversity status, environmental conditions, socioeconomic and sociocultural aspects, soil-nutrient status, agricultural systems, and current practices regarding use of natural resources (before the inception mission at the end of the second month) Selection of a priority river basin for detailed study (during the inception mission at the end of the second month) Completion of the detailed study of the priority river basin and a description of the impacts of various policies and development approaches on the environment and on the well-being of rural communities (before the midterm review mission at the end of the third month) Presentation of maps of the area, with geographic information system overlays to illustrate areas of pressure on resources, (before the midterm review mission at the end of the third month) Holding of the midterm 	<ul style="list-style-type: none"> ADB review missions Midterm Report 	<ul style="list-style-type: none"> All relevant levels of government participate and cooperate in the surveys. Design institutes provide staff of adequate quality. Work is completed on time. Budgets are adequate. Transport is adequate.

Design Summary	Performance Targets and Indicators	Monitoring Mechanisms	Assumptions and Risks
	workshop to present results and reach a consensus on strategies (before the midterm review mission at the end of the third month)		
Formulation of policy and strategy recommendations	<ul style="list-style-type: none"> • Completion of a study tour to demonstrate the successful application of desertification- control programs and related strategies (within the fourth month) • Review of existing laws and institutional arrangements, formulation of ways to eliminate perverse incentives, and submission of proposals to improve policy and program coordination among the relevant provincial agencies (before the end of the fourth month) • Formulation of recommendations to improve policies on desert fringe and rangeland management, forest protection, and watershed rehabilitation; and identification of alternative sources of income for adversely affected families (before the end of the fourth month) • Formulation of recommendations to ensure the long-term sustainable management of surface- and groundwater resources formulated (before the end of the fourth month) • Formulation of recommendations to improve policies on social safety nets, including basic services and strategies to allow adjustment of farming practices for people whose livelihood could be adversely affected (before the end of the fourth month) • Holding of a workshop to 	<ul style="list-style-type: none"> • ADB review missions • Team coordination meetings • Results of the workshops • Draft final report • Final report (incorporating comments from the final tripartite meeting) 	<ul style="list-style-type: none"> • The study tour includes persons actively involved in decision making on combating desertification. • The leading group assures adequate participation of relevant departments. • The provincial government is open to discussion of policy and legislation. • Communities support policy and strategy changes.

Design Summary	Performance Targets and Indicators	Monitoring Mechanisms	Assumptions and Risks
	<p>discuss and refine the recommendations for (i) revision of policies and strategies affecting the management of natural resource, (ii) institutional reforms to support cross-sectoral management of projects for sustainable use of natural resources, and (iii) increased community participation in resource management supported by means of ensuring adequate income for people whose livelihoods are likely to be adversely affected (before the end of the fourth month)</p> <ul style="list-style-type: none"> • Formulation of agreed recommendations to demonstrate an integrated ecosystem management approach compiled into the draft final report (by the middle of the fifth month) • Holding of a final tripartite review meeting (before the end of the fifth month). • Submission of the final report, incorporating the Government's and ADB's comments (before the end of the sixth month) 		
Inputs	Costs		
Consultants Report and communications Equipment Administration Study tour Contingencies Office accommodation and transport Counterpart staff Surveys and investigations Workshops Local staff Government representatives at contract negotiations Total TA Costs	\$451,000 \$9,000 \$30,000 \$10,000 \$31,000 \$74,000 \$25,000 \$25,000 \$55,000 \$25,000 \$25,000 \$5,000 \$765,000		

COST ESTIMATES AND FINANCING PLAN
(\$'000)

Item	Foreign Exchange	Local Currency	Total Cost
A. Asian Development Bank Financing (Japan Special Fund)			
1. Consultants			
a. Remuneration and Per Diem			
i. International Consultants	300	0	300
ii. Domestic Consultants	0	120	120
b. International and Local Travel	25	6	31
c. Reports and Communications	4	5	9
2. Equipment and Software ^a	29	1	30
3. Miscellaneous Administration and Support Costs ^b	0	10	10
4. Study Tour	31	0	31
5. Representative for Contract Negotiations ^c	5	0	5
6. Contingencies	56	18	74
Subtotal (A)	450	160	610
B. Government Financing			
1. Office Accommodation and Road Transport ^d	0	25	25
2. Remuneration and Per Diem of Counterpart Staff	0	25	25
3. Surveys and Investigations			
a. Socioeconomic and Poverty Survey	0	20	20
b. Water Resources Survey	0	20	20
c. Farming Systems Survey	0	15	15
4. Workshops	0	25	25
5. Local Support Staff Paid Directly by the Executing Agency ^e	0	25	25
Subtotal (B)	0	155	155
TOTAL	450	315	765

a Includes desktop computers and printers, photocopier, fax machine, satellite images, and geographic information software.

b Includes office supplies and miscellaneous data purchase costs.

c Includes the cost of travel and per diem for a government observer and translator invited for contract negotiations.

d Includes the cost of supplying and furnishing suitable office space (with services) in Lanzhou and Wuwei, and the cost of four-wheel-drive vehicles (with all operating costs) as needed for all local travel.

e Includes translation and interpretation services, and cost of project management office support staff.

