Document of
The World Bank

Report No: 25703-CHA

GEF PROJECT DOCUMENT

ON A

PROPOSED LOAN

IN THE AMOUNT OF US$66.27 MILLION

AND A

GRANT FROM THE

GLOBAL ENVIRONMENT FACILITY TRUST FUND

IN THE AMOUNT OF US$10.5 MILLION

TO THE

PEOPLE'S REPUBLIC OF CHINA

FOR A

GANSU AND XINJIANG PASTORAL DEVELOPMENT PROJECT

July 17, 2003

Rural Development and Natural Resources
East Asia and Pacific Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective used for cost calculations)

Currency Unit = Renminbi (RMB) Yuan (CNY)
RMB 1 = US$0.12
US$1 = RMB 8.3

FISCAL YEAR

January 1 -- December 31

ABBREVIATIONS AND ACRONYMS

ABC	Agricultural Bank of China
ACIAR	Australian Center for International Agricultural Research
ADB	Asian Development Bank
ADP	Agricultural Development Project
AI	Artificial Insemination
AusAid	Australian Agency for International Development
BD	Bidding Documents
BPM	Beneficiaries Participation Manual
CAS	Country Assistance Strategy
CBD	Convention on Biological Diversity
CCD	Convention to Combat Desertification
CFAA	Country Financial Accountability Assessment
CIF	Cost-Insurance-Freight
CNAO	China National Audit Office
COP	Conference of the Parties
CRAES	Chinese Research Academy of Environmental Sciences
DC	Direct Contracting
DDM	Digestible Dry Matter
DHI	Dairy Herd Improvement
EIA	Environment Impact Assessment
EMP	Environmental Management Plan
ERR	Economic Rate of Return
FA	Force Account
FCCC	Framework Convention on Climate Change
FECC	Foreign Economic Cooperation Center
FRR	Financial Rate of Return
GDP	Gross Domestic Product
GEF	Global Environmental Facility
GHG	Greenhouse Gas Emissions
GOC	Government of China
GP	General Practice
ha	hectare
ICB	International Competitive Bidding
MBD	Model Bidding Documents
MEGDS	Multi-Ethnic Group Development Strategy
MEIRO	Machinery&Electric Prod. Import Review Office
MIS	Management Information System
MOA	Ministry of Agriculture
MOC	Ministry of Commerce
MOF	Ministry of Finance
MOST	Ministry of Science and Technology
mu	Chinese area measurement, 1 mu=0.07 ha. 1 ha=15 mu
NBF	Non-Bank Financing
NCB	National Competitive Bidding
NEAP	National Environmental Action Plan
NPV	Net Present Value
NDRC	National Development and Reform Committee
NS	National Shopping
OD	Operational Directive
OP	Operational Program
OPR	Operational Procurement Review
PBC	People's Bank of China
PHRD	Policy and Human Resources Development
PIM	Project Implementation Manual
PLG	Project Leading Group
PMM	Procurement Management Manual
PPMO	Provincial Project Management Office
PRA	Participatory Rural Appraisal
PRC	People's Republic of China
RCC	Rural Credit Cooperatives
RPMO	Regional Project Management Office
SA	Social Assessment
SAR	Staff Appraisal Report
SCNPC	Standing Committee of National People's Council
SEPA	State Environmental Protection Agency
STAP	Scientific and Technical Advisory Panel
SW	Small Works
TA	Technical Assistance
TAG	Technical Advisory Group
TOR	Terms of Reference
UN	United Nations
UNDP	United National Development Program
USDA-ARS	United States Department of Agriculture - Agricultural Research Services
WBI	World Bank Institute
WTO	World Trade Organization
WWF	World Wide Fund for Nature

Vice President:	Jemal-ud-din Kassum
Country Director:	Yukon Huang
Sector Director:	Mark D. Wilson
Task Team Leader:	Sari Söderström

CHINA
GANSU AND XINJIANG PASTORAL DEVELOPMENT PROJECT

CONTENTS

MAP(S)
IBRD 32098, IBRD 32099, IBRD 32136, IBRD 32137

CHINA
Gansu and Xinjiang Pastoral Development Project

GEF Project Document

East Asia and Pacific Region
EASRD

Date: October 21, 2002 **Sector Manager/Director:** Mark D. Wilson **Country Manager/Director:** Yukon Huang **Project ID:** P065035 **Lending Instrument:** Specific Investment Loan (SIL)	**Team Leader:** Sari K. Soderstrom **Sector(s):** Animal production (50%), Agricultural marketing and trade (25%), Agricultural extension and research (25%) **Theme(s):** Land management (P), Other environment and natural resources management (P), Rural markets (P)
Global Supplemental ID: P077615 **Sector Manager/Director:** Mark D. Wilson **Lending Instrument:** Specific Investment Loan (SIL) **Focal Area:** G **Supplement Fully Blended?** Yes	**Team Leader:** Sari K. Soderstrom **Sector(s):** General agriculture, fishing and forestry sector (60%), Agricultural extension and research (40%) **Theme(s):** Other environment and natural resources management (P) , Biodiversity (P), Land management (P), Other rural development (P), Climate change (S)

Project Financing Data

[X] Loan **[ ] Credit** **[X] Grant** **[ ] Guarantee** **[ ] Other:**

For Loans/Credits/Others:

Amount (US$m): Loan 66.27, Grant 10.5

Borrower Rationale for Choice of Loan Terms Available on File: ☐ **Yes**

Proposed Terms (IBRD): Variable-Spread Loan (VSL)

Front end fee (FEF) on Bank loan: 1.00%

Financing Plan (US$m): Source	Local	Foreign	Total
BORROWER/RECIPIENT	34.82	0.00	34.82
IBRD	45.52	20.75	66.27
GLOBAL ENVIRONMENT FACILITY	8.40	2.10	10.50
Total:	88.74	22.85	111.59

Borrower/Recipient: PRC
People's Republic of China

Responsible agency: GANSU PROVINCE, XINJIANG AUTONOMOUS REGION
Ministry of Agriculture - Foreign Economic Cooperation Center - Livestock and Fisheries Project Division
Contact Person: Mr. Tang Zhishao
Tel: + 86 10 650 032 73 Fax: + 86 10 641 945 78 Email: Zstang@95777.Com
Other Agency(ies):
Agriculture and Animal Husbandry Department, Gansu Province
Address: 1 Qing'an Lu, Lanzhou, China, 730030
Contact Person: Mr. Li Guolin
Tel: + 86 931 845 2377 Fax: + 86 931 882 6287 Email: guoll@public.lz.gs.cn
Animal Husbandry Deparment, Xinjiang Uygur Autonomous Region
Address: 23 Xinhua Nan Lu, Urumqi, China, 830001
Contact Person: Mr. Salajidin, Mr. Wang Wanlin
Tel: + 86 991 856 8501 Fax: + 86 991 856 5120 Email: wzxmb@mail.xj.cninfo.net

P065035 Estimated Disbursements (Bank FY/US$m):									
FY	2004	2005	2006	2007	2008	2009	2010		
Annual	7.79	13.84	15.67	13.30	9.85	4.86	0.96		
Cumulative	7.79	21.63	37.30	50.60	60.45	65.31	66.27		

P077615 (GEF) Estimated Disbursements (Bank FY/US$m):								
FY	2004	2005	2006	2007	2008	2009	2010	
Annual	1.20	2.10	2.60	2.00	1.30	0.80	0.50	
Cumulative	1.20	3.30	5.90	7.90	9.20	10.00	10.50	

Project implementation period: 6 years

Expected effectiveness date: 01/15/2004 **Expected closing date:** 06/30/2010

OPCS PAD Form: Rev. March, 2000

A. Project Development Objective

1. Project development objective: (see Annex 1)

Project Development Objective. The project development objective is to promote sustainable natural resource management by establishing improved livestock production and marketing systems that would increase the income of herders and farmers in the project areas.

The project would empower farmer and herder households in project areas to better manage their grassland resources and improve the forage and feed production on arable lands. More efficient and quality focused livestock production would increase the farmers and herders incomes and generate marketable surplus to improve living standards. Developing efficient livestock marketing systems in the project counties would also increase the efficiency of the whole livestock production system and contribute raising the living standards of farmers and herders.

2. Global objective: (see Annex 1)

Background (see also Annex 13). Grasslands cover about 40% (400 million ha) of China's land area, making China second only to Australia in the extent of its grassland resources. About 75% of China's grasslands (300 million ha) are found in the semi-arid pastoral areas in the north and west of the country. The majority of these grasslands are located in Gansu, Inner Mongolia, Qinghai, Tibet, and Xinjiang. Grasslands in the project areas have three global environmental values: (a) biodiversity; (b) carbon sink; and (d) international river catchment.

Global Environmental Objective. The global environmental objective of the project is to maintain and nurture natural grassland ecosystems to enhance global environmental benefits. More specifically, the project aims to mitigate land degradation, conserve globally important biodiversity, and enhance carbon sequestration, through promotion of integrated ecosystem management in the grassland, desert, and forest ecosystems of the Qilian Shan, Tian Shan, and Altai Shan mountain ranges in Western China. The global environmental objective would be achieved by implementing community based grassland management in selected project areas with high global biodiversity values; providing incremental investments for implementing grassland management plans; and carrying out monitoring of these grasslands' habitats.

3. Key performance indicators: (see Annex 1)

Achievement of the project and global objectives would be monitored by key performance indicators:

- Average net income of participating project townships compared with non-project townships;
- Rate of grassland degradation in project townships;
- Trends in condition of key threatened grassland ecosystems and habitats in project areas (trends in improvement in biodiversity conservation, indigenous plants and animals species inventories;
- Trend of carbon sequestration in project areas;
- Feed balance for livestock (quality, quantity, and seasonal distribution of feed supply);
- Productivity of livestock and livestock products;
- Quality of livestock products; and
- Ability and opportunities of farmers/herders to market their livestock and products.

B. Strategic Context

1. Sector-related Country Assistance Strategy (CAS) goal supported by the project: (see Annex 1)
Document number: 25141 **Date of latest CAS discussion:** 2002/12/19

Country Assistance Strategy. The project is consistent with the Bank's overall Country Assistance Strategy (CAS) to the rural sector in China - to sustain rural income growth, while maintaining the natural resource base and is included in the CAS as a key element of the business program. The CAS aims to assist local governments to accelerate commercialization of agriculture, develop new income generating opportunities in interior provinces, develop new approaches to food security, promote better utilization of agricultural production, marketing and distribution resources, and support investment in non-state sector enterprises. CAS objectives emphasize support for the development of integrated marketing systems for agricultural commodities in order to establish linkages from rural production areas to urban markets. The project is also consistent with the CAS poverty alleviation objectives, supporting investments in environmentally sustainable agricultural and livestock development in the poorest regions of western China, where the incidence of poverty is the highest.

Rural Strategy. In the rural sector, the focus of the Bank's overall assistance strategy to China is on the shift from subsistence production to commercial agriculture and from the quantity to the quality of production. The need of this shift in approach was emphasized in the joint China-Bank analysis of China's rural sector ("Accelerating China's Rural Transformation," World Bank, Albert J. Nyberg, August 1999). The analysis emphasizes the need of taking an integrated approach to rural development which includes improved land and water use, diversified agricultural production with modern technology, and efficient marketing systems.

The project concept is also in line with the three overarching goals of the Bank's rural development strategy as articulated in the "Rural Development: From Vision to Action," which are to: (i) enhance economic and social well-being of rural people; (ii) improve household food security; and (iii) ensure sustainable use of natural resources. The project will also promote the Bank's overall goal of poverty reduction under which China has been identified as one of the focal countries.

Environment Protection Strategy. As reflected in the CAS, protecting the environment is an overarching objective for support by the Bank. The project is also consistent with China's national "Biodiversity Conservation Action Plan" (1994) and China's "Biodiversity – A Country Study" (1998). The Action Plan identified the Tian Shan and Altai Shan regions in Xinjiang and the Qilian Shan in Gansu as priority ecosystems for conservation of biological diversity.

1a. Global Operational strategy/Program objective addressed by the project:

Global Operational Strategy. The project is consistent with three (biological diversity, climate change, and land degradation) of the six Global Environment Facility (GEF) focal areas (biological diversity, climate change, international waters, ozone layer depletion, land degradation, and persistent organic pollutants). China ratified the Convention on Biological Diversity (CBD) on 5 January 1993, the Convention to Combat Desertification (CCD) on 18 February 1997, and the United Nations (UN) Framework Convention on Climate Change (FCCC) in 1992. The project responds to Conference of the Parties (COP) to the CBD guidance in that it promotes capacity building, conservation and sustainable use of natural resources through adoptive management of grassland landscapes, and supports the objectives of international conventions. The project approach is in line with the Government of China's strategy for desertification control, prepared in-accordance with the UN-CCD.

Global Program Objective. The global program objective of the project is to maintain natural grassland ecosystems to enhance global environmental benefits, including biodiversity conservation, carbon sequestration and ecosystem services such as water flow through encouraging sustainable resource management approaches. The project takes an ecosystem approach to land management across natural grasslands in a primarily production landscape to promote sustainable use and combat land degradation. The project will pilot participatory, integrated ecosystem approaches to grassland management and pastoral development in globally significant areas for biodiversity corridors in the Tian Shan, Altai Shan and Qilian Shan mountains. It covers a wide range of grassland ecosystems across a full elevation gradient from cold alpine meadows to low-lying arid and semi-arid grasslands. Together these grassland habitats form an important network of production landscape systems, which support the existing transhumant pastoral systems.

The project is consistent with the GEF Operational Program (OP)12 "Integrated Ecosystem Management" in that it addresses cross-sectoral policies and land use practices to ensure better grassland management and to enhance protection of environmental services, including biodiversity conservation, carbon sequestration and watershed protection in the headwaters of international waterways.

The project's GEF investments will focus on sites and habitats recognized as threatened and globally significant for biodiversity. The investments will protect vulnerable grassland and montane habitats, thus contributing to conservation and sustainable use of Critical Montane Ecosystems (OP4). Implementing more sustainable management regimes across the whole production landscape and altitudinal gradient used by pastoralists will encourage sustainable use in lower lying semi-arid grasslands used as winter pastures, thus contributing to the objectives of OP1 "Arid and Semi-Arid Ecosystems." Several of the pilot grassland areas lie in remote mountain ranges along international boundaries, thus strengthening their management will contribute to transboundary conservation efforts as part of an ecoregion approach to conservation.

By building capacity for community management and grassland planning at the local level, the project will contribute to OP13 (Agro-Biodiversity) through sustainable agricultural production in a primarily natural landscape, building on traditional transhumant practices.

2. Main sector issues and Government strategy:

Background. Since the early 1980s, with the decollectivization of agriculture, China has achieved remarkable agricultural and rural growth, greatly reduced poverty and addressed many environmental and natural resource degradation problems. Further growth and improving its sustainability in the future however, will be more difficult as many of the potential gains from the transition reforms have been achieved. Furthermore, weak aggregate demand is also impacting rural areas where incomes have been affected by falling prices for farm products and stagnant growth in non-agricultural rural employment.

Future productivity gains in the agricultural sector will have to come from greater efficiencies in production, stimulated by market forces, and greater productivity of scarce natural resources through improved natural resource management and introduction of new technologies. Sustained agricultural development and rural economic growth will also require: (i) more dynamic and effective rural institutions and financial systems; (ii) improved land tenure with marketable land-use rights; (iii) improved incentives for investing in agricultural development, liberalization of production, pricing and marketing policies; (iv) promotion of a market environment; and (v) and better targeted investments in rural infrastructure and public services.

Rural Development. Despite the political and strategic importance of the region, rural economic growth in China's northwestern areas has not been very significant. Grassland degradation is a serious problem with almost 50% of the project areas moderately to severely degraded, hillsides being often especially badly degraded. Although China's semi-arid grasslands are not highly productive, the pastoral areas are the major base for the country's animal husbandry activities and provide a living for about 40 million people, mostly ethnic minorities, who are among the poorest people in China. Of the ethnic groups living in the pastoral area, the Mongols, Tibetan, Kazakh, Yugu, and Uygur are the largest groups. Poverty is pervasive in these areas. Xinjiang and Gansu together make up almost 15% of China's total poor where widespread poverty inhibits rural development as well as the capacity of the region to seize new economic opportunities. Stimulating growth in agricultural income, reducing poverty, and managing the environment are major development objectives in the project areas.

Complex, interactive problems related to the environment and use of natural resources, agricultural practices, and human population growth hinder sustainable development in the project areas. There has been a vicious cycle of increasing human population which has lead to pressures to convert grassland to cropland and to increase livestock stocking rates to maintain incomes. This has led to further grassland degradation, reducing the capacity of the pastoral areas to support biodiversity and livestock, and the human populations that rely on them. Yet, animal husbandry will remain the major source of livelihood and economic growth in much of northwest China in the foreseeable future, since there are major limitations on opportunities for non-farm employment. In order to be sustainable, livestock development will have to adopt an approach that views livestock production as just one important aspect of an overall, integrated natural resource management strategy for the pastoral areas, and that views efficient marketing of livestock and livestock products an important tool for sustainable growth.

Main Sector Issues. The key issues for sustainable development in the pastoral areas to be resolved are: (1) widespread rural poverty; (2) grassland degradation (loss of feed and biodiversity); (3) unsustainable livestock production practices, including feeding and breeding; (4) poor market development; (5) weak community participation; and (6) lack of integration in addressing the problems.

(1) Widespread Rural Poverty. Despite remarkable average agricultural Gross Domestic Product (GDP) growth rates of 5.2% for the last 20 years and a decline in the number of rural poor from about 260 million in 1978 to some 100 million as of 1998, poverty in China continues to be a serious problem with still about 106 million rural absolute poor. The majority of these poor are clustered in resource poor areas, and comprise entire communities located mostly in the mountainous areas of western China. Some of the poorest people are the ethnic minority herders and farmers of China's pastoral regions, who are struggling to eke out a living in a harsh environment where animal husbandry is one of the very few options of livelihood they have. The proportion of the rural population living below the poverty line in Xinjiang and Gansu is 27% and 23% respectively.

(2) Grassland Degradation. Grassland degradation results in a loss of productive capacity to produce forage for wildlife and domestic animals. It also reduces other grassland benefits, including: (a) biodiversity values, which have declined in terms of the number, variety, and range; (b) watershed protection; (c) carbon storage; and (d) air quality. The total area of degraded grassland in China increased by about 95% between 1989-1998, from about 65 million ha to 130 million ha, with a notable acceleration in the mid-to-late 1990s. It should be noted that Xinjiang and Gansu are experiencing grassland degradation levels well above the average for China. This grassland degradation is caused by a combination of natural factors (infestation by rodents and insects and changing climatic factors), and human factors such as inappropriate land use policies, inadequate grassland management, and over-harvesting of grassland products. The human-induced factors are exacerbating: (i) overall poor understanding of the functioning and resilience of ecosystems; (ii) lack of awareness of various levels of government officials to the medium and long-term environmental impact of interventions and

government policies; (iii) contradicting policies among various line agencies which affect the sustainable utilization of the natural resource base; (iv) deep-rooted resource exploitation patterns by local communities; and (v) and increasing population pressure and high levels of poverty, placing increasing pressure on marginal areas.

Currently, a coherent strategy for developing the pastoral areas and for addressing grassland degradation to attain more integrated and sustainable development is lacking. While rehabilitation of degraded grasslands has now gained national attention, the focus of mitigation programs is almost entirely on investment in "technical fixes" with little attention paid to the underlying social and policy issues that are at the heart of the grassland degradation problem. Furthermore, the development planning is still mainly "top-down" with little active participation of the farmers and herders. As a result, grassland management and forage improvement technologies remain inadequate, animal productivity remains low, and grasslands continue to deteriorate. New approaches to tackling the various problems are required.

(3) Unsustainable Livestock Production Practices. The sub-optimal animal husbandry practices are major factors for the degradation of grasslands in the project areas. Most grasslands are overstocked and suffer from poor grazing management practices, especially in the winter and spring/early summer, which impede the growth of vegetation. In Xinjiang, total sheep equivalents (1 sheep equivalent = 1/5 of one cow) increased from 20 million to nearly 50 million between 1949 and 1985. In the same period, the total cultivated area increased from 1.28 million ha to 4.67 million ha, resulting in large losses of grassland. Grassland productivity has fallen by 30% since the 1960s.

Livestock production is constrained by inadequate supplemental forage and feed to maintain stock during the lean winter and spring seasons. Reproductive rates are low; there is substantial weight loss over the winter which must be regained each spring and summer, and animals are marketed for meat at an advanced age at low prices. For fine-wool sheep, poor nutrition over winter also results in poor quality wool and high levels of mortality for lambs. Poorly defined breeding goals also affect livestock production sustainability in both fine wool and mutton sheep. During the commune period in Xinjiang (1958 to 1984), collectives and State Farms were required to breed fine wool sheep, and the number of such sheep increased sharply. However, once herders were allowed to diversify in the early 1980s, they switched to the hardier local sheep, more adapted to local environmental conditions. Herders have also moved from fine wool production into the currently more profitable meat production. Consequently, China's fine wool sheep numbers have declined by about 30% since 1996. The reduced raising of fine-wool sheep is creating concern over genetic regression in a significant proportion of the remaining fine wool flocks and a need to evaluate enhanced options for fine wool sheep breeding programs. Moreover, with the shift to higher levels of mutton production, there is a need to preserve native mutton sheep germplasm as well as improve the productivity and efficiency of mutton production through genetic improvement in the native mutton breeds.

(4) Poor Market Development. China's strategy for development of its livestock industry in the pastoral areas has concentrated on breeding but has paid little attention to marketing activities and the incentives faced by producers of meat, wool and other animal products. The lack of an efficient marketing system for livestock products, particularly wool, is a major constraint to the development of the livestock sector in the pastoral areas of northwest China. About 30% of the raw wool grown in China is produced in Xinjiang and Gansu, and both these provinces have a long history of wool processing, with some of the largest and oldest wool textile mills in China. However, low efficiency of both production and marketing limits competitiveness of domestic wool production. Market liberalization, in terms of reduced trade barriers under World Trade Organization (WTO) and the restructuring of the domestic textile sector, will demand improved competitiveness through improved quality and delivery.

In the fine-wool sector, key problems are: (a) lack of standard product descriptions; (b) poor preparation and handling of the fine wool at every point in the marketing chain (shearing, sorting, baling); (c) lack of consistent wool pricing, payment and market information systems; (d) formal and informal trade barriers and price controls; and (e) lack of improved techniques in spinning and wool scouring operations, and wool fiber inspection and testing.

(5) Weak Community Participation. Participation by local people in the planning and implementation of development programs remains weak. A "top-down" approach still prevails to a large degree. Frequently, inadequate consultation, lack of transparency, bureaucracy, and poor understanding officials of local needs and constraints, impedes farmers and herders from participating in decisions on local development strategies and render many development programs ineffective and unsustainable.

(6) Lack of Integration. There is a lack of integration in addressing the various problems and challenges. Examples include such as inadequate incentives leading to low volumes of fine wool that are not attractive to processors, and local tax collection mechanisms that favor number of sheep rather than higher value of product. On grassland management, exploitation of (sloped) grazing land was in the past a cheap alternative to developing flat lands for forage crops. Lately, the emphasis has changed to developing flat grasslands because improvements in productivity are too expensive to achieve on slopes, and the slopes are already heavily degraded. Neither local authorities nor the herders can afford soil conservation measures on slopes, as the benefits of such projects are long term, and are dispersed amongst various stakeholders. Finally, management of grazing lands needs to be addressed on the basis of watershed catchments, which means an overlapping of local authorities' areas.

Government Strategy. Policy-makers in China now express serious concern over the lack of economic development and a widening poverty gap in western China. Also, there is growing awareness that a sustained growth of livestock related industries, which are based on the grassland resources, is under serious threat. The Government's Western Development Strategy targets investments in the twelve Provinces and Autonomous Regions in the Western Region (Chongqing, Gansu, Guangxi, Guizhou, Inner Mongolia, Ningxia. Shaanxi, Sichuan, Qinghai, Tibet, Yunnan, Xingjiang). The two main objectives of the Strategy are to reduce economic disparities between the western and other regions. The Strategy also recognizes the fragility of natural ecosystems in the western region and the risk of increasing environmental deterioration if appropriate policies and incentives do not accompany the implementation of the Strategy.

While sustainable growth in agriculture and ensuring food security was one of the five key areas of the Government's development strategy articulated in the 9th Five Year Plan and Fifteen Year Perspective Plan, in the 10th Five Year Plan, there has been a shift in the focus from increasing quantity, towards improved quality and more ecologically sound types of production. The proposed project would give China an opportunity to pilot more sustainable grassland-based livestock production practices and marketing/processing systems that could contribute to improving the livelihoods of its rural population in areas that have received less development attention in the past.

In its national development strategy, China is now giving the conservation of grasslands a high priority. The project will support national efforts to combat land degradation and promote sustainable grassland management as defined in the China's 1992 "Environmental Strategy Paper," the national "Biodiversity Conservation Action Plan," the "National Environmental Action Plan," NEAP (1998), and the Ministry of Agriculture's (MOA) 10th Five-year Special Agricultural Scheme on Ecological Construction, and Environmental Protection and Construction Scheme of Agricultural Ecology in the West Region of China, and the Western Development Strategy. In 1985, the Standing Committee for the National People's Congress (SCNPC) passed the Grassland Law, which covers several important aspects related to grassland management. In 1994, the SCNPC adopted the "China Agenda 21" white paper on population, environment and development. The paper defined policy actions to restrict the overuse of grasslands,

and provided measures for rehabilitation of degraded grasslands and conservation of existing natural grasslands with high ecological values. Recently, the Government has restructured the land tenure arrangements for grassland. Previous collective grazing lands are being parceled out to individual households through long term leases (30 to 50 years). Even more recently, the grassland law has again been revised to provide more guidance and clarity on government policy. A number of large-scale national programs to finance grassland restoration activities in Western China have been put in place the past few years with substantive shares to Xinjiang and Gansu.

3. Sector issues to be addressed by the project and strategic choices:

Issues to be Addressed

General. The project reflects a response to the challenges of rural development in Western China which lie in the need of environmentally sustainable growth and poverty reduction in an increasingly competitive internal and external environment. Hence, the project will address the issues of rural poverty, grassland degradation, unsustainable livestock production practices, poor market development and weak community participation in the following ways:

(1) Rural Poverty. Rural poverty in the pastoral areas of Xinjiang and Gansu will be addressed by improving the capacity of herder and livestock farmer households to enhance their incomes through improved livestock production by introducing improved animal husbandry skills and improvements in breeding. These efforts will focus on increased farm-level value-added for livestock products.

(2) Grassland Degradation. Grassland degradation will be addressed by improving the ability of herders to manage their grasslands on a more sustainable basis through extension and training in grassland management and forage production technologies, and enforcement of policies and legislation. The root causes of biodiversity loss in Xinjiang and Gansu grasslands would be addressed through field-based projects, and working with stakeholders to adjust incentives to support adoption of sustainable grassland management practices.

(3) Unsustainable Livestock Practices. Important livestock-based industries will be supported in order to improve their operating efficiency, specifically to improve the quality of livestock products and the ability of farmers/herders to benefit from them.

(4) Poor Market Development. Elements of market infrastructure will be supported to improve market performance and farmers'/herders' access to markets. The transmission of market signals will be improved by market information services that provide quality-related price data. Farmers'/herders' ability to respond to market signals will be enhanced by training that integrates grassland and feed management, breeding, sales and purchase skills, and overall financial planning. Organization of farmers'/herders' activities will be addressed by promotion of farmers' and herders' groups. An enterprise loan facility provides resources for agro-industrial initiatives that support project objectives.

(5) Weak Community Participation. Active participation of herders and farmers in the development program will be pursued, and farmers and herders groups will be supported.

Other Issues to be Addressed. In addition, project activities will address the public goods dimensions of livestock-based industries including wool and meat production and processing, through improvements in grassland management and animal husbandry, marketing infrastructure, and support for farmer/herder groups. The project will also address the wider, public goods aspects of natural resource management by undertaking provincial level grassland and biodiversity surveys and providing training in integrated grassland management and forage production techniques.

Strategic Choices. The project objectives reflect the need to initiate new interventions that embrace more integrated approaches to natural resources management and the process of rural development. Conservation and sustainable use of biodiversity in Western China, where there are a number of ecosystems recognized as global priority areas, also requires mainstreaming biodiversity and wide-ranging ecosystem concerns into natural resource management in the broader production grazingland landscape.

Reversing environmental degradation is fundamental to poverty reduction in Western China, since the poor herders and farmers are the most dependent on natural resources for their livelihoods. In view of the linkages between local rural development and sustainable use of natural resources, the project will promote community based grassland resource management planning which applies integrated ecosystem management approaches on a landscape scale to optimize the ecological, social, and economic benefits of interventions aimed at maintaining and restoring grassland ecosystem structure and function.

Sustainable rural development requires an integrated, beneficiary driven development approach which embraces close associations with the private sector, supported by the public sector. The community driven development aspect of the project comes through the involvement of the communities in project implementation and through supporting establishment of farmers'/herders' groups for resource management, production, and marketing. Based on lessons learned from other Bank-assisted agricultural development projects and poverty reduction programs (see D.3.), and environmental and agricultural sector reviews, a set of strategic choices has been incorporated in the design of the project:

- The project areas are the poorest in the country, home to ethnic minorities, which have received little development attention and have largely been bypassed by China's economic boom;
- The two project provinces, which comprise 1/4 of China's land area, are experiencing some of the worst environmental degradation in the country, and have global importance for biodiversity;
- These areas have considerable potential for livestock development. A significant proportion of China's livestock is found in Xinjiang and Gansu, representing an important income generating activity for farmers and herders. Increased domestic demand for meat, and growth potential in domestic markets offer opportunities for agrobusiness;
- The project acknowledges the role of the market in developing the livestock sector, and the need to establish competitiveness and improved marketability of local livestock products. The project will work with farmers/herders to respond to opportunities to increase, diversify and stabilize income;
- The project aims to increase access by farmers and herders to improved livestock and animal husbandry technologies as private goods, but also provides public goods in the way of support to livestock breeding and to ensure extension of modern management technologies to the households;
- The project places considerable emphasis on participation by beneficiary households. This will ensure that the project benefits those people targeted by project objectives. In addition, the mechanisms of change will be designed so as to reflect the realities of existing practices and identify critical steps in improvement. This will enable project monitoring and evaluation to be based on transparent and meaningful criteria, taking into consideration the opinions of the project beneficiaries; and
- The project recognizes that the shift from subsistence-based pastoral production to commercial livestock production has to be based on an integrated approach which includes various aspects of grassland management and diversified livestock production, incorporating traditional practices and modern technology, an efficient market system, and increased local participation.

While the project's broad scope, encompassing various activities at many levels in two provinces is justified, it does pose risks for implementation arrangements. For example, it will not be possible to pursue all household level capacity building activities in all project areas at the same time. A participatory process, that involves the herders and farmers, will be pursued during the implementation phase of the project. Deliberate choices will be made to forge links with government research institutes, academic and civic organizations which might enable the project to more effectively try new and innovative approaches.

Policy Constraints. China's transition towards a fully-functioning socialist market economy within WTO provides a generally enabling environment for the project. However, while markets are generally well integrated, various domestic trade barriers, including lack of information, put wedges between price for farmers and herders, and markets outside the village. Several policies still constrain private sector development to some extent, and therefore the implementation of the project. Examples are the legal foundation for the formation of farmer and herder groups, which is still under development, and constraints to the free movement of goods (informal transportation restrictions, informal restrictions in inter-county and inter-provincial trade, etc.) In many cases, adequate policies are in place at least at the national level, and the project will attempt to push the enforcement of such existing rules and regulations. In past rural development projects, uncertainties in land tenure was an issue for effective project implementation. Land laws have and continue to develop rapidly. All project beneficiaries have adequate land tenure arrangements. Normal tenure arrangements are 30-50 year land leases with limited inheritance rights.

C. Project Description Summary

1. Project components (see Annex 2 for a detailed description and Annex 3 for a detailed cost breakdown):

General

The project is consistent with the GEF Operational Strategy for its biological diversity, climate change and land degradation focal areas, and OP1 (Arid and Semi-Arid Ecosystems), OP4 (Critical Montane Ecosystems), OP13 (Agro-Biodiversity), and OP12 (Integrated Ecosystem Management). With respect to OP12, the project promotes cross-sectoral policies and land use practices to ensure better grassland management, and to enhance protection of environmental services, including biodiversity conservation, carbon sequestration, and watershed protection in the headwaters of international waterways. See Annex 15 for the GEF Scientific and Technical Advisory Panel (STAP) Reviewer comments on the project's responsiveness to the GEF operational strategies.)

The project has five components: (1) Grassland Management and Forage Improvement; (2) Livestock Production Improvement; (3) Market Systems Development; (4) Applied Research, Training, and Extension; and (5) Project Management, Monitoring, and Evaluation. The project will finance works, equipment, materials, Technical Assistance (TA) and training. Communities will contribute their labor. This constitutes the Baseline Scenario. The GEF Alternative builds on the Baseline Scenario by conserving key montane grassland eco-systems and their biodiversity and carbon storage capacity in selected sites of global environmental significance. Four of the five project components have incremental GEF financed activities that will: (a) conserve global grassland values and native livestock agro-biodiversity; (b) support applied research, training and extension for multiplication of indigenous grassland species for rehabilitation of degraded grasslands and the protection of native sheep and yak; and (c) establish integrated grassland management monitoring processes at provincial, county and townships levels. (See Annex 14, GEF Incremental Cost Analysis.)

Component 1. Grassland Management and Forage Improvement. The objective of the component is to introduce sustainable grassland-based livestock production systems to reverse the current trend of grassland degradation and contribute to improving beneficiaries' livelihoods. The component will finance works, goods, TA and training for household based operations and participating breeding farms. Activities include: (i) forage and fodder production (annual forage and fodder development, perennial fodder development, monitoring and evaluation); and (ii) grassland management and improvement (village based grassland management plans, grassland management, pastoral risk management strategies). It is anticipated that at least 100,000 ha of grassland will be managed under the project. Applied research, training and extension support all these activities.

GEF Activities. The GEF activities will develop and establish sustainable grassland-based livestock production systems in the project areas. This is expected to lead to improved management of the grasslands and artificial pastures and provide increased supplies of quality feed and forage, leading to increased livestock productivity and product quality and improved livelihoods of the farmers and herders. The activities are also expected to improve the capacity of farmers and herders to manage their native grazinglands, artificial pastures, and livestock, and promote more sustainable use of grassland resources and on-farm forage and feed supplies. In addition, the project activities intend to improve the capacity of township, county and provincial technicians to monitor grassland conditions and extend advanced technologies for forage production and grassland management.

GEF activities will finance the incremental costs of activities associated with conservation of global grassland values, including: (a) inventory of grassland ecosystems in selected biodiversity-rich areas, and assessment of their biodiversity and its change as a response to improved management practices. Key activities include grassland and biodiversity surveys; (b) preparation and implementation of community and herders' group-based grassland resource management plans in selected project sites, which will be designed to promote biodiversity conservation and carbon storage (including preparation of grassland resource maps); (c) community based integrated grassland management and pastoral development. This includes development of improved grazing and livestock management systems,; implementation and demonstration of global environment-friendly grassland management techniques and investments which are consistent with the existing pastoral systems (i.e. re-seeding with indigenous grass species, implementation of traditional forage production techniques; and management of grassland resources for biodiversity and watershed management; etc.); (d) strengthening existing grassland ecological monitoring systems, including monitoring of biodiversity values; and (e) capacity building, extension, training and technical assistance (TA), including preparation of training modules and awareness building to support the above activities. Specific implementation procedures for GEF activities have been developed and are included in the Project Implementation Manual (PIM).

The specific intervention sites for the GEF activities are located in areas which are defined as national priorities in the NEAP and the Biodiversity Action Plan. The priority grassland and mountain ecosystem conservation sites identified in the NEAP and which are located in project areas include: Eastern Qilian Shan Mountain Nature Reserve in Wuwei County and Zhangye City, and Anxi arid desert ecosystem in Anxi County (both of global significance) in Gansu. In Xinjiang, globally significant areas include: Altai Nature Reserve in Altai and Burin counties and southern and northern slopes of Tien Shan in Yili Prefecture, covering Yili, Xinyuan, Hencheng and Gangliu counties. Other priority areas of national significance include Eastern Tien Shan Nature Reserve, covering Hami and Barikun counties; Ganjiahu Nature Reserve, covering Kuitun and Jinhe counties; Tashikurgan Nature Reserve in Kashi prefecture; and Kalamailishan Wildlife Refuge (Gobi desert ecosystem) in Fuyun county. All of these protected areas are under heavy anthropogenic pressures, including overgrazing.

Grazing management plans will be developed for grassland ecosystems throughout a wide elevation range (summer, spring/fall, and winter pastures) that are only beginning to show signs of degradation and are still relatively biodiversity-rich. The GEF activities will be implemented within geographically targeted landscape units and natural grasslands of high biodiversity value. Landscape units, in the context of project interventions, are geographical landscape systems which cover a wide range of grassland habitats from summer pastures (cold alpine meadows) to arid and semi-arid winter rangelands along the elevation gradient, the boundaries of which match with the traditional transhumant pastoral systems. Primary focus of the GEF activities is on production landscapes. But since livestock grazing is permitted in some protected areas, grazing management will include those areas located on pastoral migration routes. *A Participatory Grassland Management Manual has been prepared as an integrate part of the PIM (see Section G D.1). Grassland management activities will be carried out in accordance with the manual (see Section G D.5.)*

Component 2. Livestock Production Improvement. The objective of this component is to develop sustainable ruminant livestock production systems through improvements in genetics and management using environmentally sound technologies. In order for animal husbandry to remain sustainable in northwest China, new approaches to livestock production need to be integrated with improved grassland management and the marketing of high quality livestock products. The specific objectives of the component are to: (a) strengthen livestock breeding, selection and multiplication programs; (b) improve livestock management and feeding; (c) improve the quality of livestock products (wool, meat, milk); (d) improve the infrastructure and skills for sheep shearing and wool handling; and (e) establish efficient input supply systems for the livestock production sector.

The component will finance works, goods, TA, and training for households, participating breeding farms, artificial insemination (AI) stations and veterinary stations. Activities include: (i) fine wool and mutton nucleus breeding stations and multiplier stations; (ii) fine wool and mutton breeding households; (iii) fine wool and mutton fattening; (iv) beef cattle breeding households and fattening households; and (v) household dairy production. These activities will receive support from breeding and veterinary services enhanced through project investments for the establishment and renovation of a AI stations to facilitate the transfer of superior genetic traits to household based activities, and veterinary stations to deliver improved livestock health. Applied research, training and extension support all these activities.

GEF Activities. GEF activities will focus on conservation of globally significant endemic livestock breeds of genetic values by strengthening breeding at designated farms and maintaining their use in household production systems where appropriate. This will increase the local capacity to distribute native breeding stock to farmers for commercial use while integrating the use of native breeds with grassland management planning activities undertaken in the grassland management component. GEF will finance incremental costs associated with conservation of native livestock agrobiodiversity, including: (i) TA for measures to conserve globally significant native livestock breeds; (ii) inventory and assessment of native livestock; (iii) training and institutional capacity building and public awareness for livestock agrobiodiversity; and (iv) limited investments to select, breed, and maintain small flocks/herds of native carpet wool sheep, mutton sheep, and yak breeds.

Component 3. Market Systems Development. The specific objectives of the component are to: (a) improve the competitiveness of local pastoral products; (b) apply standard product descriptions for the products; (c) increase awareness throughout the wool production and wool textile processing chain of the potential for profitable production and use of Chinese fine wool; (d) ensure that farmers/herders receive a reasonable share of the market price for their wool and livestock products, particularly where value is added to their products; (e) promote increasing market transparency and developing basic market infrastructure; (f) focus on quality of production as an income-enhancing strategy throughout the marketing chain for pastoral products; and (g) support the development of farmers'/herders' group

marketing initiatives. The component will finance works, goods, TA, and training for households, public breeding farms and enterprises. This includes: (i) physical investments (new and renovated livestock markets, shearing stations, milk delivery infrastructure); (ii) loans for rural enterprises or entrepreneurs; (iii) support (promotion, TA, and training) to farmers'/herders' groups; and (iv) development and establishment of mechanisms for public goods provision (market information systems, market research, quality standards' adoption and quality promotion).

The component re-enforces the other project components by magnifying the incentives for participation in the project of farmers and herders and other market participants. Benefits of the component include increased farmer/herder incomes, a means for orderly development of the livestock sector according to market signals. Primarily, the component benefits will be seen as higher and/or less variable farm-level prices for products, leading to improved incomes. In addition, market infrastructure will be improved so that price formation is more efficient and transparent. Applied research, training and extension support all these activities. Consultants will be used to deliver several important aspects of market development. Promotion of farmers'/herders' groups, development of product standards, and training of farmers/herders in buying and selling skills will be carried out at county level, led by consultants. At provincial levels, quality standards and promotion of product quality will be delivered under special programs. *An Enterprise Manual has been prepared to support the enterprise activities (see Section G D.1.).* There is no incremental GEF funding for this component.

Component 4. Applied Research, Training and Extension. The objective of the component is to develop and promote the establishment of integrated management systems that enable household livestock producers to simultaneously raise the quality of fiber, meat and milk products derived from grazing livestock and decrease the number of grazing livestock, resulting in improved grassland condition without economic loss. This represents a shift from focusing exclusively on livestock to a systems and ecosystem management approach. Research is needed to provide the necessary know-how, training is needed to present new ideas to livestock producers and equip them with new technologies, and extension is needed to transfer research outcomes to producers. Applied research, training and extension activities are necessary activities in each of the previous components to realize their expected benefits.

The component will finance applied research at the provincial levels, TA and training of trainers (in line bureaus and extension stations), households, breeding farms, and enterprises. Activities to be financed include: (a) applied research that identify, develop and adapt low-cost technologies to solve specific problems that will facilitate implementation and enhance the benefits from the project's activities. The design of the individual applied research activities will incorporate project households into on-farm experiments to ensure that their interests are the prime focus of each activity. Examples of topics that warrant investigation include: Impact of greenhouse sheds on livestock production and profitability; Effect of diet formulation of feedlot beef cattle production; Feeding management technologies of lactating dairy cows; Changing seasonal grazing times and patterns to optimize livestock performance, improvements in grassland condition, and conservation of biodiversity; Effect of cutting time and storage method on feed value of alfalfa, maize and meadow hay; Feeding strategies of heifers to realize genetic potential from improved breeding programs; Feed management for cow-calf herds especially in winter/spring; Impact of mechanical shearing and wool grading on fine wool sheep profitability; Defining diversity within and between native livestock breeds; (b) training (i.e., training of trainers, training of farmers and herders, training of provincial, county and township project staff to ensure smooth project implementation and project sustainability). This training would be delivered through TA, individual training, workshops, and study tours; and (c) public extension services (i.e., participatory demonstrations, household visits, group discussions, technical training, company led training and extension).

GEF Activities. GEF will finance incremental costs associated with applied research and extension for: (i) multiplication of indigenous grassland species for rehabilitation of degraded grasslands; (ii) grassland ecology and ecosystem management; (ii) training farmers/herders and county staff in integrated ecosystem management; (iii) ecological surveys and environmental workshops to increase environmental awareness; and (iv) applied research into conservation of wildlife habitat of global significance.

Component 5. Project Management, Monitoring and Evaluation. The objective of this component is to develop and strengthen the overall project implementation capacity of project management offices and promote effective community participation in project activities. The component will finance operational costs, goods, TA and training for the various levels of project management offices (PMO). Activities to be financed include: (a) operational costs; (b) strengthening of the provincial, city, county and township level PMOs (goods and training); (c) establishment of a monitoring and evaluation system that includes: project progress monitoring, environmental monitoring, social monitoring, and impact monitoring (TA and training), and establishment of community advisory/participation groups (TA and training). See Annex 16, Project Monitoring and Evaluation.

A *Management Information System (MIS) is been finalized to enable timely project reporting. Semi-annual reporting will take place to the Bank. In addition, independent social and environmental monitoring will take place in accordance with the Environmental Management and Monitoring Plan (EMMP) and terms of reference acceptable to the Bank (see Section G. B.1.,B.2., B.3.)*

GEF Activities. GEF will finance incremental costs associated with establishment of integrated grassland management monitoring processes at provincial, county and townships levels including: (i) development and implementation of monitoring processes for adaptive integrated ecosystem management at provincial, county and township levels; and (ii) development and implementation of monitoring tools to measure changed carbon sequestration and biodiversity status in managed grasslands.

Key Features in Project Design and Implementation Approach. Achieving the multiple objectives of the project has required a departure from a sectoral approach. For example, successfully integrated approaches require that technological improvements of productive assets must be combined with improved management of natural capital with simultaneous improvement of human and institutional capital, while fully taking into account market opportunities and economic sustainability. As such, the project takes a multidisciplinary approach, addressing issues of institutional development, natural resources management, and access to markets, which are all expected to improve the productivity of the local livestock sectors in the medium and long-run.

The project's main features include: (a) a geographic concentration of an integrated series of activities in a county; (b) integration of grassland management, livestock improvement and marketing activities at the farmer/herder level; (c) bi-directional coordination of livestock production activities with wool, meat and milk markets; (d) phasing and sequencing of activities in order to ensure flexibility in project implementation in accordance with changing environmental and market conditions; and (e) active participation of herders and farmers in the planning and implementation of activities.

The various project components are closely linked together in order to ensure optimum use and impact of investments. It is expected that the project activities will improve productivity per animal through production efficiencies gained by genetic improvement and adopting new husbandry practices, feeding regimes and livestock health programs that reduce livestock mortality and grassland degradation, leading to increased incomes for the project beneficiaries. These benefits will accrue from improvement to livestock breeding and management under the Livestock Production Improvement Component, and the provision of high quality forages and improve grassland management delivered as part of the Grassland Management and Forage Improvement Component to enable livestock to produce to their genetic potential. Livestock activities are further supported through the Market Systems Development

Component that empowers household producers to utilize market information to make informed decisions on enterprise selection and production focus.

Phasing, Sequencing and Combining Project Activities. The project's integrated implementation approach requires that the phasing, sequencing, and combining of the various activities be carefully planned to achieve the desired aggregate benefit. "Phasing" is the time allocation to an activity for its completion and a specific point in time for its starting. "Sequencing" is the arrangement of the order of implementation for any two project activities (i.e., which activity comes first and which follows). "Combining" is the combination of a group of project activities into a logical flow of inter-related activities to achieve the desired optimum results. *The timing, sequencing, and combining of project activities are elaborated in the PIM along with the definition of standards and criteria and description of procedures for the inclusion of project activities for implementation (see Section G.D.4.).*

Summary Project Costing. See summary project costing in the tables below. To emphasize the importance of applied research, training and extension, for costing purposes, all these activities, including those supporting the other components, have been allocated under the Applied Research, Training and Extension Component (Component 4).

Component	Indicative Costs (US$M)	% of Total	Bank financing (US$M)	% of Bank financing	GEF financing (US$M)	% of GEF financing
Grassland Management and Forage Improvement	13.98	12.5	6.94	10.5	2.57	24.5
Livestock Production Improvement	67.75	60.7	44.26	66.8	0.32	3.0
Market Systems Development	10.20	9.1	7.34	11.1	0.00	0.0
Applied Research, Training and Extension	13.25	11.9	4.91	7.4	6.61	63.0
Project Management, Monitoring and Evaluation	5.75	5.2	2.16	3.3	1.00	9.5
Total Project Costs	110.93	99.4	65.61	99.0	10.50	100.0
Front-end fee	0.66	0.6	0.66	1.0	0.00	0.0
Total Financing Required	111.59	100.0	66.27	100.0	10.50	100.0

A total of US$6.61 million out of US$10.5 million GEF financing is allocated to the Applied Research, Training and Extension Component. The table below shows that the main part of this training and research activities (US$3.85 million) contributes to the Grassland Management and Forage Improvement component. An additional US$0.32 million is for training and research for native livestock breed improvement.