Source: Staff estimates.

OUTLINE TERMS OF REFERENCE FOR CONSULTANTS

A. Introduction

1. The technical assistance (TA) will be implemented in two phases by a team of international and domestic consultants, recruited by the Asian Development Bank (ADB), working in close consultation with agencies of the Gansu provincial government. Phase 1 (three months) will cover surveys of conditions in the Shule, Hei, and Shiyang river basins in the Hexi Corridor of Gansu Province, and more detailed studies in one of these river basins selected as a priority area.¹ A tripartite meeting will be held toward the end of the second month of TA implementation to (i) review the consultants' initial findings; (ii) select the priority river basin for detailed study; and (iii) revise the terms of reference and work plan, if necessary. Another tripartite meeting will be held at the end of Phase 1 to review the consultants' findings and the recommendations derived from the workshop on proposed strategies.

2. Phase 2 (three months in the field) will develop recommendations to improve policies, strategies, institutional reform, and appropriate legislative support based on (i) analysis of conditions in the priority river basin, (ii) comparison of the priority river basin with other river basins in the Hexi Corridor, and (iii) recommendations from the workshops on proposed policy changes. A final tripartite meeting will be held during the fifth month, after submission of the draft final report. The report will then be finalized at the consultants' home office after receipt of the provincial government's and ADB's comments.

3. Input from stakeholders and workshops will be used to (i) prepare strategies, (ii) draw up complementary resource-management plans, and (iii) build community consensus on proposed policy and legislative changes. The proposed strategies will encompass biodiversity conservation as well as sustainable use of natural resources. To link with other similar initiatives, including aid-assisted projects, and to ensure that the recommendations complement the broader agenda of the Convention to Combat Desertification, the TA will invite the China National Committee for the Implementation of the Convention to Combat Desertification (CCICCD), through its secretariat in the State Forestry Administration, to participate in tripartite discussions and workshops.

B. Phase 1: Reconnaissance and Detailed Surveys

1. Initial Activities

4. The consultants will review available data (para. 13 of the main text of this paper), as well as (i) household poverty index, including (a) data on sources of employment outside the project area, (b) data on existing education programs, and (c) social survey data; and (ii) the findings of the United Nations Development Programme project (No. CPR/91/111) for *Gansu Integrated Desert Control and Sustainable Agriculture* (1995-97), and the results of relevant projects in other parts of the People's Republic of China (PRC).

¹ Reference will be made to the findings and recommendations of ADB's TA 2817-PRC: *Strategic Options for the Water Sector*; TA 3069-PRC: *Soil and Water Conservation in the Upper Yangtze River Basin*; TA 3123-PRC: *Provincial Legislation on Environmental Protection and Natural Resources Conservation*; TA 3139-PRC: *Policies and Strategies for Sustainable Development of the Lancang River Basin*; and TA 3259-PRC: *Yellow River Flood Management Sector Project*, TA 3657-PRC: *PRC-GEF Partnership on Land Degradation in Dryland Ecosystems*.

5. The consultants will review the province's policies for land, water, and overall environmental management, and poverty reduction strategy. The consultants will use rapid appraisal techniques during initial site visits to help design surveys of poverty, agricultural systems, and water resources, to be financed by the provincial government (see para. 8).

2. Reconnaissance Survey of the Shiyang, Shule, and Hei River Basins

6. The consultants will form three teams and conduct reconnaissance surveys in the Shule, Hei, and Shiyang river basins in the Hexi Corridor as described in para. 13 of the main text of this paper. The surveys will include inspections of representative areas of the desert fringe, oasis, rangeland, and watershed forestry systems. The teams will identify a river basin for more detailed study based on such criteria as (i) national sustainable-development objectives, (ii) land degradation status and trends, (iii) global environment significance, (iv) potential for poverty reduction and economic development, and (v) opportunity to develop potentially replicable responses for integrated ecosystem management.

7. The surveys will culminate in the preparation of an inception report describing the broad findings from the literature review, field inspections, and geographic information system analyses, and any recommended changes in the work plan based on these analyses. The report will also provide an overview of the methodology to be used for economic evaluation of possible environmental improvement initiatives (e.g., desertification control, forest planting) and for supporting improvements in irrigation, education, and infrastructure. The report will be reviewed at a tripartite meeting.