Component	GEF Total (US$M)	Services (US$M)	Works (US$M)	Goods (US$M)	Other (US$M)
A. Grassland Management & Forage Improvement	6.42	3.85	-	2.57	-
B. Livestock Production Improvement	0.64	0.32	-	0.32	-
C. Market Systems Development	-	-	-	-	-
D. Applied Research, Training and Extension	2.44	2.44	-	-	-
E. Project Management, Monitoring and Evaluation	1.00	-	-	0.50	0.50
Total	10.50	6.61	-	3.39	0.50

2. Key policy and institutional reforms supported by the project:

The project will support the continuation of China's reform process towards a liberalized rural economy with strong supportive market institutions. It promote's China's efforts to further integrate with international markets adjust to WTO by developing an integrated livestock production system which efficiently produces and markets high value products that are competitive internationally. The project will also support policy and institutional reforms towards sustainable natural resource management through research and policy studies that will analyze the incentives and disincentives that influence how farmers/herders make management decisions regarding grassland use, and will pilot new, participatory approaches that seek to manage livestock in a manner that conserves biodiversity in the production landscape. Rural incomes will be addressed by a strong focus on quality, as herders can no longer continue to increase livestock numbers. Training, applied research and extension, as well as the improvement of price mechanisms will provide the tools and incentives for quality improvement throughout the marketing chain.

Local participatory grassland management planning using integrated ecosystem management processes to protect and enhance multiple-values of grasslands will be used to give local effect to the national grassland law. The project will particularly support policy and institutional reform implementation at county and township levels to enable biodiversity conservation in productive landscapes by encouraging collaborative approaches between bureaus and development of a portfolio approach to grassland management by local institutions. Furthermore, the project will promote reforms towards more effective land use and more sustainable use of grassland resources based on the active participation of herders and farmers. Promotion of voluntary farmers'/herders' groups will allow autonomous organizations to develop and grow on the basis of an improved commercial environment in the countryside.

3. Benefits and target population:

Benefits. It is expected that herders/farmers, entrepreneurs and leading enterprises will directly benefit from the project. Social and economic analysis have been conducted as part of project preparation, including establishment of a household baseline survey, to allow ongoing monitoring and evaluation of the benefits of the project to the beneficiaries. Benefits are intended to accumulate mainly in the form of:

- Increased herder/farmer incomes and a reduction in production risk as a result of improved access to markets, enhanced price transparency, more competitive markets, and focus on product quality;
- Improved market environment in the form of more transparent markets for wool and meat with established product descriptions, mechanisms for reporting wool and meat prices that reflect market-related factors, and information campaigns that promote livestock products;
- Local environmental protection: Downstream environmental benefits come from improved watershed protection services (e.g. reduced soil erosion and sediment inflow to surface waters, and water quality and quantity in downstream agricultural and urban areas) and improved grassland environment as the grassland management activities and improved access to extension services and training will support grassland rehabilitation and balancing livestock numbers with available forage;
- Global environmental benefits: From restored biodiversity and associated increases in productivity of grassland resources in globally significant ecoregions, including increased species diversity, increased biomass productivity and improved grazing conditions for wild ungulates and livestock, and increased carbon sequestration. Benefits will also arise from reduced land degradation resulting from sustainable management of complete grassland agro-ecosystems.

- Enhanced beneficiary and community participation in the development process. The project will adopt a participatory approach whereby herders and farmers actively participate in the implementation of project activities so as to address their expressed needs regarding livestock and grassland management.

Target population. In Gansu, the main targeted beneficiaries are located in 19 counties/cities in ten prefectures (Jingtai, Jiuquan, Zhangye, Sunan, Yongchang, Liangzhou, Jingyuan, Huining, Lintao, Dingxi, Zhangjiachuan, Qingshui, Linxia City and Linxia County, Kangle, Lintai, Pingliang, Huating and Ningxian), and one provincial level farm and one prefecture level farm (Huangcheng and Minshen). In Xinjiang, project areas include 24 counties in nine prefectures (Xinyuan, Tekesi, Gongliu, Wusu, Shawan, Yumin, Bole, Wenquan, Altai, Fuyun, Changji, Hutubi, Manasi, Fukang, Jimusaer, Qitai, Hejing, Yanji, Bohu, Kuche, Baicheng, Wensu, Hami, and Tulufan) and 3 sheep breeding farms in Gongnaisi, Tacheng and Bazhou.

The target population's average annual income is substantially below the country's average per capita income (RMB 7,543, 2001). The average (net) per capita income of rural households in Xinjiang is RMB 1,710 per year and in Gansu RMB 1,508 (2001). These figures are also well below the average national rural income in China (RMB 2,366, 2001). Benefits would also accrue to entrepreneurs associated with livestock product processing industries in county, prefecture, and provincial centers. The number of households which will benefit from the project is estimated to about 35,000 households (140,000 people), whereof 24,500 in Gansu and 10,500 in Xinjiang. A large portion of these households are ethnic minorities (mainly Dongxiang, Hui, Kazakh, Mongol, Sala, Uygur, and Yugu). The selection criteria for beneficiary households is described in the PIM. Special efforts are going to be made to include poorer households, that might not be able to afford loans, in non-lending activities (e.g. training).

In Gansu, Sunan county and Huangcheng Nuclear Sheep Farm will focus on the development of fine wool sheep. Development of mutton sheep will be the main project activity in Jingtai, Suzhou, Ganzhou, Yongchang, and Huining., Beef fattening will be the principal activity in Zhangjiachuan, Qingshui, Liangzhou, Lintai, Kongtong, Ningxian, Kangle, and Huating. Linxia City, and Linxia, Lintao, Jiuquan and Dingxi counties, and Hovill Group, will focus on dairy cattle. In Xinjiang, mutton sheep production is the main production activity in Fuyun, Altai, Yumin, Hejing, Kuche Hami and Tulufan. All other counties will be producing dual purpose sheep (fine wool and mutton).

GEF activities will be implemented within geographically-targeted landscape units and natural grasslands of high biodiversity value and with significant carbon sequestration potential. Phase I GEF counties in Xinjiang are Tekesi, Fuyun, Baicheng, Bole, and Hejing. Phase II GEF counties are Altai, Qitai, Hami, Yumin, Xinyuan. Xinjiang GEF counties are located in the eastern Tien Shan and Altai Shan mountains ecoregions. In Gansu, Phase I GEF counties are Sunan, Subei, Jingtai, Dingxi and Suzhou in the Qilian Shan mountains ecoregion. Phase II counties are Yongchang, Ganzhou, and Liangzhou. Specific activities to support white yak will take place in Tianzhu county.

Women Beneficiaries. In the livestock sector, women play a significant role in production activities. Therefore women are considered as important beneficiaries of the project. Women will be loan beneficiaries, and specific training and capacity building activities targeted to women are included in the project. The role of women in the farming and herding systems in the various ethnic minority communities are described in detail in the social assessments which paid close attention to appropriateness of the project activities relative to women as well as to make sure that all activities are culturally appropriate and in accordance with the wishes of the various ethnic minority beneficiaries. Women's participation in the implementation of activities will be closely tracked through measurable monitoring indicators.

4. Institutional and implementation arrangements:

General. The implementation of the project will be supported by the Foreign Economic Cooperation Center (FECC) in the Ministry of Agriculture (MOA). FECC will assist the Provincial/Regional Project Management Offices (PPMOs) in coordination and technical assistance when necessary. The FECC has managed a number of Bank projects before. *A Central Project Management Office (PMO) will be established in the MOA to support in the coordination, supervision, and monitoring of the project (see Section G C.1.).*

Project Management Structure. The integrated approach of the project is reflected in the project management structure, in which the various stakeholders, including beneficiaries, government line agencies, and civil society, participate. Project Leading Groups (PLG), PMOs and technical advisory groups (TAG) have been established. In Xinjiang PMOs have been established at regional, prefecture (with more than 2 counties), county and township levels. In Gansu, township level PMOs will be established on a case by case basis.

Project Leading Groups. In Gansu, the Foreign Cooperation Committee of the Provincial Standing Committee, headed by the Executive Vice Governor will function as the PLG. In Xinjiang, a PLG has been formed, headed by the Vice Governor responsible for agriculture. To ensure broad ownership for implementing the project, all relevant departments and agencies are represented in the PLG: Animal Husbandry, Finance, Planning, Water Resources, Foreign Trade; and Environmental Protection; The Committees of Agriculture, Economy and Trade; Agricultural Bank of China (ABC) and People's Bank of China; Poverty Reduction Office, and Women's Federation. PLGs will also be established at county levels. *Establishment and maintenance of the PLGs are covenanted in the legal agreements (see Section G. C.2.).*

The PLGs will provide overall guidance to the project. Specific responsibilities include to: (a) mobilize institutional, technical and financial resources and support for project implementation, in particular coordinate counterpart funds and ensure cooperation among line bureaus (b) review the annual implementation plans; (c) decide on enterprise investments appraised by the PPMOs; (d) monitor the implementation works of line agencies; (e) define and supervise the work of the PMOs; and (e) discuss, define, and bring to the attention of the provincial governments, policy support measures which, by complementing project investments, could enhance the achievement of the development objective.

Project Management Offices. Provincial PMOs (PPMOs), located in the Provincial/Regional Animal Husbandry Departments, have been formed. Project institutions similar to those at the provincial level have been established at prefecture, county and selected township levels. The PMOs, under the guidance of PLGs, are responsible for: (a) coordinating the day-to-day implementation of the project; (b) *drafting of annual implementation plans and any readjustment plans* (*see Section G D.2.*); (c) in cooperation with the line agencies, implementing overall project management rules, financial management methods, procurement management methods, engineering management and training methods; (d) supervising and monitoring the project implementation, engineering quality, financial management and procurement, and training implementation; (e) the coordination of line agencies and project areas/counties; (f) reporting to PLGs and the Bank; and (g) communication and public relation.

PMOs exist on provincial and county level and are extended to most of the townships. Staff consists of personnel responsible for the different components, their integration, communications and coordination of training and extension, and procurement and financial management. Staff from the Financial Bureaus, working on financial management and disbursement, are part of the PMOs. *Establishment and maintenance of the PMOs in accordance with terms of reference and composition acceptable to the Bank are covenanted in the legal agreements (see Section G. C.3.).*

Implementation of GEF funded activities is also responsibility of PPMOs and County PMOs and will be undertaken in full coordination with other relevant government agencies (e.g., Ministry of Agriculture, State Environmental Protection Agency, State Forest Administration, Chinese Academy of Agricultural Sciences, and Chinese Academy of Sciences) , as well participating local communities.

Project Implementation Manuals (PIMs) have been prepared by Gansu and Xinjiang. The PIMs will be used as key implementation guides for the project. *All implementation arrangements including financial management (counterpart funds, household repayment, disbursement, auditing), procurement, supervision, reporting, monitoring and evaluation are included in the PIM (see Section G. D.1.). GEF activities are also included in the PIMs. During implementation, annual implementation plans will be prepared by the PPMOs based on county level plans and in accordance with Beneficiaries Participation Manuals (BPM) and the Multi-Ethnic Group's Development Strategy (MEGDS) (see Section G. D.3. and E.2.).* It is the project's intent to create a planning process, as opposed to a "blue-print."

Technical Advisory Groups. Technical Advisory Groups (TAG) have been established at the provincial levels to make recommendations on technical aspects and provide technical advice to the provincial PLGs and PMOs. Their major responsibilities are to: (a) provide advice in technical issues relevant to the project design, institutional, technical and financial feasibility and environmental impact; (b) review technical specifications and project standards; (c) participate in project monitoring, evaluation, and in the design of research and extension, formulation of training plans and appraisal of scientific achievements, and review of annual implementation plans; and (d) support the coordination with line agencies and strengthen linkages with existing institutes for research, technical extension and consulting services in the project areas. The TAGs are composed of technical specialists from line bureaus, research institutes, representatives of Producers Associations (e.g. Xinjiang Fine Wool Producers Association), and other agencies involved in the project. The TAGs would be represented by smaller TAG groups at county levels to provide similar services. *(see Section G. C.4.).*

Line Agencies. The main day-to-day implementation of the project would be managed by the PMOs at provincial, prefecture, county, and township levels. However, a number of line agencies, in particular the Water Resources Department, and the Environmental Protection are: (a) to provide assistance in the areas of law and regulation, policy, technical specifications and standards; (b) to review and comment on the overall design, engineering, technical, financial and economic feasibility studies, and environmental impact of detailed project activities; (c) to support and give guidance to the work of the PMOs, and supervise and monitor project implementation; and (d) to provide technical support and information and give necessary training to the relevant staffs in the project areas. The Finance Bureau is actively engaged in the project assuming the main responsibility for the financial aspects of project implementation as part of the PMOs. Cooperation among line agencies will be ensured by the PLG.

D. Project Rationale

1. Project alternatives considered and reasons for rejection:

The project was originally conceived as a response to China's "Good Seed Program" and was to support fine wool development only. Therefore the project approach considered during the early stages of project identification was a narrow focus on traditional fine wool sheep productivity improvements with little attention on improving the feed base and marketing of the products. This alternative was rejected on the ground that a narrow approach would not be able to address the broader issues related to diversification of household based production units, more sustainable management of natural resources, and access to financial services and markets. Most importantly, it was felt that only an integrated approach could yield an acceptable rate of return which would justify investments and would be robust enough with respect to external shocks. While the overall project design is based on integrated production, natural resources management and a marketing approach targeted to individual households,

individual activities that will be implemented under the project will undergo stringent scrutiny and will be tested against various alternatives identified during preparation.

The Western Development Strategy represents the commitment of the Government to promote sustainable development of the country's interior provinces. The government recognizes that the success of the Strategy is predicated on the protection of the region's fragile environment and the reversal of natural resource degradation trends. Specifically, this involves increased attention to overstocking by herders. Emphasis on food product quality has been embraced by several western provinces, recognizing that this is one of the important strategies for raising rural incomes. The economic development in the rural areas of Gansu and Xinjiang relies heavily on grassland dependent animal husbandry. At the same time, the grasslands in the project areas have important global environmental values. The alternative of not supporting Gansu's and Xinjiang's strive for shifting to a more sustainable livestock production system would cause increasing social and economic costs in the medium and long-run associated with stagnated productivity, degrading environment, and increasing volatility of incomes facing economic shocks due to weather and market fluctuations.

2. Major related projects financed by the Bank and/or other development agencies (completed, ongoing and planned).

Sector Issue	Project	Latest Supervision (PSR) Ratings (Bank-financed projects only)	
		Implementation Progress (IP)	Development Objective (DO)
Bank-financed			
Development of mixed crop-livestock production farming systems.	China: Gansu and Inner Mongolia Pov. Red.Project	S	S
Livestock production by low income households.	China: Shaanxi Agricultural Development Project	S	S
Smallholder cattle production within existing crop farming areas; improved feed production; marketing of products.	China: Smallholder Cattle Development Project	S	S
Improved sheep productivity; better management of pastures; marketing of sheep products.	Kyrgyz Republic: Sheep Development Project	S	S
Community based pasture management; livestock and fodder production; risk management.	Mongolia: Sustainable Livelihoods Project		
Establishment of community based resource users associations; improved access to markets.	China: Jiangxi Integrated Agricultural Modernization Project - under preparation		
Improving pastoral risk management and livestock production.	China: Inner Mongolia and Xinjiang Snowstorm Emergency Recovery Operations	S	S
Other development agencies			
Canadian International Development Agency (CIDA)	China: Dairy cattle and forage production project, and grassland management projects.		
Australian Agency for International Development (AusAID)	China: Small ruminant and rangeland management project.		
Asian Development Bank	Optimization of Initiatives to Combat Desertification in Gansu Province.		
United Nations Development Program (UNDP)	Regional biodiversity conservation in the Altai Mountain ecoregion in Mongolia, Kazakhstan, Russia. Morocco High Atlas Mountains project. Pakistan Mountain Area Conservancy project.		

IP/DO Ratings: HS (Highly Satisfactory), S (Satisfactory), U (Unsatisfactory), HU (Highly Unsatisfactory)

GEF-Supported Projects

The project is one of the key elements of China's GEF Partnership on Land Degradation in Dryland Ecosystems under OP12, Integrated Ecosystem Management implemented by the Asian Development Bank (ADB). The GEF component will also complement the United Nations Development Program (UNDP)-GEF regional biodiversity conservation initiatives in the Altai Mountain ecoregion in Mongolia, Kazakhstan and Russia. The main focus of the UNDP-GEF projects are on biodiversity conservation in selected protected areas and buffer zones, and biodiversity overlays at the landscape level. The Bank's GEF, in the context of this project, will work in the Chinese side of the Altai Mountains ecoregion. The linkages between these projects arise through promoting sustainable landscape resources management activities outside protected areas in production landscapes. The Bank's GEF activities will allow transfer of lessons learned from implementation of community based grassland management plans to the China/ADB Partnership and the UNDP-GEF Altai-Mountains biodiversity conservation projects.

3. Lessons learned and reflected in the project design:

The project has benefitted from the Bank's extensive experience in livestock and rural development in China and other countries around the world. More generally, the project has built on lessons learned from, among others, Gansu and Inner Mongolia Poverty Reduction Project, Shaanxi Agricultural Development Project, Smallholder Cattle Development Project in China, Sheep Development Project in Kyrgyz Republic, and from the preparation of the Sustainable Livelihoods Project in Mongolia. A key lesson from Bank financed projects is that active participation of beneficiaries and stakeholders (village, township and county governments) and commitment from government, provides the framework for smooth and successful activity implementation. Also, the nature of the project requires, in particular, that it is driven by entrepreneurial individuals in its implementation. Lessons learned from other Bank projects include:

- **Institutional Capacity Building**. (a) establishment of farmers'/herders' groups should be bottom-up; (b) lending programs need to capitalize on what has already been achieved in institutional development, and further strengthen and delegate responsibilities to farmer based grassroots institutions, enabling them to become self-reliant; and (d) participation of beneficiaries in project preparation and implementation helps meet their needs more closely than if investments are decided centrally. Once beneficiaries develop a sense of ownership in a project, they are willing to co-invest in it and take over the responsibility for maintenance and sustainability.
- **Natural Resources Management**. (a) the need to take into consideration of the variability of the climatic conditions in determining the stocking rate. Control of stocking rates needs to be a dynamic process; (b) professional development and training programs are an important instrument in providing the underpinning for changing behavior of private and public actors in the common natural resources management; (c) active participation of beneficiaries is important in achieving effective, efficient and sustainable delivery and provision of basic services and the management of natural resources; (d) adequate attention needs to be given to the financial sustainability of the natural resources management efforts; (e) communication, outreach and ownership building are essential to the development of sustainable natural resources management strategies; and (f) better efficiency and effectiveness during execution require an adequate monitoring and evaluation system.
- **Fine Wool Sheep**. China’s past initiatives to develop a fine wool industry have succeeded in developing a livestock resource and advancing skills in animal husbandry. However, the product has not been able to compete with imported wool because herders have had no proper incentive to present the product for sale correctly. Therefore, the incentives faced by herders needs to be made the central focus of fine wool activities.

- **Market Access**. Past experience in China suggests that setting up and providing the essential elements for sustainable livestock production activities has a quick impact on household incomes. However, a strategy of improving supply conditions will increasingly need to take into account demand characteristics and constraints such as storage requirements and quality grades. Support to marketing and processing thus need to be integrated in project interventions.

A recent GEF review ("Achieving Sustainability of Biodiversity Conservation: Report of a GEF Thematic Review." Monitoring and Evaluation Working Paper 1. GEF) of sustainability of biodiversity conservation concluded that: (a) it is essential to identify clearly what biodiversity one seeks to sustain, on what scale, and over what time period; (b) since much biodiversity will remain outside protected areas, a discussion of sustainability must include conservation and sustainable use on privately owned lands; (c) the major factors that affect sustainability are socioeconomic and policy related, referring to policies that provide the incentives and disincentives related to conservation and sustainable use of biodiversity, the processes by which these policies are made and enforced, and the influences of groups or individuals on these processes; and therefore (d) a comprehensive, long-term, and adaptive approach is needed to conserve biodiversity sustainably. The project has embraced these conclusions in the design through:

- seeking to conserve biodiversity at the larger ecosystem level and sustain the ecological benefits contributed by the ecosystem processes of the Qilian Shan, Altai Shan, and Tian Shan mountain ranges which have national and global significance;
- focusing project activities in the grazingland production landscape because much of the biodiversity in project areas is found in landscapes outside the protected area network;
- addressing the root causes of biodiversity loss through field-based projects, the strengthening of conservation institutions and working with stakeholders to adjust policy implementation and incentives because the root causes of biodiversity loss in western China – and thus the threats to sustaining that biodiversity – are found in the socioeconomic context that motivates local actions; and
- mainstreaming biodiversity and wide-ranging ecosystems concerns into natural resource management in the broader production grazingland landscape through a comprehensive strategy to conserve and sustainably use biological diversity and integrated ecosystem approaches to the management of grasslands.

4. Indications of borrower and recipient commitment and ownership:

Policy-makers in China are expressing serious concern over the lack of economic development and a widening poverty gap in western China. At the same time, the government is giving the conservation of grasslands a high priority in its national development strategy. The project approach is in line with the government's strategy for desertification control, prepared in-accordance with the UN-CCD, and supports national efforts to combat land degradation and promote sustainable grassland management as defined in the China's 1992 Environmental Strategy Paper, the national Biodiversity Conservation Action Plan, the National Environmental Action Plan, and the Ministry of Agriculture's Tenth Five-Year Special Agricultural Scheme on Ecological Construction and Environmental Protection and Construction Scheme of Agricultural Ecology in the Western Region of China, and the Western Development Strategy. The Government has also restructured land tenure arrangements for grassland and in late 2002 and revised the grassland law to provide more guidance and clarity. The project is designed to help China implement these grassland management strategies and laws.

Within the framework of the Western Development Strategy, the government has requested the Asian Development Bank to coordinate the preparation of a China–GEF Partnership on OP12 on Integrated Ecosystem Management. This project is the first GEF co-financed investment initiative under that partnership.

The Ministry of Agriculture and the State Planning and Review Commission have been very active in including the project in the World Bank project timeline and the local governments in Gansu and Xinjiang have issued formal expressions of commitment in regard to it.

5. Value added of Bank and Global support in this project:

The project is designed to be a "second-generation" rural development project. It would give China the opportunity to pilot a quality focused integrated livestock development system that could contribute to improve livelihoods of its herder population. Bank support for the project is justified through its mandate to lend for development-oriented activities with a strong element of public goods, such as environmental management, public information systems, training, extension, and applied research. Provision of these kinds services in the project will provide a firm foundation for future sector investments by the private sector as well as improve the utilization of scarce public resources (financial and technical) creating a basis for increased government revenues for future development.

The project approach is consistent with the recently revised rural development strategy of the MOA and with the Bank's rural strategy for China initiating the second generation of rural development projects in the country. The project would support activities for the medium and long-term growth of the sector as opposed to simple revenue generating activities. The Bank's experience would add value to the Borrower's efforts to provide an enabling environment for future economic growth in Gansu and Xinjiang while accelerating the transition process of its livestock sector into a modern market economy.

Global support is justified in that four of the five project components can be enhanced to provide global environmental benefits in improved biodiversity conservation, increased carbon sequestration, improved watershed protection, and reduced soil erosion. Most of these global environment benefits are long term (i.e. benefits take time to materialize but accrue for many years after the project has terminated), which makes them less attractive to local populations, who struggle to make a living on a day-to-day basis. The global support will help to bridge the gap between the long term benefits and short term economic needs of local population by giving them incentives to change their current resource utilization practices. It will also demonstrate to the local population the long-term economic and environmental benefits of adopting more sustainable grassland management approaches.

Coordination and Cooperation with Other Organizations

Bank involvement has been instrumental in attracting the interest of domestic and foreign investors and of enhancing and coordinating the work of other aid organizations. The Bank has had numerous discussions with various donors regarding opportunities for grant financing, especially for some of the technical assistance activities. More specifically:

Asian Development Bank (ADB). This project forms the first pilot project under China's GEF Partnership on Land Degradation in Dryland Ecosystems under OP12. Close coordination will take place with ADB during the implementation of the project.

Australian Center for International Agricultural Research (ACIAR). ACIAR is carrying out complementary activities which support the project objectives. The ACIAR activity attempts to change the approach to grasslands management employed by agencies in China. The main objective of the first phase (out of two phases) of the ACIAR research and development program is to develop a grassland livestock farming system model, to collate and analyze data on farm productivity within specific project counties in Gansu and Xinjiang (and Inner Mongolia), and capacity building of Chinese scientists. Close links have been established between this activity and the project to maximize data and information exchange, to assist in the supervision and training under the Bank project's applied research sub-component, and develop monitoring and evaluation frameworks to assess project impact.

Canada International Development Agency (CIDA). CIDA is providing parallel support for a dairy herd improvement program for the dairy cattle activities in Gansu within the context of their on-going dairy program. In addition, in the context of ongoing programs, CIDA is examining further opportunities in support of sustainable grassland and livestock and livestock management in Western China. About US $30 million equivalent is been considered to fund activities in a number of provinces, including activities to support the Bank project in Gansu and Xinjiang. More specifically, TA support in the form of resident advisors in both Gansu and Xinjiang over the lifetime of the project is been considered along with specific TA and training for grassland and livestock management activities.

United States Department of Agriculture, Agricultural Resource Service (USDA-ARS). Project preparation has benefitted from technical expertise provided by USDA-ARS, support that will continue during project implementation. In addition, project preparation has provided a platform for cooperation through a Joint U.S.- China Center on Grazingland Ecosystem Sustainability in the United States and Western China. This initiative will promote interagency cooperation and coordination. A joint coordinating center is envisioned under this initiative in Gansu with full participation from Xinjiang and other western grassland provinces/regions. The joint coordinating center would serve as a platform to facilitate partnerships, share information, and stimulate cooperation.

World Bank Institute (WBI). This project provides a platform for the implementation of a comprehensive multi-level capacity enhancement program on grassland management and sustainable livestock development in Western China, designed by WBI in close consultation with MOA and the Bank's project team. The capacity enhancement program as currently designed consists of four modules. Module 1 would target high level policy and decision makers in MOA, Ministry of Science and Technology, Provincial Vice Governors, and Animal Husbandry Department Directors. This module would discuss strategies, policies, and legislation for sustainable grassland management and grassland dependent livestock systems. Module 2 would target Provincial Vice Governors, county mayors, provincial level animal husbandry department officials, grassland and animal husbandry station managers, senior rural extension officers, and grassland science and livestock production specialists in local research institutes. This module would discuss good practices on how to implement, monitor and enforce national and local strategies, policies, and legislation. Module 3 would target managerial and technical personnel from county animal husbandry bureaus, county extension workers, farmers and herders representatives. This module would be based on Module 2, adapting similar topics for dissemination to a non-academic, more practitioner-oriented audience at the county levels. Module 4 would consist of farmers'/herders' field days. These field days would target township and village extension workers, and farmers and herders. The field days would allow farming and herding communities to discuss at village level, sustainable grassland management and improved livestock grazing systems with participants from Module 3.

E. Summary Project Analysis (Detailed assessments are in the project file, see Annex 8)

1. Economic (see Annex 4):

● Cost benefit NPV=US$18 million; ERR = 17 % (see Annex 4)

○ Cost effectiveness

○ Incremental Cost

○ Other (specify)

General. Economic analysis has played an important role in identifying costs, benefits and risks, and in evaluating design alternatives during project preparation. A cost-benefit analysis has been carried out based on household activities. While investments into nucleus and multiplier farms and livestock production or processing enterprises are excluded from the overall economic analysis, detailed economic and financial analysis of pre-identified investments have been carried out on case-by-case basis. Specific investments not yet identified, will also undergo detailed analysis during project implementation before final approval of loan funds.

The economic analysis of the project focuses on three major areas of quantifiable benefits; (i) increased turn-over of live animals due to reduced mortality rates and increased reproductive performance; (ii) improved productivity of livestock production (i.e. increased carcass weight, increased wool and milk yield, improved wool quality); (iii) improvements in wool price received by herders. Other benefits include local and regional environmental benefits from reduced sediment retention, and global environmental benefits from carbon sequestration from improved pasture management.

Economic Rate of Return. The economic rate of return (ERR) of the project is 17.1%. The ERR for Xinjiang is 19.4%, and 15% for Gansu. Capitalized value of total project net benefits is RMB 146 million (discounted at 12% rate). Capitalized value of direct economic benefits from livestock production activities is RMB 119.2 million which represents some 82% of the total project benefits. Capitalized value of environmental benefits is RMB 26 million or some 18% of total project benefits. The value of environmental benefits calculated in this analysis should be considered as a conservative lower bound estimate of total environmental benefits as it does not include many existence and option values associated with environmental resources, as well as various ecosystem life-support services. Furthermore, the underlying assumptions of economic benefits such as incremental improvement of livestock productivity as response to improved nutrition and management are conservative.

Sensitivity Analysis. A sensitivity analysis shows that the project returns are robust. Quantified economic benefits of project activities need to decline some 20% in Gansu and even more so in Xinjiang for total ERR to drop below 12%. Even with productivity risks that may result from climatic extreme outcomes such as drought and/or severe winters, it is unlikely that declines of greater than 20% of project benefits will occur.

2. Financial (see Annex 4 and Annex 5):

NPV=US$ million; FRR = % (see Annex 4)

Financial Rate of Return. Financial analysis was carried out on representative farm/herder households models for eight pilot counties (Jingyuan, Sunan, Yongchang, Pingliang and Lintao Counties in Gansu Province and Bole City, Tekesi and Fuyun Counties in Xinjiang). The models represent different livestock production patterns and pastoral systems typical to the project areas (see Annex 4 for details).

- The size of investments of farm households based sheep and cattle production models varies between RMB 7,600- RMB 30,000/household. The financial rate of return (FRR) is in the range of 17-28%.

- Average investment into household based sheep and beef fattening operations varies between RMB 20,000-98,000 per household. The FRR is in the range of 20-29%.
- Investments into (five) 100 head dairy cow farms is about RMB 2.5 million. The investment will be managed either by individual entrepreneurs or a group of individuals. The FRR is 17%.

Sensitivity Analysis. Sensitivity analysis of household based fattening operations indicate that these investments may be relatively risky. The major risks associated with the financial sustainability of farm investment projects include: (a) reduction of prices of livestock products; (b) increased cost of major inputs (including fodder crops); and (c) increased investment costs. The sensitivity of the FRR has been tested against the following assumptions: (i) 10% and a 20% decrease in the prices of livestock products; (ii) 10% and 20% increase in production costs; (iii) 10% and 20% increase in investment costs. The results indicate that farm household production models are relatively robust to the changes in input and output prices. Decline in output prices has the largest impact on production systems which depend largely on purchased fodder (i.e. Lintao dairy production models and Pingliang beef cattle production model). The models are generally less sensitive to increased input and investment costs. However, the FRR of these activities is sensitive to marginal changes of average daily growth rates; reduction of livestock prices and increase of feed costs. The project design will mitigate these risks through: (1) encouraging a larger share of farm-produced feed in the total annual feed requirements; (2) providing households training in appropriate livestock fattening and business management skills; and (3) phasing of investments and monitoring their physical and financial impacts.

Fiscal Impact:

Distribution effects, such as the project's net impact on beneficiaries and the provincial/county budgets has been reviewed. The loan itself is anticipated to have no net impact on the central budget since it would be on-lent through the province to lower government levels and the beneficiaries; and emphasis is put on project financial management in order to promote timely repayment of sub-loans. The net impact on the provincial budget is anticipated to be small as no "new" funds would be allocated as counterpart funds, instead existing funds would be reallocated to the project. The provincial finance bureaus have requested detailed sources of counterpart funds statements from all project counties and have carefully reviewed these statements. By raising the value of marketable farm production output the project is expected to have a positive impact on the provincial budget through increased agricultural tax revenues.

3. Technical:

General. Technical challenges under the project vary among components, but as a general principle, project technical standards will conform with or complement Chinese standards. The project will ensure the full implementation of these generally high standards through its design and institutional set-up, check and control measures, and its monitoring and evaluation system. The technical features of the production components of the project will be based on experience in these aspects in other projects in China. These include technologies for breeding, feeding, support services, and feedlot management. In addition, the project will attempt to improve techniques and technical standards through experiences gained during implementation, specific TA and empirical research activities, as well as the improvement of product pricing mechanisms and project elements that promote quality.

In general, the technical aspects of the project will focus on long term productivity improvements and implementation of risk reduction measures from environmental and economic factors. Key measures include: (a) establishment of farmer's/herders' groups (e.g. in grazing, and livestock product marketing); (b) promotion of improved pasture management techniques based on grassland management plans; (c) development of reliable feed and forage supply systems; and (d) promotion of improved access to markets and improved functioning of markets.

Technically, the main challenge of the project is to retain its flexible approach that enables quick adjustments to changing markets in the detailed design. The flexibility has been integrated into the project design and its implementation guidelines through its phased and sequenced approach. The Bank will carry out regular reviews in order to make structural changes in the project possible.

Phasing and Sequencing of Activities. A crucial technical issue is the phasing and sequencing of activities. E.g. for wool, this means that the wool pricing and payment system must be improved before the herder's enthusiasm can be harnessed. This implies that location-by location piloting may be necessary and analysis will have to assume a cumulative adoption pattern linked to implementation plans, and steps needed may be different in different places.

Sustainable Livestock Stocking Rate. Another important technical issue to be addressed in the project is the risk that the project could lead to increased number of animals on the grasslands although quality would be emphasized as opposed to quantity. Therefore, improved marketing is a vital component of the project, where project interventions will be looking to greatly increase livestock off-take (more and more younger lambs being sold instead of being held for many years). In addition, the project will actively work with herders and farmers and officials to develop improved stocking rate guidelines and balance livestock numbers with available forage. Support is provided to improved monitoring and enforcement of stocking rates. *Annual township level feed balances will be prepared to ensure adequate feed availability (see Section G E.7.).*

Institutional Capacity. The guiding premise of the project is that there is latent technical and managerial capacity at the local level. However, for successful implementation, consistent with the integrated nature of the project, significant and focused institutional capacity building to the various stakeholders (government offices and beneficiaries) will be needed. To remedy shortcomings some of the technical and management deficiencies at the local government levels, the project will also provide training for farmers'/herders' groups.

Policy Constraints. The legal framework for farmers' associations in China is still very rudimentary. They are currently covered as social organizations with limited legal status. The project will take a flexible approach in order to promote and support further progress in this area. Additional work on farmers' associations is ongoing jointly with the Bank and the Development Research Center under the State Council. The project will closely follow recommendations from this study once available.

4. Institutional:

General. Overall, Bank-financed projects in China have had a good implementation record. Areas to improve, per lessons learned from other Bank financed rural development projects and in recent Bank Quality Assurance Group reviews include: (i) monitoring and evaluation; (ii) procurement; (iii) financial management; and (iv) provision of counterpart funding. These areas of improvement have been addressed in the design of the project.

Project Institutional Arrangements. The project's institutional and implementation arrangements are standard for most Bank financed projects in China. Based on experience, it is anticipated that project management (PLG and PMOs) will have to pay particular attention to coordination among line agencies and adequacy of management funds at line agencies.

In addition, the nature of the project requires that project beneficiaries be closely involved in project implementation (including monitoring and evaluation). The Beneficiaries Participation Manual (BPM, see section 6.2 below) would provide guidance in this process.

4.1 Executing agencies:

Successful execution of the project will involve various provincial bureaus and require close collaboration and strong support of a number of key line agencies (in particular, Water Resources, Forestry, Environmental Protection). Several of the provinces' line agencies have been involved in implementation of other Bank-supported projects and are technically strong. However, coordination among these agencies has proved to be a pertinacious issue in project execution. Also, the key department - the animal husbandry department in Gansu has not been involved in implementation of Bank-supported projects in the province before, and the technical strength and the organizational capacity of that department is weak. Xinjiang animal husbandry department has implemented its first Bank financed project, the Xinjiang Snow Emergency Project and has been quite successful its management and execution. In any case, strengthening of and coordination among the involved agencies is essential. The PLG has to play an important role in this coordination.

4.2 Project management:

Key players in project management are the PLG, PMOs, and the TAGs. The PLG at the provincial level is headed by the Vice-Governor/Vice-Chairman, which ensures highest level support for the project. Other group members include high ranking representation from the other relevant line departments finance, forestry, planning and development, and water conservancy departments). Based on experience from other rural development projects, the full attention of PLGs at all levels is key for smooth project implementation.

While the PMOs are in place and active, their capacity will be further strengthened during implementation of the project. PMO staff at all levels will receive specific training in project management (e.g. financial management, procurement, disbursement, monitoring, PRA methodology) in order to better meet the demands of the integrated approach of the project. County PMO's role in implementation is crucial.

For the TAGs to be effective, it is necessary that its members are well recognized and experienced individuals. Also, it is imperative the adequate beneficiary representation is included (private sector and farmer households). The Bank will continuously review the effectiveness of these groups.

4.3 Procurement issues:

(See Annex 6)

Country Procurement Assessment Report. Issues identified in the Country Procurement Assessment Report (July 7, 1997) have been basically resolved or significantly diminished. All procurement under the Bank financed projects in China are governed by the Bank's Guidelines for Procurement under IBRD Loans and IDA Credits and Guidelines for Selection and Employment of Consultants by World Bank Borrowers. The Bank has approved Chinese Model Bidding Documents (MBD) for procurement of goods and works under International Competitive Bidding (ICB) and National Competitive Bidding (NCB) procedures which are in mandatory use for all Bank financed projects.

Chinese Bidding Law and Local Procurement Regulations. The Law on Tendering and Bidding of the People's Republic of China became effective on January 1, 2000 ensuring sound procedures to be followed in procurement and codifying the duties and responsibilities of procurement agencies. Since development of the private sector in China is still in its early stages, procurement procedures for the private sector and commercial practices are not documented.

There are some inconsistencies between the Chinese bidding law/local procurement regulations and the Bank Procurement Guidelines in terms of procedures, in particular for procurement of civil works. While the national procurement laws and provincial regulations do not apply to the Bank financed projects in China as specified in the Chinese Bidding Law, they may impact Bank projects. Main issues to pay attention to are: (a) cost estimates are prepared based on mandatory but out-of-date norms and guidelines; (b) shorter bid preparation (20 days); (c) bracketing is used for evaluation; (d) a merit point system (scoring system) is used for bid evaluation; (e) bidding with less than three bidders can be cancelled. These issues will all be addressed in the Project Agreement and GEF Grant Agreement and through the Ministry of Finance (MOF) NCB Guidelines which are currently being prepared with the assistance of the Bank. The MOF NCB Guidelines will supersede the NCB procedures set out in the Bidding Law and other local procurement regulations.

Another issue to be paid attention to is the internal procurement review process, mainly for ICB. The involvement of the Machinery and Electric Product Import Review Office (MEIRO) of the Ministry of Commerce (MOC) (former Ministry of Foreign Trade and Economic Cooperation) in the review process has in the past resulted in delays in the procurement process. MEIRO's function is to review bidding documents (BD) and bid evaluation reports for mechanical and electric equipment procurement. The World Bank Office in Beijing is working closely with MEIRO and MOC to improve their efficiency of the review process and help them better understand the Bank's procurement procedures. The central and provincial review processes have been incorporated into the project procurement plan.

Operational Procurement Review (OPR). An OPR report for China was completed in February, 2003. The basic conclusion of the OPR is that, given the large size and complexity of the China portfolio, the number of issues that constitute intractable barriers to good procurement in the long run is small. Nonetheless, the problems identified are serious enough to warrant close attention by both the Bank and the government. These include weaknesses in procurement planning, use of unrealistic cost estimates, poor technical specifications, incomplete design studies, weak procurement and project management capacity, sub-optimal procurement slicing and packaging, and potential conflicts of interest. Based on the recommendations made in the OPR, a joint Action Plan will be developed for China. Results of this action plan will be incorporated to the extent possible into this project during its implementation.

Procurement Under the Project. Procurement under the project will include small and scattered works for construction of water supply and irrigation systems, livestock sheds, breeding centers, wool storages, forage bases, laboratory and office buildings, and goods contracts for supply of trucks and other vehicles, grassland management equipment, livestock production equipment and materials, breeding stocks, etc. Bank financing also includes technical training and some small assignments of consulting services. The procurement would generally follow the procedures of ICB, NCB, International and National Shopping, Direct Contracting, Small Works, and Force Account in accordance with the Bank's procurement guidelines and practices. Consulting services under the project are likely to require various levels of TA.

Procurement Management Manuals (PMM) have been prepared by each PPMO with the objective to provide detailed procedures for PMO staff to follow, minimize procurement delays and cost over runs. The PMMs define: (a) procedures applicable to the project; (b) internal review and the Bank's prior review requirements and its flow chart, including timeframe; (c) roles and functions defined for each level and relevant agencies involved in the project; (d) quality assurance and assistance including inspection and acceptance procedures; and (e) filing system requirement. *The Bank's standard procurement covenants are included in the legal agreements. (See Section G. A.5.).*

Procurement Management Capacity. Lessons learned from previous Bank financed rural development projects in China demonstrate a variety of potential procurement problems. E.g. unless the quality of the designated staff and the filing and management system is adequate, the procurement of agricultural inputs might lead to substantial delays and, since agriculture is dependent on season and weather, to substantial implementation problems.

A procurement management capacity assessment by the World Bank Beijing Office was carried out in July, 2002 and updated in October 2002 and April 2003. As the project implementing agencies are not experienced in Bank financed procurement, there is a need for strengthening their capacity to efficiently carry out procurement under the project. The following action plan for this purpose was proposed by the procurement management capacity assessment mission and agreed by PPMOs.

- Utilization of lessons learned. PPMOs will consult with the other PMOs in their provinces who have been implementing similar Bank projects, learning from their experiences and lessons in project management, and find a way to utilize some of their staff if possible.
- Workshops. Procurement workshops will be provided by Bank Beijing procurement staff prior to negotiations in Lanzhou and Urumqi. The workshops will focus on practical methodology of NCB and shopping procedures for the PPMOs and county PMOs staff(trainers). Other staff at county and township levels will be trained by the trainers.
- Procurement Agents. Specialized procurement agents (PAs) will be hired by PPMOs to assist in ICB, NCB and international shopping to ensure efficient procurement. PPMOs have carried out discussions with Northwest China International Tendering Company as a potential agent who has satisfactorily undertaken several Bank-financed health projects. The PA would prepare all aspects of the BD except technical specifications which are under PPMOs' responsibility and integration of the documents. With the PPMO's participation, the PA would undertake bidding activities including advertisement, issuing BD, receiving bids, bid opening, bid evaluation, award notification and contract signing.
- Procurement Planning. The procurement arrangement table and the procurement scheduling for the first year project implementation were prepared and submitted by each PPMO in November/December 2002, followed by a revised version in April 2003 which were reviewed by the Bank. The county PMOs will prepare the annual procurement plans and submit them to PPMOs for approval. The PPMOs will prepare a consolidated plan and submit it for the Bank's review based on the county plans. The PPMOs will also closely monitor the implementation of the plans and avoid undue delays.
- Procurement Management Manual. Each PPMO has prepared a PMM, outlining the procurement cycle management, administrative procedures, responsibilities and authorizations of PMOs of various levels, and filing of procurement records, etc. Bank missions have reviewed the manuals and found them generally acceptable. The procurement provisions as set in the project legal agreements should be fully incorporated into the manuals. The manuals will be issued by PPMOs to prefectures, counties and townships prior to implementation. PPMOs will explain in detail the provisions of the manuals to the related PMO staff at prefecture, county and township levels in workshops.
- Waivers. Waivers should be incorporated in the Procurement Schedule of the Loan Agreement for the differences between the Bank Guidelines and the Tendering and Bidding Law (TBL) of China and other central and local regulations. The waivers should require for mandatory use for NCB procurement of the Chinese Model Bidding Documents issued and revised by MOF.

4.4 Financial management issues:

Country Financial Accountability. In general, China is in good compliance with the Bank's financial management policies and procedures. Challenges exists in the areas of internal financial control procedures, the reporting system, and staffing. A formal country financial accountability assessment has never been carried in China. However, the Chinese government has made substantial improvements in the areas of public expenditures, accounting and auditing in China. It strongly supports a strong financial management system in Bank financed projects and has laid the foundation for compliance with Bank policies by issuing several national laws, including the revised "Accounting Law of the People's Republic of China" and the "Audit Law of the People's Republic of China."

In 1997, MOF issued a document "Provisional System for Financial Reporting under World Bank Financed Projects," which specifies the procedures for financial management for all project implementation entities. Establishment of a financial management system under Bank financed projects is now standard practice. Simplified financial reports have been agreed upon and are used for all Bank financed projects in China appraised after July 1, 1998. In addition, MOF issued "The Regulation on Accounting and Reporting for World Bank Financed Projects in China" in early 2000. These regulations were jointly prepared by the Bank and the government. Project accounting and reporting software developed for Bank-financed projects in China is also available.

Project Audits. Auditing quality in Bank financed projects in China has improved significantly and is now quite satisfactory. Audits often reveal cases of misappropriated project funds, thus enabling the Bank to address financial management issues at project level more forcefully. No outstanding audits or audit issues exist with implementing agencies involved in the project. Gansu and Xinjiang Provincial Audit Bureaus have been identified as auditors for the project. The audit reports will be issued by the provincial audit bureaus under the guidance and supervision of the China National Audit Office. It has been agreed that the audit investigations for one particular project county will not be carried out by that county's staff (s*ee Section G. A.2.).* In Xinjiang, annual cross-county and cross-prefecture auditing arrangements have been agreed upon and budgeted for within the project. In Gansu, the provincial audit bureau will carry out the county level audit investigations. In addition, the internal audit department established in the provincial finance bureaus will provide internal audit functions for the project. The provincial audit bureaus have been actively involved in the preparation of the project and assisted in the design of the financial control and accountability system and will continue to play an important role during implementation of the project.

Financial Control and Accountability. It has been agreed that comprehensive training will be provided at all levels in order to ensure well functioning financial management during project implementation. Financial management, account control and auditing will be carried out in accordance with the Financial Management Manual included in the PIM (*see Section G D.1.*). *In addition, standard financial control covenants are included in the legal agreements (record and accounts keeping, audits and utilization of statement of expenditures.)* (s*ee Section G. A.1., A.2.).*

The availability of timely and reliable financial information is essential in enabling monitoring of the project's progress toward its objectives. The financial management capacity of the implementing agencies has already been strengthened during project preparation and will be further increased through specialized training at the start of the project. MOF has requested that the Bank assist in the establishment of a streamlined disbursement and (on-lending) loan management system (a management information system, MIS). Such systems are already in use in other Bank projects. *During negotiations it was agreed that the MIS would be established by January 31, 2004 (see Section G. B.1.).*

An assessment of the financial management system and its capacity was carried out in July 2002 per requirements of the Bank's OP10.02. The assessment found that there was strong financial support and commitment from Gansu and Xinjiang governments (i.e. provincial finance bureaus). This will facilitate smooth project implementation. Also, both Gansu and Xinjiang finance bureaus have been involved in more than 20 Bank financed project and are familiar with Bank requirements. The financial management assessment revealed no major weaknesses and concluded that the financial management system under the project will be adequate to provide, with reasonable assurance, accurate and timely information on the status of the project in the reporting format agreed with the Bank. The main findings of the assessment and recommended actions are summarized below and described in more detail in Annex 6.

- **Inexperienced PPMOs**. Gansu Animal Husbandry Bureau, the key project management and implementation body in Gansu province, has not been involved in Bank-supported projects, and the technical capacity and organizational skills of the Bureau is relatively weak. Therefore, capacity building and strengthening of the Bureau should be a top priority. In addition, the PLG has to play a more active role in project coordination and guidance.
- **Inexperienced PPMO Staff.** There will be quite a few implementing agencies involved in the project and although financial/accounting staff identified for the project have relevant educational background and work experience, they are nonetheless new to Bank operations, and therefore lack knowledge of Bank procedures and requirements. Comprehensive training in financial management has to be provided for all relevant staff. The Bank task team should participate in such a training program and continue to provide assistance as and when needed throughout project implementation.

Choice of IBRD Loan Instrument. The Borrower has chosen the Variable Spread Loan. MOF will on-lend IBRD funds to the provinces on the same terms as received by the Bank.

On-Lending Arrangements, Flow of Funds and Loan Repayment. On-lending agreements will be signed between the various government levels of the Province/Region, i.e. Provincial/Regional Finance Bureau, Prefecture Finance Bureaus, and County Finance Bureaus. Repayment for goods and services of public nature would be made by the government at the county level or, in case of province-wide benefits of such goods, at the provincial level. The repayment responsibility for project activities which are of private nature, would be passed on to individual beneficiaries (enterprises and households) under varying terms for different project activities. The following general guidelines have been agreed upon: (a) repayment responsibilities of households will be denominated in local currency and no foreign exchange risk will be handed down to the final beneficiaries *(see Section G A.3.)*; (b) the interest rate of the amounts to be repaid will be fixed at the time of contract signing and cannot be changed over the course of the repayment period; (c) the cost of the total amount to be repaid by beneficiaries is expressed in terms of one uniform interest rate, i.e. any other costs (fees and charges) have to be converted into a mark-up of the interest rate; (d) the maturity of repayment amounts will depend on the repayment capacity of the borrower and the returns from the investments. *The detailed repayment terms and conditions have been specified in the PIM (see Section G. A.3.).*

As the implementation of the project will involve very large numbers of agreements between County Financial Bureaus and beneficiaries, the MIS will also include a loan tracking module. This would allow for sound control of payment recovery.