3. Detailed Study of a Selected Priority River Basin

8. A detailed study of a selected priority river basin will identify and describe the impacts of various policies and development approaches on the environment and on the well-being of communities deriving their income from herding, farming, and exploitation of natural resources, including land, water, forests, and biological resources. By adopting the whole river basin as the basic survey unit, the consultants will establish a model study to help the provincial government prioritize future investments and policy changes to combat desertification throughout the Hexi Corridor.

9. The consultants will prepare, in close consultation with the relevant agencies, terms of reference, specifications, and implementation schedules for surveys covering (i) socioeconomic and poverty characteristics, (ii) farming systems, and (iii) the status of surface- and groundwater resources. Although the surveys will be financed by the Gansu provincial government, the consultants will assist in their supervision. The socioeconomic and poverty survey will be conducted in accordance with ADB's *Guidelines for Incorporation of Social Dimensions in Bank Operations* (October 1993) and *Handbook for Poverty and Social Analysis* (Social Development Division, Office of the Environment and Social Development [SOCD] draft 2001). Reference will also be made to ADB's *Poverty Reduction Strategy: Fighting Poverty in Asia and the Pacific* (October 1999).

10. Giving particular attention to possible relationships between poverty and desertification, the consultants will analyze the results of the social surveys and prepare an initial social assessment. Poverty data will be supplemented by rapid rural appraisals and analyzed in accordance with ADB's *Handbook for Integrating Poverty Impacts in Economic Analysis* (SOCD draft 2001). The procedures for conducting rapid rural appraisals are described in ADB's *Handbook for Incorporation of Social Dimensions in Projects* (May 1994). The consultants will

formulate strategies for social improvement (in education, gender issues, work opportunities) and poverty reduction, and document the extent of local and provincial unemployment and underemployment, compared with work opportunities outside agriculture.

11. The consultants will (i) study the ecology of desert fringe, oasis, rangeland, and watershed forestry systems in terms of their major representative landforms and vegetation systems; (ii) identify the reasons for successional change in natural vegetation systems in relation to constraints imposed by management, water, soil, climate, and other factors; (iii) develop strategies for (a) small-watershed conservation, (b) oasis protection by expanding windbreak areas, (c) sustainable management of grasslands within their ecological limits, and (d) desert-fringe stabilization; (iv) assess the carbon sequestration potential of rangeland; and (v) analyze agricultural and livestock practices (and assess carrying capacity) based on the farming-systems survey.

12. The consultants will (i) determine the overall water balance, including consumptive and nonproductive uses (with particular attention to losses), from the results of the survey of water-resource status in the river basin; (ii) closely examine groundwater dynamics and means of stabilizing groundwater consumption in line with recharge rates; and (iii) prepare scenarios with and without interventions to reduce groundwater use.

13. The consultants will (i) study the economics of existing enterprises in agriculture, forestry, herding, and town and village agroprocessing and light industry; (ii) incorporate the findings of the farming-system survey to develop strategies for enhancing livelihood opportunities; (iii) suggest improvements reflecting returns per cubic meter of water used; and (iv) conduct parallel studies of appropriate prices for inputs (particularly water) and outputs, using border prices in line with the PRC's move to a market economy.

14. The consultants will (i) study existing land uses and environmental impacts; (ii) identify unsustainable land uses, waste disposal, and habitat destruction in the river basin; and (iii) develop a strategy to improve land use, based on a holistic approach to management of water, land, human, and livestock resources, to promote sustainable production systems. The strategy should (i) determine if irrigated areas need to be reduced, and (ii) recommend means of maintaining production and rural incomes.

15. Consultants will (i) prepare maps of the area, with GIS overlays to illustrate areas of pressure on resources; (ii) present strategies to improve social development, land-use planning, water-resource and agricultural management, and desertification control at a workshop toward the end of Phase 1; and (ii) submit after the workshop a midterm report describing strategies and a resource-management plan agreed upon by all parties. Phase 1 will conclude with technical discussions and a midterm tripartite review meeting in Beijing.

C. Phase 2: Formulation of Policy and Strategy Recommendations

16. At the end of Phase 1, selected provincial and national representatives will join a study tour to examine desertification control in an ADB member country with arid climatic conditions similar to those of the Hexi Corridor. The study tour site will demonstrate successful desertification-control programs and appropriate strategies to (i) reestablish vegetation on degraded land, (ii) enhance biodiversity, (iii) increase the efficiency of water use in irrigated and rainfed agriculture, (iv) develop sustainable livestock enterprises on rangeland, and (v) improve the profitability of rural livelihoods. The study tour participants will provide a short report on the

relevance of the observed resource-management strategies, and will help the consultants develop recommendations for policy reform.