Counterpart Funds. Commonly, Bank financed rural development projects in China experience serious delays in the provision of counterpart funding hindering timely project implementation. The participating counties' ability to provide counterpart funds has been assessed and will be closely monitored by the Provincial Finance Bureaus. The overall counterpart fund requirement for the project is about 1/3 of the total project funding. Counterpart funds will come from various government sources. The project is relying heavily on central government programs in the context of the Western

Development Strategy where the project counties are beneficiaries for large funding into grasslands and animal husbandry programs. Some of the more significant programs are: "Return to Grassland Program," "Grazing Ban Program," "Pasture Rehabilitation Program," "Grass Seedling Base Development Program," "Livestock Improvement Project in Gansu," "Food Quality Program." The PLG will coordinate the various sources of funds. *Details for sources of funds for the various activities have been identified and are included in the PIM. Repaid amounts by beneficiaries that have not yet fallen for repayment by the counties to the province would be used for similar activities to the project (see Section G. A.4.*).

5. Environmental: Environmental Category: B (Partial Assessment)

5.1 Summarize the steps undertaken for environmental assessment and EMP preparation (including consultation and disclosure) and the significant issues and their treatment emerging from this analysis.

Environmental Impact Assessment. An environmental impact assessment (EIA) has been carried out in parallel with project preparation, by Chinese Research Academy of Environmental Sciences (CRAES) certified to undertake environmental impact assessments according to Chinese regulations. The EIA work is fully in line with the participatory approach of the project. The EIA has: (a) informed the screening of the project to the most appropriate review and approval option; (b) established an environmental baseline against which to measure future change; (c) established environmental objectives, standards and performance indicators; (d) identified additional environmental project activities; (e) identified benefits and residual impacts or risks (i.e. those that cannot be avoided or mitigated); (f) designed an environmental monitoring and mitigation plan with a schedule and triggers for action; and (g) provided guidance to more detailed planning and implementation. (See also Annex 12).

The EIA is prepared to meet the requirements of relevant environmental protection and assessment processes and regulations of the People's Republic of China, Gansu Province, Xinjiang Autonomous Region, and the World Bank. The EIA report presents the results of the environmental impact assessment for the project, based on two separate studies undertaken in Gansu and Xinjiang The studies were later combined due to similarities of the environmental issues and the proposed mitigation measures to form one report. The project counties were divided into different groupings based on the major prevalent livestock production systems in each county. Within each grouping, the environmental issues were further assessed under secondary breakdown of counties based on different ecological zones present within the project areas. The studies concluded that the major potential environmental and social issues and required mitigation measures are more related to different production systems than the ecological zoning, most likely since the production systems have been adopted by the local herders/livestock farmers based on ecological characteristics of their environment. Activities such as livestock and auction markets, rural enterprises, and milk processing facilities were also reviewed, and potential environmental impacts and respective mitigation measures were identified.

Anticipated Environmental Impacts. The major identified environmental issues are the present status of grasslands, adequacy of feed for livestock, and adequacy of natural resources (water and soils) for the production of artificial pastures and improved natural grasslands to ensure an environmentally sustainable development project. During implementation and operation, as long as the project enforces grassland laws and do not allow any increase in the number of animals within natural grasslands beyond their carrying capacity, it is not likely that project implementation will have any negative environmental impacts. The development of irrigated fodder and forage crops (artificial pastures) under large on-going government programs is already reducing the pressure on natural grasslands, allowing for the rehabilitation of the presently overgrazed grasslands. The project will support these government efforts. For the GEF activities, use of seeds of indigenous grass species for the improvement of natural grasslands through supplementary sowing would provide for improvement of natural grassland ecology, thus generating positive global environmental impacts (Annex 4 under Summary of Costs and Benefits).

Possible negative environmental impacts of the project could originate from net increase of livestock; site specific limitations in availability of irrigation water for the development of artificial pastures; and inadequate soil quality for development of irrigated forage/fodder crops (soil salinity, sodicity, water holding capacity, nutrient availability, etc.) within project counties. Although the project intends to reduce the pressure of livestock on grasslands, overstocking of animals is a risk. Livestock numbers will be strictly monitored within the project. Regarding water availability, since the exact location for the developments of artificial grassland will be determined on-goingly in accordance with the project's phased and sequenced approach (as the beneficiaries will be selected), the location specific impacts of those activities cannot be determined in advance. The project will, in line with the water resources planning of the region, make sure that the available water resources are sufficient for sustainable implementation. Water balance studies will be carried out at selected sites prior to any developments *(see Section G D.6.*). In addition, the project will encourage alternative, less water demanding forage crops and water saving irrigation methods. The Environmental Management and Monitoring Plan (EMMP) includes monitoring measures for livestock numbers, and water and soil issues. While the project will not finance the use of pesticides on the artificial pasture, a training program is included to improve the knowledge base of the agricultural extension and grassland monitoring station staff on the basics of pest management and agrochemical use, handling, and application within project areas.

The dairy sub-component in Gansu has its own specific environmental issues and potential impacts. Two different dairy production models are proposed: (a) small-scale household dairy farmers (1-5 heads) with 1-2 dairy cows being financed by the Bank; and (b) medium-size dairy farms with up to 100 heads operated by Hovill Dairy Company and entrepreneur households in Linxia, Dingxi, Jiuquan and Lintao counties. The small-scale household activities are not anticipated to cause any significant impacts. However, the medium scale dairy farms, as well the proposed beef cattle feedlots could have pollution impacts and health related issues (possible coliform increase), odor, solid and liquid manure, and liquid waste from washing of the equipments. Appropriate waste/wash water and manure treatment plans will be incorporated in the detailed design of these activities to reduce potential negative impacts.

The potential negative environment impacts during construction and implementation phase of the project are of temporary nature and limited in magnitude. These impacts include: impact on natural vegetation due to temporary land occupation at the construction sites, pollution as a result of additional daily waste produced at the construction site and noise and dust of the construction machinery.

5.2 What are the main features of the EMP and are they adequate?

To prevent or reduce the adverse direct and indirect environmental impact of the project, *an Environmental Management and Monitoring Plan (EMMP) has been developed to guide the implementation of the identified monitoring and mitigation measures. For artificial pasture locations not yet identified, and activities under the Market Systems Development Component not yet designed in detail, the EMMP spells out detailed environmental assessment procedures to be followed prior to clearance of such activities (see Section G. E.1.).* The EMMP is based on the highest standards of the Government of China. The content is consistent with corresponding Bank policies and includes: (a) recommendation of feasible and cost-effective measures to prevent or reduce significant negative environmental impacts to acceptable levels, including work programs, budget estimates, schedules, staffing and training requirements, and other necessary support services to implement the measures; (b) identification of the needs of institutions to implement environmental assessment recommendations, including staffing, authority and capability, organization and management, and knowledge and experience on environmental issues; and (c) preparation of detailed arrangements for the monitoring of implementing mitigating measures and the impacts of the project during construction and operation. A training program for all people involved in the environmental monitoring and mitigation program, including environmental inspectors and other county and provincial level environmental staff has been prepared and budgeted in the EMMP.

5.3 For Category A and B projects, timeline and status of EA:

Date of receipt of final draft: April, 2003

The project has been categorized into Environmental Risk Category B and Safeguards Risk Category S2 on the basis of the general restorative and conservation nature of project activities; (b) no conversion and active restoration of natural habitats; and (c) limited use of fertilizers in some grassland rehabilitation activities. This category is consistent with guidance given in General Practice (GP) 4.01 Annex 1(b) and is consistent with recent practice in the East Asia Region on projects of similar scope. Adverse impacts, if any, are expected to be localized. Environmental issues which may be encountered under the project can be managed with known mitigation measures which are defined in the EMMP.

A detailed work plan and outline of the EIA report was prepared and submitted to PPMOs and the Bank before any work started. A first draft of the EIA was completed in March 2002 and submitted to the Bank for review and delivered to the Bank's InfoShop. It was distributed to all project-affected groups and other key stakeholders (as identified by the Social Assessment team) to be used as an element and background for project pre-appraisal. The final EIA report is dated April 2003.

5.4 How have stakeholders been consulted at the stage of (a) environmental screening and (b) draft EA report on the environmental impacts and proposed environment management plan? Describe mechanisms of consultation that were used and which groups were consulted?

In order to seek local support, to increase transparency and accountability to the public, to reach consensus with various stakeholders, and to enhance ownership of the environmental management in the project, participation of beneficiaries and other stakeholders was of great importance in the environmental assessment process. The EIA Terms of Reference (TOR) were sent to the libraries within the affected communities for review and comment by interested parties. Notices were issued and put up on notice boards. News media, including local newspapers, television and radio were also used extensively to inform all beneficiaries and potentially affected people within the areas of project impact about the planned environmental study, and their input was sought actively.

Separate Beneficiary Participation Manuals have been prepared in cooperation with the EIA process which establish the means and mechanisms by which project beneficiaries will participate in project implementation. Training and capacity building to enhance the Borrower's ability to implement the project in a participatory manner are included in the project.

5.5 What mechanisms have been established to monitor and evaluate the impact of the project on the environment? Do the indicators reflect the objectives and results of the EMP?

Monitoring is an important part of the environmental assessment process throughout project implementation. Arrangements have been concluded for monitoring the impacts of the project during construction, operation, and implementation of any mitigating measures as part of the EMMP. Training and institutional strengthening will ensure that environmental monitoring will be carried out with participation of all project stakeholders. Environmental monitoring indicators are included in the regular monitoring reporting such that they fully reflect and follow the objectives of the EMMP. Environmental inspectors and county level environmental staff will be trained as part of the project training programs on identification of project environmental monitoring indicators and triggering points. The EMMP plans are prepared with the understanding that such plans are dynamic in nature and have to adapt to potential changes to the environmental regulations and the dynamic nature of integrated development projects.

6. Social:

6.1 Summarize key social issues relevant to the project objectives, and specify the project's social development outcomes.

General. Many of the targeted beneficiaries in Gansu and Xinjiang are ethnic minority semi-sedentary herders (sedentary in winter, nomadic during summer) and farmers belonging to the Dongxiang, Hui, Kazakh, Mongol, Tibetan, Tu, Uygur, and Yugu ethnic groups. The social assessment work paid close attention to appropriateness of the project activities relative to the different ethnic minorities as to make sure that all activities are culturally appropriate and in accordance with their wishes. Two rounds of consultations (Participatory Rural Appraisals, PRAs) were conducted during project preparation.

Initial Consultations. Individual in-depth interviews and stratified focus groups were the main sources of data used in the analysis. An interview guide was developed during training provided in Gansu in January, 2000. The interviews and focus groups consisted mostly of open-ended questions but also included a standard set of questions to develop a socioeconomic and demographic profile of each informant. Care was taken to maintain the anonymity of all informants as best possible. The objective of the PRAs were to identify the needs and interests of the potential project beneficiaries. Main issues and identified by the herders/farmers included the wish to increase income from livestock development, lack of availability of improved breeds, lack of adequate support services and inadequate winter forage. Findings from the PRAs played an important role in shaping the project as it currently stands.

Social Assessment Process. In order to ensure effective project preparation and implementation, a social assessment (SA) process was established. The overall purpose of the SA is to assist in designing and implementing the project with the support and active involvement of individuals and groups most directly affected. It is anticipated that this participation will range from simple one-way communication, such as information disclosed in publicity campaigns and surveys, to more intensive interactions involving two-way discussions in which the informant's opinion is recorded and considered in the project's implementation arrangements. The SA should be viewed as a continuous process of consultation to take place throughout the project's life cycle.

During the summer of 2001 social assessments were carried out in Gansu and Xinjiang. PRAs involved focus group discussions, village-wide meetings, household case studies, and householder interviews. The focus for this project preparation SA was to discuss the outlines of the project with potential stakeholders and gather their suggestions for project design revision. A draft SA Report was submitted to the Bank during the winter of 2001-2002 which incorporated a number of recommendations. The SA Report advised the Bank and the Borrower to prepare Ethnic Minorities Development Plans for both provinces in accordance with OD 4.20 as the best mechanisms to address minority nationality issues. *Multi Ethnic Group Development Strategies (MEGDS) have been prepared and reviewed by the Bank and the project will be implemented in accordance with these plans (see Section G. E.2).*

6.2 Participatory Approach: How are key stakeholders participating in the project?

General. The nature of the project requires close involvement of the beneficiaries in the detailed design of the various project activities. This bottom-up approach was initiated through the PRAs carried out in the spring of 2000 and summer of 2001. During later preparation, another round of PRAs, utilizing the fieldwork methods of cultural anthropology and a semi-structured questionnaire survey, were carried out as an integral part of a SA process. This approach of SA will continue during implementation.

Beneficiary Participation Manual. In order to "streamline" beneficiary participation in implementation, Beneficiary Participation Manuals (BPM) have been prepared and the project will be implemented following these manuals *(see Section G D.3.)*. The purpose of the BPMs are to describe in detail and formalize the consultation and participation process with various stakeholder groups. As such,

it is a manual for allowing stakeholders to influence and share control over the decisions and resources that affect them. The BPM: (a) identifies the project's main stakeholder groups (beneficiaries in general, women in particular, government leaders, academicians, and any other groups that will be affected by the project); (b) summarizes the types of activities project households and affected groups are involved in at different points in the project cycle for each of the components; and (c) describes the extent of participation by households and affected groups, and (d) the forum for participation. The BPMs are viewed as working documents that will be modified to reflect any changes in the project and/or in the economic, political, and social conditions.

6.3 How does the project involve consultations or collaboration with NGOs or other civil society organizations?

The project promotes the formation of farmers'/herders' groups for grassland management, production, and marketing, which through their active involvement in project implementation would increase project impact and sustainability. Training activities will include collaboration with local Women's Federation.

6.4 What institutional arrangements have been provided to ensure the project achieves its social development outcomes?

Institutional arrangements to ensure that the project achieves its social development outcomes are incorporated into the project design. The main tool to ensure this are the BPMs and MEGDSs.

6.5 How will the project monitor performance in terms of social development outcomes?

As for the environment, monitoring of social performance is an important part of the SA process throughout project implementation. A quantitative/qualitative baseline survey has been prepared for monitoring purposes and arrangements for monitoring the social impacts of the project have been included in the PIM. Continuos follow-up monitoring of the baseline survey households will be carried out by an independent local institute in cooperation with project beneficiaries *(see Section G. B.2.)*. Both quantitative and qualitative baseline surveys will be carried out for monitoring purposes. In addition, the BPMs establish a feedback mechanism that allow project beneficiaries to influence the implementation of the project. Implementation arrangements of the project are designed in such a way that it can easily respond to ongoing monitoring and evaluation findings. The BPMs have also established information dissemination mechanisms (in the context of a Project Communication Strategy) through which stakeholders can receive continuous information on the project impacts.

7. Safeguard Policies:

7.1 Are any of the following safeguard policies triggered by the project?

Policy	Triggered
Environmental Assessment (OP 4.01, BP 4.01, GP 4.01)	● Yes ○ No
Natural Habitats (OP 4.04, BP 4.04, GP 4.04)	○ Yes ● No
Forestry (OP 4.36, GP 4.36)	○ Yes ● No
Pest Management (OP 4.09)	○ Yes ● No
Cultural Property (OPN 11.03)	○ Yes ● No
Indigenous Peoples (OD 4.20)	● Yes ○ No
Involuntary Resettlement (OP/BP 4.12)	○ Yes ● No
Safety of Dams (OP 4.37, BP 4.37)	● Yes ○ No
Projects in International Waters (OP 7.50, BP 7.50, GP 7.50)	○ Yes ● No
Projects in Disputed Areas (OP 7.60, BP 7.60, GP 7.60)*	○ Yes ● No

7.2 Describe provisions made by the project to ensure compliance with applicable safeguard policies.

General. Copies (and Chinese translations) of all relevant operational policies have been provided to and discussed with the PPMOs at every mission. Borrower is well aware of the Bank's safeguard procedures and has fully integrated them into the project design. Monitoring of safeguard issues has been made part of the regular monitoring activities.

Environmental Assessment and Natural Habitats: see Section 5 above. No project activities will take place in natural reserves or within buffering zones of natural reserves. Final sub-project designs will be reviewed by the Bank prior to implementation. *Procedures for environmental reviews for final plans have been developed in the EMMP (see Section G E.1.).*

Indigenous People. Many of the anticipated project beneficiaries are ethnic minority nationalities. The social assessment recommended the Borrower and the Bank that a minorities-targeting development strategy should be devised as the appropriate approach for the application of OD 4.20 to the project to ensure that indigenous people benefit from project activities and to avoid or mitigate potentially adverse effects on indigenous people caused by project activities. MEGDSs have been prepared for both provinces *The MEGDSs form an integrated part of the PIMs (see Section G. E.2.).*

Safety of Dams. It is possible that the project will utilize irrigation water from dams exceeding 15m in height or 10m in height and more than 1 million cubic meters in storage capacity, thus being subject to safety review in accordance with procedures acceptable to the Bank and in accordance with OP 4.37. Twenty-six dams in Xinjiang and 24 dams in Gansu could potentially require safety review. *Dam Safety Review Management Plans have been prepared and included in the PIM (see Section G. E.3.).*

Resettlement. No resettlement or land acquisition is anticipated in the context of project activities.

Disclosure. The EIA and MEGDSs have been disclosed through the Bank's Infoshop and by the Borrower in both project provinces.

F. Sustainability and Risks

1. Sustainability:

General. The overall success of the project depends upon: (a) a continuing stable macro-economic environment; (b) the various government level's political commitment to sustainable natural resource management; and (d) good ownership of the implementation process by project beneficiaries. For example, the sustainability of the investments into grassland and pasture improvement depends upon the functioning of the relevant resource users groups being able to achieve sustainable operation and maintenance of the investments. Project investments will thus be carried out in parallel with capacity building at the local level through a participatory approach. Particular attention will be paid to supporting the beneficiaries in building capacity to take on the responsibility for sustainable management of the natural resource base. The purpose is to optimize positive ecological, social, and economic benefits of interventions aimed at maintaining and restoring grassland ecosystem structure and function. Thus, the project will attempt to manage sustainability by promoting community-based grassland resource management planning which applies integrated ecosystem management approaches on a landscape scale. More specifically, three main factors are critical for project sustainability:

- **Ecological Sustainability**. More generically, sustainability of biodiversity conservation requires: (a) clear identification of the biodiversity to be sustained, on what scale, and over what time period; (b) conservation and sustainable use on privately owned lands; and (c) recognition that socioeconomic and political factors are root causes of biodiversity loss; and therefore a comprehensive, long-term, and adaptive approach is needed to conserve biodiversity sustainably. In particular, the ecological sustainability of the GEF funded grassland management activities would be pursued through

improved monitoring and enforcement capacity. This would include strengthening of monitoring of grassland ecosystems and stocking rates to ensure compliance with national grassland laws. In addition, the project will actively work with the ADB/PRC GEF Partnership on Land Degradation to coordinate actions into phased and flexible programs, scaled to local institutional capacity, and with discipline provided by results-oriented milestones and effective monitoring and evaluation systems to make biodiversity conservation sustainable.

- **Institutional Sustainability**. Institutional sustainability will be pursued by working at local levels with a wide range of stakeholders, building capacity of Animal Husbandry Departments and Grassland Monitoring Stations, and working with existing and/or new herder/farmer groups.
- **Economic Sustainability**. Economic sustainability will be achieved by demonstrating direct economic benefits of improved grassland management approaches to local communities to convince both them and policy decision makers that there is a direct benefit from biodiversity conservation in the productive landscape. The Market Systems Development Component will promote implementation of activities based on economic incentives for farmers/herders to participate. The project embraces market-related activities that are inherently sustainable. An example is the reorganization of fine wool marketing at herder level. The marketing program's early years are specifically designated to improve selling systems which can yield immediate and tangible benefits to herders. This will solidify support for fine wool husbandry and ensure that genetic resources are fully utilized. Market information systems based on standard product descriptions will be demanded long after the project has finished. It is expected that increased animal productivity and resulting financial returns to local communities from sustainably managed grasslands would be important incentives in the long-run, while also generating significant global benefits.

The Western China Development Strategy and its supporting programs and projects will help sustain the project activities. These include the Ecological Agriculture County Program by MOA; Micro-financing for Poverty Alleviation by Poverty Alleviation Office of State Council and MOA; Ecological Demonstration Area by SEPA; Sustainable Development Strategy and Agenda 21 by /Ministry of Science and Technology; 10th five year plan by NDRC, Xinjiang Regional and Gansu Provincial 10th five-year plans; and Green accounting by State Statistics Bureau.

1a. Replicability:

The ADB's PRC-GEF partnership has identified the project along with six other projects as a demonstration project to generate experience in integrated ecosystem approaches to land management. It is intended that these projects will provide an array of lessons and replicable models on integrated land management for the western region, and more widely across the country.

The grassland management approaches implemented under the project are based on the experience of other similar Bank financed development projects elsewhere. Whilst there are no blueprints for success, good examples will be tailored to local situations and replicated elsewhere under the project. What is more important yet is that people who live from the pastoral resources need to see with their own eyes how adoption of better management techniques could benefit them and have the opportunity to ask pointed questions relating to their problems and make up their own opinion as to the applicability of what they have seen. Preparation and implementation of pilot grassland management plans and demonstrations for rehabilitation of degraded grassland would create opportunities for replication of these activities in other communities as they gain confidence in new approaches. Farmers/herders who have survived on marginal resources are careful and risk averse and will take their time to adopt new avenues and techniques, which will ensure sustainable utilization of their resource base. GEF pilots and demonstration activities are intended to provide incentives and confidence for farmers/herders to overcome barriers that currently limit their adoption of integrated and sustainable pastoral production

systems. There are also good opportunities to replicate project activities in other countries in the region with the same environmental and/or social conditions, especially where initiatives are already being taken in the domains of integrated livestock and grassland management systems.

2. Critical Risks (reflecting the failure of critical assumptions found in the fourth column of Annex 1):

Availability of Natural Resources. In the project areas, general risk exists regarding the availability of natural resources for the implementation of the project. Availability of adequate feed quality (nutritional value) and quantity is strongly correlated to availability of water resources (quality and quantity) and land resources (absence of high levels of salinity/sodicity, adequate water holding capacity, adequate soil depth, etc.). The yields of fodder/forage crops, as envisaged in the PIM and farm models will only materialize if land and water resources of adequate quality are available, and appropriate water and agronomic management practices are adapted within areas earmarked for the development of irrigated forage/fodder crops (artificial pastures) by the farmers/herders within the project areas.

Risks Related to Economic and Financial Sustainability. A possible lack of farmer/herder participation represents a risk to the success of several project activities. Participation in breeding, grazing and marketing activities, as well as training and extension, will to some extent determine both the costs and benefits of some project components. The impact of such activities can only be transferred through large-scale adoption by herders, and other market participants, of new techniques and procedures. The project contains several aspects of training and extension, including a large proportion dedicated to marketing-related training and extension. For fine wool, publicity campaigns amongst herders are planned. This will help offset the risks.

The major risks associated with the financial sustainability of farm investment projects include: (a) reduction of prices of livestock products; (b) increased cost of major inputs; (c) increased investment costs; (d) inability to achieve the projected productivity targets; (e) lower than expected fodder crop yields which would increase the total cost of feed and fodder; (f) inability to achieve the projected increase of farm–gate level wool prices; (g) loss of livestock due to winter snow storms; and (h) reduced productivity of natural grasslands due to extended drought conditions.

It is expected that risks (a)-(c) are modest. Livestock products have shown an upward trend in China and prices of major inputs have been stable. Risks (d) and (e) are mitigated by providing farmers training in livestock management and extension services, through sequencing of investments, and monitoring their physical and financial impacts. Risks (g) and (h) are mitigated through investments into warm sheds and increase of fodder base; training and extension; and through phasing of investments and monitoring their physical and financial impacts. Regarding risk (f), the current wool prices received by herders are so far below national and international levels (adjusted for transport and quality considerations) due to the shearing, grading and baling practices, that this risk is rather distant. There are some limited domestic causes of price volatility linked to local transport and storage restrictions, lack of transparent pricing and quality standards descriptions. This risk is mitigated through implementation of the project marketing activities, which target the domestic inefficiencies.

Delivery of Project Benefits. The current capacity of the PPMOs staff in both provinces is a major constraint to deliver the project benefits. The specific skills in the PPMOs are pertinent to livestock production specifically and need to be supplemented by training and people with complementary skills. In the project areas, a risk exists that project participants may not receive uniform access to project resources. In particular, loans may not be channeled efficiently. Several aspects of the Market Systems Development Component rely on competitive pressures to deliver project benefits. In particular, this refers to prices for meat and wool being influenced by a larger number of market participants and the provision of liquidity at strategic times of the year. If the entry of new market participants is hindered for some reason, the delivery of benefits (mostly in terms of raised prices) will not be delivered.

Additional risks are listed in the table below.

Risk	Risk Rating	Risk Mitigation Measure
From Outputs to Objective		
Local governments do not effectively support decentralized and herder managed natural resources control.	S	The project will support training, awareness building, knowledge and information man. for relevant institutions and entities.
Lack of community commitment to enforce natural resource use and provisions of the grassland law.	S	The project will strengthen community and public institutions to enforce appropriate regulations and maintain natural resources sustainability, and develop proper incentives.
Grassland stations continue having difficulties to enforce the implementation of the grassland law (including controlling animal numbers)	S	The project will support linkages with and service provisions by public agencies, by establishing links with various centers of technical expertise at all levels.
Difficulties to trade wool across provincial borders freely remain.	S	The project will work to obtain full local government support to monitor and enforce free trade.
Low adoption rates of new technical innovations and packages by farmer/herders.	M	The project activities will be sequenced. Technologies and technical innovations which are profitable and consistent with farmers/herders skills and needs will be developed. Technologies which have significant positive impact of farmers/herders incomes while minimizing the risk will be selected. Training and extension will build confidence in production techniques and activities.
From Components to Outputs		
Provincial, prefecture and county governments will not approve and release project counterpart funds on time.	S	- Obtain commitment from provincial and local government to provide sufficient counterpart resources through close consultation and involvement of officials at all levels. - Detailed arrangements for the allocation and channeling of counterpart funds in a timely manner to the country project implementation entities have been developed.
Unsuitable staff will be appointed to implement project activities.	M	The project will establish evaluation mechanisms to ensure that competent staff is in place. TA support during implementation.
Overall Risk Rating	S	

Risk Rating - H (High Risk), S (Substantial Risk), M (Modest Risk), N(Negligible or Low Risk)

Main Risk Minimization Strategy. The principal risk minimization strategy of the project is careful phasing and sequencing of investment activities. This is crucial in order to: (a) distribute the number of beneficiary households over the project period to suit the abilities of the county level PMO staff to procure and implement household activities; (b) improve the success of the outcome by ensuring that a logical sequence of developing the physical components within an activity is followed; (c) improve the economic viability by spacing out the purchase of capital items within an activity; and (d) sequence activities in project areas so that training and institution-building activities, as well as activities enhancing feed supply, precede investments in breeding, so as to maximize potential benefits and farmer/herder participation. The project will establish a monitoring and evaluation system which would create a feedback-loop by providing project management updated information about the financial viability and sustainability of activities under implementation, which will be in turn then used to adjust the annual project implementation plans.

3. Possible Controversial Aspects:

General. More generically, any internationally financed project in Western China could possibly cause international sensitivities. This is an issue however, that must be addressed at a country portfolio level rather than through individual projects. Western China has specific environmental issues and is the home of many ethnic minority nationalities which could cause additional issues. However, careful application of OD 4.20, and effective implementation of the EMMP and MEGDSs should help alleviate some of the possible concerns.

Specific. Potential project specific aspects of controversy could include:

- Detailed design for certain activities missing. An overall strategy for the production and marketing of wool, meat, hides and other livestock products is lacking in the project provinces. A range of development possibilities exist based on local knowledge of products and production systems, as well as substantial product volumes. The determination of project support to specific products should await the development of an overall strategy. One example is wool of medium fineness (23-25 microns), which is often referred to in China as “unsellable”, but in fact makes up a large proportion of Chinese wool imports. Similarly, China has a well established carpet industry that needs supplies of white strong (27-40 micron) wools: several Chinese breeds can and do produce such wools, for which prices are currently very low. The risk exists that the mechanisms for defining value-adding activities may be misinterpreted and later blamed for poor project performance.
- Lack of political support for farmers'/herders' organizations. The participatory approach of the project and the importance of involving farmers/herders groups could potentially be difficult at the local levels. However, most officials recognize that this approach is in line with national policies and will improve the situation for the local rural areas as a whole.

G. Main Loan Conditions

1. Effectiveness Condition

N/A

2. Other [classify according to covenant types used in the Legal Agreements.]

A. Procurement and Financial Covenants

A.1. Records and Accounts. Gansu and Xinjiang, and each project county shall maintain adequate records and accounts, in accordance with sound accounting practices, for the operations, resources and expenditures related to the project. *(PA. Article III, Section 3.01(a); LA. Article IV, Section 4.01. (a)(i-iii); GA. Article IV, Section 4.01(a)(i-iii)).*

A.2. Audits. Gansu and Xinjiang provincial level audit bureaus shall annually audit the province's/region's, and all project counties project accounts based on terms of reference acceptable to the Bank. *(PA. Article III, Section 3.01 (b)(i-iii); LA. Article IV, Section 4.01. (b)(i-iii) and Schedule 4, 5(b); GA. Article IV, Section 4.01(b)(i-iii) and Schedule 3, 5(b)).*

A.3. Repayment Arrangements for Beneficiaries. Repayment arrangements for beneficiaries shall take place according to the Project Implementation Manuals (PIM) and various project sub-manuals. The foreign exchange risk will not be born by households.*(PA Schedule 2, 9 and 11(b)(i)).*

A.4. Sources of Funds. Details for sources of funds for the various activities have been identified and are described in the PIM. Repaid amounts by beneficiaries that have not yet fallen for repayment by the counties to the province/region would be used for similar activities to the project. *(PA Schedule 2, 10(a)).*

A.5. Procurement. Goods and works and consultant services shall be procured in accordance with the Bank's procurement guidelines *(PA. Schedule 1; LA. Article III, Section 3.02; GA. Article III, Section 3.02.).*

B. Reporting and Monitoring Covenants

B.1. Management Information System. Project will implement and maintain by January 31, 2004 a management information system acceptable to the Bank. *(PA. Schedule 2, 4).*

B.2. Project Monitoring. Project will implement and maintain adequate procedures to enable to monitor and evaluate the impact of the project on an ongoing basis, in accordance with indicators satisfactory to the Bank. This monitoring includes independent social and environmental monitoring. *(PA. Schedule 2, 9(a)(v), 14).*

B.3. Reporting. The PPMO shall prepare and furnish to the Bank semi-annual reports for the physical, financial, social and environmental aspects of the project in accordance with outline and terms of reference acceptable to the Bank. *(PA. Article III, Section 3.02 (a-b); Schedule 2, B, 12 (c-d)).*

C. Project Management and Coordination

C.1. Central Project Management Office. Project will establish and maintain throughout project implementation, a central project management office in the MOA to support the coordination of the project, with terms of reference acceptable to the Bank *(LA. Article III, Section 3.01 (c)).*

C.2. Project Leading Groups (PLGs). Project will establish and maintain throughout project implementation, provincial, prefecture/city and county level PLGs in accordance with terms of reference acceptable to the Bank. *(PA Schedule 2, 1(a-b)).*

C.3. Project Management Office (PMOs). Project will establish and maintain throughout project implementation, provincial, prefecture/city and county level PMOs and township level working stations in accordance with terms of reference and staffing acceptable to the Bank. *(PA Schedule 2, 2(a-b)).*

C.4. Technical Advisory Groups (TAGs). Project will establish and maintain provincial and county level TAGs, throughout project implementation, with qualified members under terms of reference acceptable to the Bank. *(PA Schedule 2, 3(a-b)).*

D. Project Implementation

D.1. Project Implementation Manual and Sub-Manuals. The project would be implemented in accordance with the Project Implementation Manual, including Procurement Management Manual, Financial Management Manual, Participatory Grassland Management Manual, Household Repayment Manual, Enterprise Manual, and others. *(PA Schedule 2, 9(a-b)).*

D.2. Annual Work Plans. PPMO shall facilitate participatory preparation of annual work plans for the Bank's prior review. *(PA Schedule 2, 10(a-b)).*

D.3. Beneficiary Participation. Project shall be implemented according to the Beneficiaries Participation Manual agreed upon with the Bank. *(PA Schedule 2, 8(a-c)).*

D.4. Phasing and Sequencing of the Project. The timing, sequencing, and combining of project activities are elaborated in detail in the PIM along with the definition of standards and criteria and description of procedures for the selection and inclusion of project activities for implementation *(PA Schedule 2, B. 9(iv)).*

D.5. Grassland Management Plans. Participatory grassland management plans for all GEF counties shall be prepared and implemented in accordance with guidelines acceptable to the Bank *(PA. Schedule 2, B, 5(a)(iii)).*

D.6. Water Balance Studies. If water balance study reports for counties identified as potentially water deficient and adequate groundwater and surface water data are not available at the time of implementation, water tests and studies will become a prerequisite for implementation of artificial grassland sub-components. In addition, water withdrawal permits, required according to national and local regulations, should be obtained from the respective water resources administration bureaus before release of funds for the development of irrigated artificial pastures. *(PA Schedule 2, 12).*

D.7. Feed Balances. For all project townships, annual township level feed balances, prepared in accordance with guidelines and standards acceptable to the Bank shall be furnished to the Bank for review together with the presentation of the annual work plans. (*PA Schedule 2, 13).*

E. Environmental, Social and Bank's Safeguard Policies Related Covenants

E.1. Environmental Management and Monitoring Plan. Project will implement an Environmental Management Plan, acceptable to the Bank, in a manner satisfactory to the Bank. For investment sub-projects of the Market Systems Development Component, the Project will carry out environmental screenings in accordance with guidelines satisfactory to the Bank; and thereafter incorporate adequate mitigation measures into the relevant sub-project. *(PA Schedule 2, 5(a-c), and 11(a)(ii)).*

E.2. Indigenous People. Project will implement the Multi Ethnic Groups Development Strategy (MEGDS), consistent with World Bank Operational Policy for Indigenous People, in a manner satisfactory to the Bank. Project will not amend, waive or modify the provisions of the MNDP without the prior concurrence of the Bank, and said national minorities communities. *(PA Schedule 2, 6.).*

E.3. Dam Safety. Project will be implemented in accordance with the Dam Safety Review Management Plan, acceptable to the Bank, the Chinese national regulations relating to dam safety, and consistent with World Bank Operational Policy for Dam Safety. *(PA Schedule 2, 7(a-b)).*

H. Readiness for Implementation

☐ 1. a) The engineering design documents for the first year's activities are complete and ready for the start of project implementation.
☒ 1. b) Not applicable.

☒ 2. The procurement documents for the first year's activities are complete and ready for the start of project implementation.
☒ 3. The Project Implementation Plan has been appraised and found to be realistic and of satisfactory quality.
☐ 4. The following items are lacking and are discussed under loan conditions (Section G):

I. Compliance with Bank Policies

☒ 1. This project complies with all applicable Bank policies.
☐ 2. The following exceptions to Bank policies are recommended for approval. The project complies with all other applicable Bank policies.

Sari K. Soderstrom	Mark D. Wilson	Yukon Huang
Team Leader	**Sector Manager/Director**	**Country Manager/Director**

Annex 1: Project Design Summary

CHINA: Gansu and Xinjiang Pastoral Development Project

Hierarchy of Objectives	Key Performance Indicators	Data Collection Strategy	Critical Assumptions
Sector-related CAS Goal: Achieve sustainable growth in rural incomes, while maintaining the natural resource base.	**Sector Indicators:** - Average net income of participating project townships compared with non-project townships increased by end of project. - Rate of grasslands de-gradation in project townships halted or reduced.	**Sector/ country reports:** - Periodic income statistics and poverty surveys. - Periodic grassland surveys	**(from Goal to Bank Mission)** - Government will continue to focus on rural development. - Government at all levels committed to sustainable resource management.
GEF Operational Program: Maintain and nurture natural grassland ecosystems to enhance global environmental benefits: Mitigate land degradation, conserve globally significant biodiversity, and enhance carbon sequestration in project areas.	**Outcome / Impact Indicators:** - Trends in condition of key threatened grassland ecosystems and habitats in project counties. - Trend of carbon sequestration in project areas.	- Periodic grassland surveys - Regular pasture inspection and monitoring (including aerial photography and satellite imagery). - Periodic physical monitoring of carbon sequestration in selected points.	- Government at all levels committed to sustainable resource management, biodiversity conservation, and fulfillment of global environmental commitments.
Project Development Objective: Promotion of sustainable natural resource management through establishment of improved livestock production and marketing systems.	**Outcome / Impact Indicators:** - Feed balance for livestock: quality, quantity and seasonal distribution of feed supply. - Productivity of livestock and livestock products - Quality of livestock products (percentage of wool professionally sheared, graded and baled; percentage of accepted milk). - Ability and opportunities of farmer/herders to market their livestock and products.	**Project reports:** - Independent project M&E reports (beginning, mid term and final) - Regular PPMO monitoring - Specific surveys - Annual implementation plans versus progress reports - Regular PMO supervision - Bank supervision missions - Reports by Nanjing Wool Market - Market information reports (information bulletins, internet sites, specific surveys analyzing market information at local level)	**(from Objective to Goal)** - Government at all levels committed to sustainable resource management. - Farmers/herders recognize and react to the improved market signals generated by the project. - All levels of government committed to: (i) monitoring and enforcing the National Grassland Law; (ii) maintaining agricultural research programs and extension of the results, and (iii) improving the enabling environment for generation and transmission of market signals. - All levels of government enforce laws allowing free movement of products within and between counties and provinces. - Local governments and agencies support and foster competitive market mechanisms.

Hierarchy of Objectives	Key Performance Indicators	Data Collection Strategy	Critical Assumptions
Output from each Component:	**Output Indicators:**	**Project reports:**	**(from Outputs to Objective)**
1. Grassland Management and Forage Development Establish a sustainable grassland system for livestock, biodiversity and global environmental values.	- Number of community based grassland management plans developed and under implementation. - Area in ha of integrated grassland management. - Area in ha of grassland improved (seeded, fenced). - Area in ha of artificial pasture & forage crops established. - Number of Grassland monitoring stations equipped and in operation.	- Periodic grassland surveys - Regular PPMO monitoring - Annual implementation plans versus progress reports - Bank supervision missions - Annual audited project accounts	- Government commitment (at all levels and in all agencies) to implementation of the Grasslands Law - Grassland technicians have adequate institutional and technical means for enforcement of provisions of the Grassland Law (including monitoring potential overstocking of animals on grasslands) - Adequate government commitment to, promotion of and support for decentralized and herder managed natural resources activities.
2. Livestock Production Improvement Establish a sustainable livestock production system developed through improvement in animal genetics and management using environmentally sound technology.	- Number of improved nucleaus breeding animals - Number of improved breeding animals - Number of livestock sheds & silage pits built. - Number of AI, nucleus breeding and veterinary stations established. - Native species support breeding programs established (Han Tan Sheep, White Yak)	- Regular PPMO monitoring - Annual implementation plans versus progress reports - AHB, PPMO records. - Sheep tallies. - Sales data. - Specific surveys - Milk supply records - Milking stations and milk collection points' records - Bank supervision missions - Annual audited project accounts	- Sufficient incentive exists for AI stations and breeding farms to purchase improved livestock for breeding purposes. - Sufficient incentive exists for farmers/herders to purchase improved livestock.
3. Market Systems Development Promote the development of a functioning market system through improved market infrastructure.	- Number of shearing stations livestock markets, and milking stations. - Numbers of livestock markets converting to auction sale - Number of appraised rural enterprise activities. - Number of financed rural enterprise activities. - Market information system in place (including published set of product description and quality standards). - Proportion of sheep shorn by certified shearers.	- Regular PPMO monitoring - Annual implementation plans versus progress reports - Bank supervision missions - Annual audited project accounts	- Local governments and agencies support and foster competitive market mechanisms. - Herders convinced of the benefits of mechanical shearing. - Herders, wool traders, Herders' Associations, textile processors, etc. are able to transport wool across county and Provincial borders without encountering formal or informal trade barriers. - Chinese wool processors recognize Chinese fine wool as a viable alternative to imported wool. - local traders do not collude on pricing of livestock.

4. Applied Research, Training and Extension Establish improved integrated management systems that enable household livestock producers to simultaneously raise the quality of fiber, meat and milk products derived from grazing livestock and decrease the number of grazing livestock resulting in improved grassland condition without economic loss.	- Number of proposals submitted, reviewed, and awarded. - Number of on farm case studies for applied research implemented. - Number of demonstrations for integrated grassland eco-system management and biodiversity conservation - Number of logged technician visits to villages and households - Household satisfaction with technician visits (w/extension services) - Number of Extension bulletins - Number of technicians trained, (AI, shearing, etc.) and their degree of satisfaction with the training - Number of farmers/herders trained and their degree of satisfaction with the training - Number of public information campaigns to educate farmers/herders (including in marketing) developed and implemented.	- Regular PPMO monitoring - Annual implementation plans versus progress reports - Bank supervision missions - Annual audited project accounts - Annual progress updates by research institutes - Final report by research institute within 6 months of project completion - AHB records - Specific farmer/herder surveys - Training reports	- Extension stations participate effectively in project. - Farmers collaborate in demonstration projects.
5. Project Management, Monitoring and Evaluation Develop and strengthen overall project implementation capacity of project management offices and participating communities.	- Number of meetings of the PLG - Number of meetings of the TAG - Number of PMO staff trained. (Project management, procurement, etc.) - MIS system used as a management tool - Progress reports/annual implementation plans prepared on schedule -Project progress on schedule	- Regular PPMO monitoring - Annual implementation plans versus progress reports - Bank supervision missions - Annual audited project accounts	- PLG and TAG actively involved in project implementation effective - PMOs at all levels are able to attract and maintain qualified staff on a full time basis. - Operational support from key government agencies provided to PMOs - Beneficiary groups are indeed allowed to have effective input to project implementation, monitoring and evaluation.

Hierarchy of Objectives	Key Performance Indicators	Data Collection Strategy	Critical Assumptions
Project Components / Sub-components:	**Inputs: (budget for each component)**	**Project reports:**	**(from Components to Outputs)**
Grassland Management and Forage Development	$13.98 million	- Project progress reports - Project Financial Management Reports - Bank supervision mission reports - Project ICR	- Provincial, prefecture and county governments release project counterpart funds on time
Livestock Production Improvement	$67.75 million		
Market Systems Development	$10.2 million		
Applied Research, Extension and Training	$13.25 million		
Project Management, Monitoring and Evaluation	$5.75 million		

Annex 2: Detailed Project Description
CHINA: Gansu and Xinjiang Pastoral Development Project

By Component:

Project Component 1 - US$13.98 million

Grassland Management and Forage Improvement (US $13.98 million of which GEF US $2.57 million. The total excludes US $3.85 million from GEF as well as other funding for research and training related to this component costed under the Applied Research, Extension and Training component.)

Component Output: Introduction of sustainable grassland-based livestock production systems that will reverse the current trend of grassland degradation and contribute to improving the livelihoods of its rural population. The GEF activities will introduce participatory approaches to planning integrated ecosystem management of grassland resources to reverse the trend of land degradation and biodiversity loss.

Expected Benefits: The activities are expected to: (a) lead to improved management of the grasslands and artificial pastures, and provide increased supplies of quality feed and forage, resulting in increased livestock production efficiency, higher quality products and improved livelihoods of the farmers and herders; (b) improve the capacity of farmers/herders to manage their grasslands, artificial pastures, and livestock, and promote more sustainable use of grassland resources and the quality of on-farm forage and feed supplies; and (c) improve the capacity of township, county and provincial technicians to monitor grassland conditions and extend advanced technologies for forage production and grassland management.

The GEF incremental benefits are expected to include: (i) increased understanding of grassland ecosystem dynamics; (ii) improved information base on grassland and biodiversity resources; (iii) improved ability of herders and government technicians to plan and implement participatory grassland development in an integrated ecosystem approach; (iv) development and implementation of village-based participatory grassland resource management plans; (v) improved management of grasslands for livestock and wildlife; (vi) conservation of globally important grass and legume germplasm; (vii) increased in supplies of forage from reseeding degraded grasslands; and (viii) improved wildlife habitat.

Description of Sub-Components: The sub-components will comprise: (1) forage and fodder production; (2) grassland management and improvement; (3) community based integrated grassland management and pastoral development; and (4) applied research, extension and training (described here but costed under Applied Research, Training and Extension Component).

1. Forage and Fodder Production. Forage and fodder development is essential for improving the management of grasslands and for increasing livestock productivity. Resting or deferring grazing on native pastures is not possible unless livestock producers have additional forage/feed. Increased supplies of quality forage and feed would also help reduce nutritional stress on livestock, leading to improved production efficiency. Annual forage/fodder development would focus on growing corn for silage and feed-grain, and alfalfa for hay production. In addition, attention would be directed towards other annual crops such as oats, peas and vetches to increase the forage range that could be raised in a variety of situations. The sub-component would develop practical models for the production of forage and fodder on arable land. Funding would be provided to support the following key activities:

(a) Annual forage/fodder development: (i) development, testing and extension of new systems for growing corn for silage, and livestock feed-grain; (ii) development, testing and extension of new systems for growing other annual forage/fodder crops (oats, peas, vetches); and (iii) limited irrigation development and deep wells to provide water for forage and fodder development. Since forage and fodder development will take place on both irrigated and non-irrigated land, there will be different seeding rates and fertilizer applications depending on whether or not the land is irrigated or not.

(b) Perennial forage Development, testing and extension of new systems for growing alfalfa and perennial grasses, and managing these for high quality hay production and persistence of the sown species.

(c) Monitoring and evaluation: (i) project monitoring of implementation and output indicators; (ii) environmental monitoring; and (iii) project impact monitoring to document the impact of improved forage/fodder production on profitability of households.

2. Grassland Management and Improvement. Promoting more sustainable management of the grasslands in the project areas requires that a number of different improvements be undertaken in an integrated manner in order to improve livestock grazing management and to improve grassland productivity and condition. For example, development of water for livestock can help improve livestock distribution on the grasslands, especially when considered as part of an overall village-based grazing management plan. Reseeding degraded grassland with suitably adapted forage plants can greatly increase forage productivity, particularly when complemented with improved grazing management practices. Fencing can also be a valuable improvement, often leading to improved grazing management and grassland condition. This sub-component would develop practical grassland management and improvement models. The GEF relevant activities will comprise: participatory grassland resource planning; and community-based integrated grassland management and pastoral development. Funding would be provided to support the following key activities:

(a) Village-based participatory grassland resource management plan development (includes GEF). Participatory grassland management plans are a valuable tool to assist herders in developing more sustainable use of grassland resources that maintain livestock production, improve product quality and enhance the livelihoods of their communities. The key to improving the efficiency of livestock production is to ensure year long animal access to quality forage/feed. Since forage produced from native grasses and other forage plants (shrubs, forbs) is the primary feed resource, developing and implementing a practical program of grassland resource management becomes even more crucial to the sustainability of livestock production. The procedure used to develop these grassland management plans is based on the following reasoning:

- ecological condition of the plant community in terms of structure and composition influences the level of utilization by grazing and determines the ecologically sustainable stocking rate;
- the stocking rate correlates directly with the livestock off-take available to be sold to provide income and profits to the producer;
- a stocking rate balanced with annual availability of forage and fodder resources allows the grassland manager to anticipate, over a specified planning time-frame, the changes in stocking rate that might occur if improvements (i.e., improved yield of natural pasture, construction of artificial pasture, higher producing hay-land, water development, improved livestock nutrition, reseeding of degraded grassland, etc.), were implemented; and
- the increase in income obtainable from selling superior quality livestock products as a result of a stocking rate balanced with available feed resources, can be compared with the costs of the improvement to determine if economic benefits (including improvement to resource stocks) outweigh costs of improvement.