1. Recommendations for Legislative and Institutional Reforms

17. The consultants will (i) determine the effectiveness of structures for, and official and community-based laws on natural resource management in Gansu; (ii) formulate ways of eliminating perverse incentives; (iii) give special consideration to laws having direct and indirect impacts on the livelihood and employment opportunities of the poor; and (iv) identify alternative income sources and support (e.g., cash cropping in place of grain, outside work, women's employment opportunities, and family assistance).

18. The consultants will (i) examine the extent to which cross-sectoral coordination for planning and implementing different agencies' programs is encouraged and practiced in Gansu; (ii) assess the provincial-level arrangements for implementing the 10th five-year plans of the ministries of agriculture and water resources, and of the state administrations of forestry and environmental protection, and (iii) propose measures to improve policy and program coordination.

2. Recommendations for Improved Forestry, Rangeland, and Desert Management Policies

19. The consultants will formulate recommendations to improve policies related to (i) desert fringe and rangeland management, (ii) forest and rangeland protection, and (iii) watershed rehabilitation. The consultants will give consideration to creating (i) incentives for sustainable land use, (ii) appropriate land-use controls, (iii) alternative sources of income for families dependent on herding and agriculture in desert fringes, (iv) improved land tenure arrangements, and (v) reconversion of marginally profitable agricultural land to grassland and forest. The recommendations will (i) take account of overall resource constraints, (ii) focus and direct investment through measures that will improve natural resource management, and (iii) provide income for local communities. Ecological and productive investments should be balanced.

3. Recommendations for Improved Water Resource Management Policies

20. The consultants will (i) formulate recommendations to ensure the long-term sustainable management of surface and groundwater resources; (ii) give consideration to (a) designation of special water rights to meet basic human needs and maintain base flows for reforestation and ecological improvement, (b) water pricing to reflect the real cost of irrigation and other commercial use, (c) principles for determining rational allocations to industry and agriculture, (d) recycling of water, (e) selection of crops suited to the climate of the priority river basin and which give higher returns for any given water allocation, and (f) improved enforcement of pollution controls and polluter-pays principles; and (iii) describe techniques for improving water-use efficiency (especially for irrigated agriculture), and assess their potential for application in the priority river basin.

21. Recommendations should reflect not only existing agricultural practices, but also those that may be possible under a free-market system following the PRC's accession to the World Trade Organization. Farm models should maximize incomes to counter the effect of increased water charges, by maintaining a balance of grain, livestock, and horticulture, for example.

4. Recommendations for Improved Socioeconomic and Poverty Reduction Policies

22. The consultants will recommend improved policies to create social safety nets for people whose livelihood could be adversely affected by more sustainable land use. The social safety nets include education support (particularly for women) and provision of basic services and health care to maximize labor productivity. Recommended strategies will give farming practices time to adjust to policy changes. The consultants will describe the extent of and potential for increased community consultation and participation in resource management, and the possibility of food-for-work programs replacing during periods of adjustment. The consultants will assess the effectiveness of existing poverty reduction programs and the potential use of microfinance as an alternative to cash subsidies.

5. Finalization and Consolidation of Recommendations

23. A workshop will be conducted so that representatives of all relevant agencies (including CCICCD) and community representatives from the priority river basin can help the consultants discuss and refine the recommendations for (i) revision of policies and strategies affecting the use and management of natural resources; (ii) institutional reforms to support cross-sectoral planning, design, implementation, and management of projects based on sustainable use of natural resources; and (iii) increased community participation in resource management supported by provision of basic services and means of ensuring adequate incomes for people whose livelihoods are likely to be adversely affected. Agreed-upon recommendations will be compiled into a provincial-level response demonstrating an integrated ecosystem management approach applied to a whole river basin.

D. Reporting

24. The consultants will submit four reports. The inception report, to be submitted within 1.75 months of commencement of the TA, will present the initial findings, recommendations relating to the priority river basin, and , if necessary, an updated work plan reflecting specific issues. The midterm report, to be submitted toward the end of Phase 1, will describe the results of the detailed surveys and the proposed strategies for improved control and prevention of desertification. The draft final report, to be submitted after 4.5 months, will reflect the outcome of the workshop and describe the full set of recommendations for improved policies, strategies, institutional reform, legislative support, and provision of social safety nets. The final report will incorporate the results of the final tripartite meeting and be submitted after 5.75 months. All reports will be translated into Chinese.