As part of the project's preparation process, GEF feasibility studies and implementation plans were developed for three townships in Sunan County, Gansu and one township in Fuyun County, Xinjiang. Implementation of GEF activities will be initiated by further development of feasibility studies and initial plans for all the GEF project areas following the participatory model. This participatory model will be further refined and adapted to local needs during implementation to establish a documented and repeatable participatory planning process for grassland resources in Gansu and Xinjiang.

(b) Grassland surveys (including GEF). For most of the project areas, the last comprehensive grassland survey was undertaken almost 20 years ago. Grassland conditions have changed considerably since then and up-to-date assessments of grassland status and trend need to be made for improved management. The current state of the grasslands also needs to be determined to provide a baseline condition against which changes in grassland condition over the life of the project will be compared. County Grassland Stations, tasked with assessing and monitoring grasslands, currently lack adequate equipment, resources and skills to undertake their assigned tasks. Support to the Stations will improve their capacity to undertake comprehensive grassland surveys, assessment and monitoring of grasslands. This will enable the Stations to: (i) pilot interpreting satellite imagery and associated grassland maps in key selected areas to quantify and assess changes in grassland vegetation and the pastoral landscape; (ii) develop and test new grassland survey and inventory systems, that build on existing grassland surveys and manuals as well as best international practice; (ii) collect grassland biophysical and socioeconomic information; (v) develop a grassland resource management data base; and (vi) reclassify grassland carrying capacities based on updated field information and county and township-level workshops to promote revised classifications and more sustainable livestock stocking rates.

For GEF related activities, this would comprise collection of grassland ecological and socioeconomic information. The information obtained would be used to determine grassland types, forage productivity in relation to grassland condition, sustainable livestock carrying capacities and to identify areas for reseeding, rehabilitation, exclusion, and improved management. Based on this information, along with participatory discussions with officials and herders, village-based participatory grassland resource management and development plans would be developed.

(c) Biodiversity surveys (GEF). Comprising collection of biophysical information in the Qilian Shan, Tian Shan and Altai Shan regions of Gansu and Xinjiang. The biophysical information obtained would be used by the provinces as they develop activities for establishing nature reserves and watershed protection areas and for managing existing reserves. The Environmental Protection Bureaus could also use it in its efforts to ensure that proposed development activities for the areas do not compromise the biodiversity of globally significant ecosystems. The Qilian Shan ecosystem is included in the Tibetan Steppe ecoregion, one of 200 globally important ecoregions due to its highly distinctive species, ecological processes and evolutionary phenomena, but for which the distribution and conservation status of the fauna and flora is poorly understood. The Black River (Hei He) that also originates in the Qilian Shan is a river system gaining increased national attention and importance for its watershed values. The Tian Shan and Altai Shan ecosystems are included in the Middle Asian Mountain Temperate Forest and Steppe ecoregion, another of the 200 globally important ecoregions where the flora and fauna is also poorly understood. The Ili River, in the Tian Shan, and the Ertix River in the Altai Shan are important international river systems requiring improved watershed management.

(d) Grassland resource maps (GEF). Maps will include information on the distribution and diversity of ecosystems within the project sites, along with information on management zones, seasonal pastures, key biodiversity habitats, villages and settlements. The maps will be developed using existing baseline data and information collected through participatory planning processes and grassland resource planning activities. The maps will make use of remote sensing, complemented with on-the-ground fieldwork, and will be entered into a geographic information system (GIS).

(e) Grassland management (includes GEF). (i) integrated grassland improvement comprising reseeding, rangeland pitting (*huapo caopi*), and fencing of degraded grassland; (ii) water tanks to provide drinking water for livestock and herders; (iii) new fencing and repair of old fencing to develop improved grazing management systems; and (iv) strengthening county, prefecture and provincial grassland stations (grassland surveys, and assessment and monitoring equipment.)

(f) Pastoral risk management strategies (includes GEF). Herders in the pastoral areas of Gansu and Xinjiang are confronted with many risks in raising livestock. Instead of a singular focus on improving livestock production, more attention on risk management by herders could provide beneficial solutions for the pastoral livestock sector, Pastoral risk management is the process of taking various actions to reduce the chance of herders losing assets (normally livestock), income, or other aspects of livelihood. Risk management among pastoralists consists of four main elements: (i) asset diversification; (ii) income diversification; (iii) improved access to production and market information; (iv) and increased access to external resources. For the project herders, this could entail: (a) raising diverse livestock species (fine-wool sheep, meat sheep, cattle/yaks and horses) in order to diversify their assets of production; (b) seeking ways to earn income not only from the sale of livestock but also from the sale of specialty livestock products (fine wool, coarse wool for carpet/felt production, yak meat, etc.) or certain classes of animals (young meat lambs that could command higher prices), hay, forage seed, medicinal plants collected from pastures, and income from tourism or hunting; (c) obtaining up-to-date information on livestock production technologies, including pasture management and fodder production, market prices for livestock and livestock products; and (d) improved access to credit to build warm sheds or purchase improved breeding animals, veterinary services, and other livestock production related inputs.

Adopting an approach of strategically managing risks would require a shift in attitudes and some current approaches to livestock development in the pastoral areas. First, a pastoral risk management strategy entails the systematic implementation of a four-stage course of action. All stages are important and require thorough planning for the strategy to be successfully implemented. Stage 1 involves risk reduction and avoidance and is the stage of long-term activities, undertaken by herders and the government, to reduce vulnerability to risk. Stage 2 is risk planning that includes activities to prepare the pastoral economy for stress periods such as winter and for unexpected shocks, such as blizzards and drought. Stage 3 is reacting to risk, such as severe snowstorms or drought, and includes the key tasks once such an event occurs. Finally, Stage 4 is activities undertaken to recover from such events.

A pastoral risk management strategy can build on the traditional knowledge herders possess of the environment in which they make a living primarily from the livestock they herd. Herder groups can play an important role in forging better linkages between herders for exchange of knowledge and information that underpins improved risk management. Promotion of pastoral risk management will comprise training and workshops to change attitudes among herders, Animal Husbandry Bureau staff, county and provincial officials, and policy makers.

3. Community-Based Integrated Grassland Management and Pastoral Development (GEF). This subcomponent will introduce sustainable grassland-based grazing and livestock management systems to reduce land degradation and reverse biodiversity loss. Based upon lessons learned in China and elsewhere, the subcomponent will join cadres, herders and pastoral communities into a co-learning framework in the development of integrated grassland resource management with the objective of achieving sustainable and economically viable pastoral development at the local level. Financing would be provided to support the following key activities:

(a) Developing improved grazing and livestock management systems. Management systems that maintain productivity of grassland ecosystems and reduce threatening processes would be developed by building on the technical expertise in Grassland Institutes and Provincial and County Grassland Monitoring Stations and practical experience of herder participants. This is likely to include changing the commencement time and duration of grazing in different ecosystems of summer transhumant ranges, intensively managed areas such as valley bottoms and spring/autumn range that require rehabilitation. Areas of high biodiversity will be set side.

(b) Forage seed production. Including germplasm collection of native grasses, forbs and shrubs and development of seed production. Local stocks of indigenous grass and legume species are needed for sustainable rehabilitation of grassland systems and are critical to conservation of genetic diversity in globally important forage species. Without production of local provenance of forage legume and grass species, globally important forage legume and grass species which could easily be polluted with introduced genetic material, even if it is of the same species.

(c) Reseeding grasslands. Using locally collected stocks of indigenous grass and legume species to enrich intensively used and high risk areas such as valley bottoms, riparian zones and forest margins.

(d) Management of grassland resources for biodiversity conservation and watershed management. Traditional management and contemporary development plans have focused on productive values of grassland ecosystems rather than multiple benefits. New skills are needed to balance the trade-offs between short-term and local productive benefits and longer-term and global benefits such as conservation of globally significant plant and animal species or watershed management for international rivers. National policies support such trade-offs, but their practical implementation in poor areas of Western China are still being developed. These activities will pilot and adapt participatory approaches and capacity building to achieve an acceptable balance between these trade-offs.

4. Related Applied Research, Extension and Training (includes GEF).

(a) Applied Research. Activities would strengthen the capacity of research agencies to develop and implement research activities which addresses information requirements for more effective integrated ecosystem management, participatory grassland management and pastoral development. This would include applied research on grassland ecology, herbivore ecology, grassland rehabilitation, forest grazing, watershed management and socio-economic research on pastoral production practices.

Applied research projects will be designed to contribute to broader themes related to sustainable grassland utilization and improved livestock efficiency. Based on the research needs identified on project sites, specific proposals will be developed and implemented following standard format and implementation criteria detailed in the Applied Research, Extension and Training Component. Research topics are anticipated to include: (i) forage production management; (ii) rehabilitation of degraded grasslands; (iii) seed production and re-establishment of native forage germplasm; (iv) indigenous knowledge of grassland resources and livestock, and customary grassland management; (v) linkages between livestock utilization and grassland degradation; (vi) grassland ecology, including vegetation succession dynamics; (vii) economic valuation of grassland products and services; (viii) mechanisms to charge consumers for benefits derived from grassland resources; (ix) grassland tenure and allocation of grasslands to individuals vs. groups; (x) the effect on grasslands of settling herders; (xi) economic valuation of forage and fodder production and services provided by forages; and (xii) market development and marketing of forage and fodder products and services, and market intelligence systems.

(b) Extension and Training. These activities would be directed at improving the delivery of key research findings and technical grassland management and improvement and forage/fodder improvement guidelines to project staff (provincial, county and township levels) and to herders/farmers, mainly using existing extension networks at the county and township levels. Specific activities would be directed at provincial and county Animal Husbandry Bureau and Grassland Station staff involved in the planning, organization, supervision and monitoring of grassland management and forage/fodder improvement related activities. An important task will be the development of training modules. A range of international and national universities are expected to assist the Animal Husbandry Bureaus in this activity. Key staff will undergo training in activities related to sustainable grassland management by participating in study tours and training in other provinces of China and abroad in countries with proven experience in grassland management and forage/fodder improvement and pastoral development.

GEF specific activities would strengthen technical programs for grassland management, participatory grassland management planning and conservation of grassland and native livestock biodiversity. They would also include support for the development and transmission of improved technologies and extension material on integrated grassland resource management to herders and farmers. Training programs will be designed to improve the capacity of Animal Husbandry Bureaus, Grassland Stations, and Forestry Bureau staff for integrated grassland resource management and watershed management. Participatory grassland resource planning and community-based grassland management and pastoral development would provide intensive learning opportunities for staff. Existing staff will also participate in an integrated program of in-service training courses designed to cover different aspects of integrated resource management. Key activities to be supported include: (i) general staff training comprising a training program for animal husbandry bureau staff tailored to the needs and levels of different job positions, with separate courses targeting decision makers, middle-level managers, scientific staff, and administrative staff; (ii) building local capacity for training delivery comprising support to local institutions/universities to provide in-service training to herders, farmers and technicians; and (iii) overseas study tours and training including possible visits to Erzurum Rangeland Management Institute in northeast Turkey, which has many similar species and ecosystems as well as 10 years of participatory grassland planning (supported by early GEF investment in 1992-1997).

Project Component 2 - US$67.75 million

Livestock Production Improvement (US$67.75 million of which GEF US$0.32 million. This amount excludes funding for related research and training activities including an additional GEF contribution of US$0.32 million costed under the Applied Research, Training and Extension Component.)

Component Output: The component will develop and establish sustainable livestock production systems in the project areas through improvements in genetics and management using environmentally sound technologies to improve production efficiency. In order for animal husbandry to remain sustainable in northwest China, new approaches to livestock production need to be better integrated with improved grassland management and the marketing of livestock products. In the past, livestock development has focused primarily on introduced breeds, while generally ignoring the local native breeds that are well adapted to local environmental conditions. Indigenous breeds found in the project areas are of global significance and the GEF incremental activities will strengthen the capacity of the Animal Husbandry Bureaus and local research institutes to maintain and improve native livestock germplasm as part of agro-biodiversity conservation and sustainable pastoral development in Western China.

Expected Benefits: It is expected that the project activities will improve productivity per animal through production efficiencies gained by genetic improvement and adopting new husbandry practices, energy based feeding regimes and targeted livestock health programs that reduce livestock mortality, leading to increased incomes for project beneficiaries. These benefits will accrue from improvement to livestock breeding and management, and the provision of high quality forages and improved grassland management delivered as part of the Grassland Management and Forage Development Component to enable livestock to produce to their genetic potential. Livestock enterprises are further supported through the Market Systems Development Component that will equip household producers to utilize market information to make informed decisions on enterprise selection and production focus.

Incremental benefits are expected to flow from maintaining agro-biodiversity through indigenous livestock conservation underpinned by an improved capacity of herders and technicians to determine the production advantages of these local breeds and assess their potential for inclusion in livestock development programs.

Description of Sub-Components: Component will comprise activities that are integrated with the other components to provide impact across the major fiber, meat and dairy industries in Gansu and Xinjiang.

This will be achieved through a balanced program of activities that equally emphasis breeding, husbandry and management: (1) fine wool and mutton nucleus breeding stations; (2) fine wool and mutton multiplier stations; (3) fine wool and mutton breeding households; (4) fine wool and mutton fattening households (5) beef cattle breeding households; (6) beef cattle fattening households; and (7) household and enterprise dairy production. These sub-components will also receive support from breeding and veterinary services enhanced through project investments in the establishment and renovation of a network of veterinary stations to deliver improved livestock health and Artificial Insemination (AI) Stations to facilitate the transfer of superior genetic traits to household based livestock production. Implementation of the AI station development program will be phased with maximum four AI stations per county established in Year 1. Use of the AI stations will be closely monitored during the first year and the results will be used as a condition to determine if the remaining planned AI stations will be built in Year 3. A threshold level use guide for Year 2 is 2,500 for mutton sheep and 4,200 for fine wool sheep as determined by appraisal analysis for economic viability. The related applied research, extension and training activities are described here but costed under the Applied Research, Training and Extension Component.

1. Fine Wool and Mutton Sheep Nucleus Breeding Stations. The nucleus stations will improve the economic viability of the sheep industry through genetic improvement in the quality and production of wool or meat per sheep. This will be achieved through the selection of superior animals to reduce fiber diameter in fine wool sheep and increase growth rate and meat quality in mutton sheep.

For the fine wool industry, genetic improvement will be achieved by importing superfine *Merino* rams and embryos from Australia, and by selecting within existing Chinese fine wool breeds at nucleus breeding stations at Gongnaisi (Xinjiang), Bazhou (Xinjiang) and Huangcheng (Gansu). In order to make maximum progress in genetic improvement and to meet the market demands, fine wool nucleus breeding flocks will be divided into breeding lines emphasizing economically important traits within each line. These breeding stations have a significant public good dimension in protecting the genetic progress already made to fine wool bloodlines and positioning them to achieve further progress in improving wool quality.

The mutton breeding program will continue to import and evaluate terminal sires to facilitate the production of prime lambs (non-breeding stock) for the commercial market from the environmentally adapted native mutton ewes. Breeding stations at Manasi (Xinjiang), Yongchang (Gansu) and Jingtai (Gansu) will implement breed evaluation programs with local and imported exotic mutton sheep in which genetic improvement will emphasize the maternal ability of ewes and early growth of lambs (pre-weaning and post-weaning) to allow early off-take from native grasslands and artificial pastures. Breed preservation will also be done through the use of *Small-tailed Han* and *Tan* breeds in Gansu in household activities and medium size breeding enterprises.

The breeding stations will also serve as sites for herder and technician training in best management practices for sheep breeding including nutrition, reproduction, shearing and wool grading, and marketing of wool and mutton base on quality parameters.

2. Fine Wool and Mutton Multiplication Farms. Multiplier farms are an important channel for propagating high quality fine wool and mutton sheep stock, thereby accelerating the impact of the nucleus flock on the quality of household wool production by replacing the inferior breeding stock often used in natural breeding at the household level. The overall objective is to increase the number of genetically improved fine wool and mutton sheep and increase demand for better quality breeding stock actively promoted through effective extension. Options for commercialization will be reviewed at the fine wool multiplier farms at Sunan (Gansu) and Tacheng (Xinjiang) and implemented where appropriate. Since the availability of terminal sires in limited, Yongchang Breeding Station (Gansu) which has the largest flocks of *Poll Dorset* and *Borderdale* in Gansu will act as the multiplier farm for

terminal sires for use in the project-supported AI stations. Some herder flocks associated with nucleus breeding stations may also be used as multiplier flocks to provide rams to household breeding activities.

3. Fine Wool and Mutton Breeding Household Production. Small breeding households produce the majority of the sheep used for wool and mutton production. However, current breeding stock and management practices need to be improved to enable herders to produce to achieve gains in production efficient and product quality. The project will support households by providing improved genetic lines and better equipment and facilities for raising breeding sheep to increase income. In order to gain full benefits from their investments in the genetic improvement of fine wool and mutton sheep, herders will also receive practical training in livestock and grassland management through the project's training programs designed to complement and strengthen existing extension programs in Xinjiang and Gansu. In addition, demonstration sites associated with the breeding stations, multiplier farms and selected households will be used in community-based learning programs focused on low-cost technologies such as wool sorting and preparation, early weaning and use of warm sheds.

4. Fine Wool and Mutton Fattening Household Production. Shortage of feed supply often limits small households from finishing lambs before the onset of winter. Carrying these lambs over the winter period is a very inefficient because the weight loss incurred over winter must be regained in spring. One solution to this problem is to establish a feedlot system in which small households that are able to raise lambs but not finish them to market weight can on-sell these lambs to specialized fattening households for finishing. Under the project, households and medium sized farms will be supported to undertake specialize fattening of wool and mutton sheep to meet market demands and quality. The strategy is to provide adequate shelter and forage production capacity to improve the efficiency of feedlot mutton production. Expansion in fattening activities should provide opportunities to value add to meat products and to encourage entrepreneurial activities in sheep trading to develop as the project proceeds. Emphasis will be given to smaller, household fattening operations (<300 head/year), but larger operations will be considered based on reviews of financial and environmental plans. Since sheep feedlot production is a new activity for many sheep herders, training in livestock feeding methods, disease control and marketing will be provided as part of the project's training package.

5. Beef Cattle Breeding Household Production. Beef production currently accounts for ~13% of the meat production in Gansu but the increasing concentration of beef cattle in several Gansu project counties provides the opportunity to develop small beef breeding households to take advantage of the expanding alfalfa areas as part of China's cropland conversion program. Increasing beef production has the potential to attract joint-venture opportunities in beef slaughtering and processing to the region. To provide a supply of good quality beef, there is a pressing need to improve production efficiency and product quality by crossing local cattle with exotic breeds. Household based cow and calf activities (<4 cow herds) will cross local breeds (including *Qinchun* and *Anxi* cattle) with superior exotic beef breeds *(Simmental* or *Limousin*) using AI to produce yearlings suitable for fattening households.

6. Beef Fattening Household Production. Small households often cannot finish beef cattle to meet market specification due to limited feed supply. Now specialized cattle fattening households have emerged in China as a commercialized form of household production buying cattle from smaller households and fattening them in a feedlot. Project will support specialized fattening households to establish 30 head beef feedlots to finish yearlings to trade specifications up to three cycles each year using on-farm grain and forage resources supplemented with concentrate and hay purchases. Households will receive technical and market training to equip them to face the market-orientated budget constraints of feedlot production.

7. Dairy Component. The dairy industry in Gansu has expanded rapidly in response to improved living standard and awareness about the nutritional value of milk products. This has also resulted in the establishment of processing facilities in Gansu that have introduced new technologies and pioneered the

development of a number of dairy products. However, statistics show that there is a big gap between the demand for dairy products and the ability of the Gansu dairy to supply raw milk for processing. The main objective of this activity is to address this shortfall in milk production by supporting the expansion of household dairies comprising herds of 1-5 cows. Experiences in other dairy production regions of China show that the quality of dairy cows, veterinary support services, the supply of high quality semen for AI breeding and targeted feeding strategies all affect the stability of milk output. The total cost of the dairy production sub-component to address these problems is US $9.52 million excluding costs for construction of milking centers and milk collection stations which are included in Market Systems Development Component. The specific activities would include:

(a) Construction of Pedigree high yielding dairy cattle multiplication farms. The project will provide funding for the construction of five 100 dairy cow farms that will improve the genetics of dairy cows by establishing pure line farms from which superior cows can be transferred to small dairy households. Frozen semen straws will be used through AI to multiply and improve the base cowherd. The dairy farms will be owned and managed by local leading farmers and/or enterprises. The farmers/enterprises will be responsible for repayment of loan. The project will finance construction of production facilities, procurement of equipment and dairy cows.

(b) Construction of milking centers. Milking stations and milk collection stations will be established to provide necessary services and procedures for hygienic milking and safe transport. Eleven milking centers will be constructed and operated by private operator and/or county operator. It is expected that milking stations will lead to the increase in milk quality by preventing adulteration of milk and allowing mechanical cooling. Milking centers also allow farmers to participate in milk quality premium programs, which would increase the value of their production. Implementation of this activity will be phased over 4 years period in order to allow for the expansion of the local dairy herd. The project would finance construction of facilities and procurement of milking equipment.

(c) Construction of county owned milk collection stations. The project will support construction of three milk collection centers in two project counties. Implementation of this activity will be phased over three years period and follows the pace of construction of milking centers and general expansion of the local dairy herd. The project would finance construction of facilities and procurement of equipment.

(d) Construction of county artificial insemination stations. A network of strategically located AI stations is needed to provide efficient breeding services to the expanding dairy industry through the supply of frozen semen to farmer households and the establishment of a recording system for dairy cows. The project will support establishment of 12 new AI stations in four project counties. The location and phasing of these AI stations needs will be based on the dynamics of cattle population in the project areas which would allow the AI technician a reasonable rate of return on his operation. It is expected that one AI station will service a minimum of 500 dairy cows. The project would finance construction of facilities and procurement of equipment and vehicles for technicians.

(e) Construction of county veterinary stations. Veterinary stations will provide specialized disease diagnosis, treatment and prevention advice for dairy cattle. The project will support rehabilitation of 12 veterinary stations in four project counties. The project will provide funding for the procurement of equipment and vehicles for technicians.

(f) Establishment of Milk Quality Control Center. The project will support the establishment of milk quality control center and development of a dairy herd improvement program (financed by Canadian International Development Agency, CIDA). A laboratory will assume responsibility for quality monitoring of milk production, processing and marketing of the entire project area. To ensure the quality of raw milk purchased from farmer households and the safety of dairy production, milk will be tested for fat content, protein content, non-fat solid maters, milk freeze point, the number of body cells, residue of

antibiotics and other parameters. The DHI system is critical to farmers having the skills and information to achieve milk quality standards. The project funds will be used to finance construction of facilities and procurement of laboratory equipment.

(g) Small scale farmers. Dairy production is a highly specialized enterprise in which poor management causes significant production loss. The project will support local small-scale dairy farmers to expend their production scale and improve the efficiency of production practices. The average investment per household is RMB 30,000 to purchase two dairy cows, improve their sheds and finance improved the reliability of their feed resources (i.e. working capital). Beneficiary households will be geographically located close to each other to reduce the costs associated with milk collection and the provision of veterinary and AI services.

8. Native Livestock Breed Conservation (including GEF). There are globally significant livestock types unique to the project area that justifies conservation through GEF funding. In the past, livestock development has focused primarily on introduced breeds, while generally ignoring the local, native breeds that are well adapted to local environmental conditions. Maintaining and improving local livestock germplasm is essential to conserve agro-biodiversity and to promote sustainable pastoral development. This activity will strengthen the capacity of the Animal Husbandry Bureaus and research institutes to conserve native breeds of livestock in Western China.

In Xinjiang, the project will focus on the conservation of Altai, Bashibai, Bayinbuluk and Kuche sheep in Xinjiang which have globally significant endemic genetic values by strengthening the breeding of the nucleus flocks and thereby increase their capacity to distribute breeding stock to farmers for commercial use. The project will focus on identifying adaptation traits such as body size, early maturity, multiple litter characteristics, and feed conversion efficiency that may be used in future mutton breeding programs. TA will determine the global significance of the conservation of these sheep breeds using genome analysis techniques (if applicable) and advise on an investment strategy for the native sheep breeding stations.

White yaks, found mainly in Gansu are globally endemic animals that have significant genetic value that needs to be conserved. TA will determine the extent of this significance of yaks and advise on a suitable investment strategy for the preservation of white yak and support of the breeding program at the White Yak Breeding Farm in Tianzhu County.

9. Related Applied Research, Extension and Training (including GEF).

(a) Applied research. Will focus on specific problems identified in the project design phase as potential constraints to implementation that are not being addressed in other current research programs or for which there were no data available to assess financial impact. Some specific applied research projects identified include: (i) impact of greenhouse sheds on livestock (fine wool sheep, mutton sheep and beef) production and profitability; (ii) effect of diet formulation of feedlot beef cattle production; (iii) feeding management technologies of lactating dairy cows; (iv) changing seasonal grazing times and patterns to optimize livestock performance, improvements in grassland condition and the conservation of biodiversity; (v) effect of cutting time and storage method on feed value of alfalfa, maize and meadow hay; (vi) feeding strategies of heifers to realize genetic potential from improved breeding programs; (vii) feed management for cow-calf herds especially in winter/spring; (viii) impact of mechanical shearing and wool grading on fine wool sheep profitability; (ix) defining diversity within and between native livestock breeds; and (x) value of using terminal sires in wool and mutton production. These specific applied research activities would be designed to contribute to broader themes related to sustainable grassland utilization and improved livestock efficiency.

(b) Extension and Training. Will be directed at improving the delivery in effective demonstrations of key applied research findings on: (i) improved breeding (e.g. use of terminal sires; frozen semen use in

dairy cows); (ii) management (e.g. impact of greenhouse sheds on breeding time of sheep; heifer feeding programs); (iii) feed efficiency (e.g. feed value of different forages expressed in growth rate of milk production); and (iv) product quality (e.g. sorting and grading wool; milk butter fat). Training modules will be designed to include classroom instruction by technicians and on-the-spot demonstrations provided by leading farmers with the assistance of the technical instructor. To closely integrate these training methods, the formal (classroom) instruction will be conducted at the village level wherever feasible. Active beneficiary participation will be required where possible to include hands on involvement in the training program (e.g. wool handling and grading as part of the shearing demonstration). Since existing extension networks at the county and township levels will be used for extension and training, technicians will also receive training through seminars, workshops, technical assistance and study tours.

Project Component 3 - US$ 10.20 million

Market Systems Development Component. (US$10.20 million. This amount excludes funding for related applied research, training and extension activities which are described here, but costed under the Applied Research, Training and Extension Component. This component has no GEF funding).

Component Output: This component will: (i) improve the competitiveness of relevant Chinese pastoral and farm products; (ii) apply standard product descriptions for pastoral products; (iii) increase awareness throughout the wool production and wool textile processing chain of the potential for profitable production and use of Chinese fine wool; (iv) ensure that farmers/herders receive a reasonable share of the full market price for their wool and other livestock products, particularly where value is added to their products; (v) assist with increasing market transparency and developing the basic market infrastructure; (vi) focus on quality of production as an income-enhancing strategy throughout the marketing chain for pastoral products; and (vii) support to local marketing initiatives.

Expected Benefits: This component re-enforces the other project components by magnifying the incentives for participation in the project by farmers/herders and other market participants. Benefits of the component include increased farmer/herder incomes and orderly development of the livestock sector according to market signals. Primarily, the component benefits will be seen as higher prices for products. In addition, market infrastructure will be improved so that price formation is more efficient and transparent and training will be given in how to best utilize those improvements. Farmer/herder incomes will be raised by higher prices due to improved payment mechanisms and improved capacity to produce quality products as increasingly demanded in the marketplace. Component contributions include the adoption of quality standards and instigating the various marketing activities necessary to achieve higher prices at farm level. Herders will receive training in the use of market information and in planning change to take advantage of market opportunities. Investment in market infrastructure will provide an expanded number of auction markets, shearing stations, and milking centers. Provincial level activities will address market information deficiencies and the lack of a long term marketing strategy. Enterprise loans provide support to emerging agro-industrial enterprises.

Description of Sub-Components: The component will comprise: (1) physical investments; (2) support to enterprises and enterprise like activities; (3) support to local marketing initiatives; (4) establishment of mechanisms for public goods provision; and (5) applied research, training and extension (described here but costed under Component 4). Several elements of this component will be addressed by assignment of national consultants under the Applied Research, Training and Extension Component.

1. ***Physical Investments*** will entail: (a) new and reconstructed livestock markets (3 in Gansu, 44 in Xinjiang); (b) new and reconstructed shearing stations; (c) wool storage facilities; and (d) milking and milk collection stations.

(a) *Livestock markets*. The rationale for upgrading the livestock markets is the improvement of market efficiency. Improved access to markets for herders and traders, increased numbers of available

selling outlets, and improved transparency of price formation are the targeted outcomes. This will be magnified by the requirement that these markets convert to an auction system during the project, thereby opening up price discovery mechanisms. A short-term outcome of investment in markets will be to lower the transaction costs, and improve the aesthetics, logistics and environmental aspects of livestock marketing. This has been demonstrated locally to attract both buyers and sellers to a market.

The ownership for the livestock markets varies according to locality and the specific needs of the local community. Investments in Gansu will be made by local governments, but the markets will be leased to private operators. Markets in Xinjiang will be owned by the local government. Delivery and display of market information, using standardized product descriptions, will be required from all market operators.

In Jingyuan County (Gansu), the existing lamb slaughterhouse and market will be expanded. The main purpose is to expand and develop the market for Jingyuan Lamb, which has been trademarked and successfully marketed through licensed restaurants. The establishment will also assume tasks of research, development and extension of in-depth processing of lamb, accelerating the extension and popularization of improved breeds, promoting commercialization of sheep and meat markets so as to ensure the quality of Jingyuan lamb production and sustainable development of Tan sheep production.

(b) Shearing stations. Upgrading and construction of shearing stations (70 in Xinjiang, 3 mobile plants in Gansu) is a prerequisite for improved wool quality and enhanced practices in packaging and presentation of wool for sale. Ownership is generally by local authorities, with the option of later privatization. Feasibility of shearing stations requires a threshold level of utilization, so herder participation is a prerequisite for successful implementation. Training and extension, with enhanced market information, will be delivered at the same time as investments into shearing stations. Targets have been established for wool price advantages (over blade shearing by the herders at home), and the shearing stations are to be integrated into the sales and information network as storage points.

(c) Wool storage facilities. Provision of "wool storage" actually addresses other marketing functions than storage only, including: bulking of sales lines, improved transport logistics, access to sampling and testing, and presentation for sale to an enhanced number of buyers. Efficient storage and product handling is necessary for implementation of advance payments for wool held in storage.

(d) Milking stations and milk collection stations. Eleven demonstration milking stations and 3 milk collection stations will be established in Gansu. These will provide a market outlet for milk flowing from the household investments in dairy production. They will provide services and procedures necessary for milking, and testing of milk for safety and quality.

2. Support to Enterprises and Entrepreneurs. Loans will be made available to profitable private enterprises and/or enterprise like activities (i.e. larger-scale household based activities) that pursue project-relevant objectives. Long-term loans (3-7 years), mainly for fixed asset investments would be made available to selected rural enterprises, leading farmers and farmer groups for the purchase of equipment that would increase production efficiency, profitability and value added of farms and processing enterprises. Shorter term loans would be made available to trader enterprises for seasonal investment capital. The loan funds would be channeled to enterprises and entrepreneurs through local Finance Bureaus. The screening and appraisal of the investments would be coordinated by the PPMOs. The loan decisions would be made by the PLG.

At project appraisal, four enterprises have been identified and appraised for funding. These are Hovill Dairy Company, Tengfei sheepskin processor and Hauniu Dairy Company (Gansu) and Sapale wool brokerage (Xinjiang). In addition, in both provinces, a reserve of uncommitted has been allocated for future loans. Procedures have been laid down for application, and evaluation and appraisal criteria.

3. Support to Local Marketing Initiatives. The project provides training and technical assistance for the promotion and development of farmers'/herders' groups. This addresses the difficulties experienced by small scale farmers/herders in connecting with the market, particularly in remote areas characterized by few buyers and exploited by traders. Farmers'/herders' groups developed and assisted in the project will have a commercial purpose and will employ principles of cost recovery and the distribution of benefits on the basis of use. Extension and training activities be channeled via these groups. Alongside GEF activities, farmer/herder groups' marketing activities will be aligned with other group tasks such as grazing management and feed production. Support will be provided for communications; legal and commercial support; identification of opportunities; dissemination of lessons learned in other areas; and the specialized design of group structure and functions. In addition, support will be given to:

(a) Livestock Product Trading Activities. TA and training support will be given to farmers'/herders' groups involved in trading activities.

(b) Fine wool selling systems. In Xinjiang, project developments in fine wool will be led by re-organization of wool selling systems at county and township level. A plan of action in promoting group action by herders has been adopted in the fine wool counties. This involves promotion and information regarding fine wool production, primarily to convince herders to use shearing stations. Further organizational tasks involve training and extension activities to ensure that wool quality management is adopted by herders. At a number of sites, a local level organization will assume responsibility for wool accumulation and storage for sale. Herders will receive wool receipts at shearing, and payments will be entirely based on the quality and weight of wool submitted. These organizations will convert to independent herders' associations during the project.

(c) Huangcheng Livestock Farm. Gansu's leading fine wool breeding farm will upgrade its shearing facilities under the project. This will allow wider use of mechanical shearing by local households. As part of that training, and its wool marketing activities, Huangcheng will provide training to households on wool quality management and will also participate in market information collection. Huangcheng will use project resources to register and establish a brand for marketing and promoting its wool.

4. Investment in Capacity for Delivery of Public Goods addresses the need for training and extension to herders and other market participants, the development and promotion of market information services for livestock products, market research activities, and initiatives in quality promotion and quality management. These activities are focused on building the capacity for improved or new services, and not the recurrent costs of provision. In substance, much of this targets the specific problems of the fine wool sector. In addition, Gansu has been active in defining a public role in improving the marketing performance in other livestock sectors and in specific market functions (e.g. refrigeration). For the most part, these activities provide for the development of strategic leadership in marketing, and so in the direction given to breeding, feeding and the ultimate commercial use of the grasslands. Identification of products, production methods, markets and quality requirements will provide guidance to private and public investment activities relevant to the project.

(a) Market Information Services: This would entail:

Quality improvement and promotion: Improved market information, and long term herder income increases, rely on a strong and transparent linkage between price and quality. The first step in establishing a market information service will be to ensure that standard quality descriptions are used for all price information reporting. The project will address the issue of product quality. A program of quality improvement and promotion will focus on identification and adoption of quality measurement standards for pastoral products. Particular attention will be devoted to meat standards. Carcass grading and other processor-oriented tasks are beyond the scope of the project and probably

premature at this time. However, considerable potential exists for increased herder incomes for the improved management enabled by live animal assessment. This will entail the increased use of liveweight-pricing rather than per-head pricing by herders. An accompanying step is standardized livestock price reporting by the market information service which will be used in training, extension and applied research.

At the provincial level, a quality certification and promotion program will be implemented. The objective is to identify and promote pastoral products that can compete with imported products on the basis of quality. Criteria for judging quality in processes and products, and an application and award procedure will be established. An associated publicity campaign will design and promote a logo or "marque" indicating quality certification. If successful, this program would become self-financing as firms would pay for the certification.

Market information service provision: PPMO's will be responsible for coordination of data collection, processing and dissemination (in Gansu the Huangcheng Livestock Farm will collect the data on fine wool). Most data provided will be from secondary sources. Enterprises and activities sponsored by the project (e.g. livestock markets, milk collection stations, shearing stations, enterprises supported by loans) will provide market information and display it. Primary distribution will be via the internet and fax, with PMOs organizing information distribution to remote centers.

(b) National quality standards for wool. There will be further development and adoption of quality standards for wool. A new set of standards has been in development for some years, but has neither been completed nor adopted in such vital areas as wool pricing and livestock performance. This effectively prevents the functional competition of Chinese wool with imported wool. The method by which this national level component will be incorporated into the project is not yet clear. It is however vital to ensure that competing standards, and proprietary standards, are avoided so that open access is established for marketing functions based around wool standards.

5. Relevant Applied Research, Training and Extension. All on farm research will include market related activities. This will include generation of financial and management-related information, thus being a real force for change by targeting herders' incentives. Several related activities (e.g. farmers'/herders' groups, use of market information, livestock pricing by liveweight) offer excellent opportunities for applied research. A number of market related research activities, addressing topics of Provincial-level concern with respect to markets for pastoral products have been preliminarily identified. Flexibility has been maintained by nominating just a few of these at inception (outlined briefly below), with the remainder to be specified as project implementation proceeds. The first three topics are:

(a) Refrigeration as a challenge to meat and livestock industry. Given the near-surplus status of the mutton industry, refrigeration technology offers threats, challenges and opportunities. The implications of refrigerated distribution of imported product have not been examined, particularly in the light of the growing importance of supermarkets and the processing of frozen meat. The project's enterprise loan facility has received applications from meat processing enterprises that anticipate exporting frozen meat. Applied research would examine the needs, costs and implications of a cold chain in the province.

(b) The future of fine wool in Gansu. Fine wool production and processing in Gansu is falling rapidly, and the project allocates very limited resources to this sector. The existence of so many improved fine wool sheep in some areas of Gansu makes these trends of critical strategic importance. Should the genetic resources be allowed to disappear, they could never be replaced. Strategic research would examine the economic and social consequences of alternative development paths for fine wool. Those paths would be defined by the requirements of the textile industry both in Gansu and beyond, and by the ability of Gansu's fine wool areas to deliver a high quality product at a competitive price.

(c) Development paths for Jingyuan Lamb. Jingyuan County (Gansu) has initiated an effective meat marketing strategy (see above under livestock markets) where quality control and market transparency have been emphasized with some success. Research would evaluate future alternatives: diversification from fresh into processed, chilled and frozen products; dedicated or out-sourced distribution functions; product differentiation including large and small carcass sizes; and contract supply of livestock and meat.

Extension will focus primarily on ensuring that technical advance is mobilized for farmers by elucidation of the financial consequences of management and enterprise change. As with training, the project's innovation in this regard is to bring together grassland management, feeding, breeding, production and marketing tasks on the farm. Financial consequences for the farmer/herder are in effect what cements these elements together. The main focus of training will be on buying and selling skills, and on understanding the natural fluctuations and inter-connections of markets (value adding activities on the farm) while addressing the linkages between feed resources, timing of purchase and sale, and income.

Project Component 4 - US$13.25 million

Applied Research, Training and Extension (US$13.25 million of which GEF US$6.61 million. This component includes the costs for all TA and training activities from the other components: (i) Grassland Management and Forage Improvement (IBRD US$1.09 million, GEF US$3.85 million, government US$0.55 million); (ii) Livestock Production Improvement (IBRD US$2.50 million, GEF US$0.32 million, government US$0.40 million); (iii) Market Systems Development (IBRD US$0.96 million, government US$0.14 million); and (iv) Project Management, Monitoring and Evaluation (IBRD US $0.36 million, GEF US$2.44 million, government US$0.64 million).

The total cost of GEF specific applied research, training and extension activities is US$2.44 million. The remaining US$4.17 million is services procured under this component to support activities described under the grassland management and forage improvement component (US$3.85 million) and indigenous breed conservation activities described under the livestock production improvement component (US$0.32 million) that deliver global environmental benefits.

Component Output: This component will develop and promote integrated management systems that enable household producers to simultaneously raise the quality of fiber, meat and milk products derived from grazing livestock, and decrease the number of grazing livestock, resulting in improved grassland condition without economic loss. Research is needed to provide the necessary know-how, training is needed to equip producers to accept new technologies, extension will transfer research outcomes to producers. Activities in the context of the Market Systems Development Component focus on the form and information content of transactions, supported by consulting work and training. GEF activities will address the broader issues of land degradation and biodiversity loss in globally important grassland ecosystems.

Expected Benefits: Targeted applied research, effective extension, and relevant training are key mechanisms to enable farmers/herders to achieve sustainable livestock production and grassland protection. There are many problems facing livestock production in the project areas that cannot be solved without an integrated approach that includes research, extension and education. Using this integrated approach, the Component is designed to develop and promote new management systems that enable household livestock producers to increase profitability by improving the quality of wool, meat and milk products rather than simply increasing livestock numbers. The use of a participatory learning approach with farmers/herders included as co-partners provide the opportunity to develop new research and extension methods to deliver information in a more impacting manner than before. Since the technical level of technicians employed in the livestock production sector is rather low, capacity building will focus on improving the technical base and improving communication with farmers/herders to encourage the adoption of new low-input technologies that efficiently deliver high quality outputs.

The importance of integrating livestock management, improvement of grasslands and marketing at the household level is not yet fully recognized in the pastoral industry of north-western China. Targeted applied research, effective extension, and relevant formal and informal training are key mechanisms to empower herders to realize the opportunity to achieve sustainable livestock production and grassland protection. Applied research, training and extension activities are necessary sub-components in each of the previous components to realize their expected benefits. GEF incremental benefits are expected to generate targeted research, effective extension and training will empower herders and local technicians and improve their capacity to sustainably manage natural resources.

Description of Activities and Implementation Principles: The component will comprise: (1) applied research; (2) training; and (3) extension. The specific activities are described in preceding sections for Grassland Management and Forage Development; Livestock Production Improvement; Market Systems Development; and Project Management, Monitoring and Evaluation. The following describes the principles to be used to deliver targeted applied research, effective extension, and relevant training within the project time-frame

1. Applied Research. The objectives of the applied research program are to: (i) develop new practices to improve the efficiency or quality of livestock production (e.g. use of terminal sires in sheep production); (ii) generate production data on current practices to define benefits to households (e.g. the impact of greenhouse sheds); and (iii) define the economic impact of new or current practices on household profitability and sustainability through triple bottom line accounting. The strategy adopted to implement project-funded applied research emphasizes that beneficiary households must be incorporated into these on-farm experiments and case studies as co-partners to ensure that the interests of herders and farmers remains the prime focus of all project supported applied research. To achieve this, research projects will use simple contrasts to define the merits of best management practices relative to traditional or current methods, preferably within a low cost design (~RMB 250,000 per research project).

Identifying topics for applied research will be an on-going process so those problems that arise during project implementation can be subjected to research during the time-frame of the project. Farmers and herders will participate in this process by describing their most important limitations to production as part of the beneficiary application form. Lists of identified research topics will be circulated to provide research organizations opportunity to develop proposals to meet the selection criteria and budget limits. These proposals would follow a standard format detailed in the Project Implementation Manual and would be developed by the local personnel working in collaboration with a provincial research institutions. Post graduates and younger scientists (particularly women and ethnic minorities) will be particularly encouraged to develop research proposals as part of the project's capacity building and gender and ethnic equity strategies.

Publication of project results in an appropriate Chinese journal and extension bulletin within 12 months of completion of data collection will be required as part of the applied research contractual obligations. All applied research will be fully integrated to include assessment of financial impact and market implications of each management practice developed. This will ensure that the research results can be rapidly incorporated into the training programs for technicians and beneficiaries in Years 5 and 6 and promoted for adoption by farmers/herders as part of the extension program.

2. Training Activities. Training activities are designed to: (a) train trainers to efficiently transfer technical and management knowledge to households through extension activities so that a sustainable livestock production systems can be achieved; and (b) equip PMO staff to ensure smooth project implementation. Training will be provided in an integrated package with financial management and market skills providing the unifying mechanism between new technologies and market strategies. The contents of the training would focus on needs of the target groups to ensure that the project is efficiently

implemented and so that the technology and management level of the beneficiaries is improved.

(a) *PMO training.* The establishment of the PMO and skills training for staff is crucial to the success of the project. Project management training will be given the highest initial priority because other project activities (e.g. beneficiary selection, preparation of beneficiary training modules) depend on the PMOs for their efficient implementation. Since all reports for the project will be computerized using the MIS, targeted training will be provided to ensure a high level of computer competency at all levels. Project management training will include workshops and individual tutoring.

(b) *Beneficiary training.* The training program will use the following strategies to provide the beneficiaries with the knowledge and skills to efficiently implement project activities: (i) classroom instruction to outline basic principles; (ii) field demonstrations provided by leading farmers with the assistance of a technical instructor; and (iii) linkage of beneficiaries to demonstration sites. To closely integrate these three training methods, the formal (classroom) instruction will be conducted at the village level wherever feasible. Training will include topics such as: grassland management, forage production, feeding livestock for production and product quality, livestock husbandry and management, livestock breeding, and using market information for decision making.

Active beneficiary participation will be required to include hands on involvement in the training program. Participation in discussion will be encouraged so that differences between beneficiary resource base, knowledge levels and social condition can be accommodated in course delivery. Courses will be structured in modules to include all relevant technical information associated with the project activities. These modules will be reviewed by the TAG for quality and consistency along with a detailed training plan for each project county that will determine the modules to be delivered at the county level. This will also ensure that the latest information is delivered to the beneficiaries in a more impacting manner than evident in past efforts. At the conclusion of each training course, an evaluation form will be completed by beneficiaries to identify shortcomings in either content or delivery style and to provide audit trail to verify completion of training courses. Modules will be amended based on these evaluations.

(c) *Technician training:* Since the technical level of the staff at the county level is rather low, strengthening technical training to improve beneficiary training and extension is a priority. This capacity building will focus on improving the technical base and communication with farmers/herders to encourage the adoption of new low-input and low cost technologies. Technical training will follow the topics outlined for beneficiaries but will require a greater depth of knowledge regarding the biological processes involved. Competency of technicians will be assessed through examinations on course content. Overseas and domestics training and/or study tours will be used for training trainers from each province. The activities for study tours for technical training will be based on detailed terms of reference that will include reporting on the study tours that will be distributed to the PMOs to maximize the impact to the project.

Technical assistance provided by international and national experts in the major project activities of grassland management, livestock production, market system development and project management, monitoring and evaluation will be used to further strengthen the technician training program. The strategy to implement the TA program for training will include: (1) interactive workshops with technicians; (2) seminars; (3) development of case studies; and (4) identifying problems and providing solutions. The timing and focus of these TA activities will be determined by the PPMO in consultation with the Bank.

2. ***Extension Activities.*** Effective extension is crucial because many household producers do not have sufficient technical skills and decision-making knowledge about resource allocation within a market framework to implement project investments without training. New and innovative methods based on active participatory and company-led extension approaches will be used as key mechanisms to improve

the effectiveness of extension activities to empower herders to realize the opportunity to achieve sustainable livestock production and grassland management. This poses a major challenge for the extension services to change from a top-down approach to a bottom-up approach where producers participate in the implementation, monitoring and evaluation of on-site activities. The following methodologies will be used to maximize active participation of beneficiary household in the project's extension sub-component:

(a) Participatory Demonstrations: The community will be the basic unit for implementing participatory extension, and a community learning approach will be adopted to involve farmers/herders in the planning and implementation of simple demonstrations designed to encourage adoption of new low-input and low cost technologies. These demonstrations should contribute to the success of the project by focusing on improved efficiency of livestock production, improved quality of produce, and improved grassland condition. As examples of best management practice based on the latest scientific and technical information, the demonstrations will lead to a general improvement in the level of livestock production, especially as households from a range of social levels will be included in demonstrations. These demonstration will, where possible, be undertaken at the same sites as the applied research programs

(b) Household Visits: The PMO, line bureau technicians, and other experts will visit households to identify problems related to their production that emerge during project implementation and provide timely answers to their questions. Where solutions are not readily available, these issues will be referred to collaborative research institute and universities for consideration as research topics. This may lead to the establishment of a farmer-oriented agricultural research and extension system;

(c) Group Discussions: Small group discussions will be used to provide specific advice on production (*ie.* technical management) and agribusiness (*e.g*. market information, financial information) activities. The PMO and other line departments will use production models with economic and financial analysis in these discussion groups to provide farmers with a better understanding of how their financial position can be improved by paying attention to product quality.

(d) Company-led training and extension: This approach will be used in dairy activities where the company will provide relevant technical support training and information to household producers in return for the supply of milk at contracted prices. At the same time contracting with leading enterprises reduces the marketing risks for small household producers.

4. Technical Assistance. The purpose of the TA is to provide project staff and technicians with cutting edge knowledge delivered by international and national experts in the major project activities of grassland management, livestock production, market system development and project management, monitoring and evaluation. During project implementation, a number consultants will be hired to provide specialized advice and training to technicians and beneficiaries. The strategy used to implement the TA program will include workshops, seminars and development of case studies.

5. Implementation Arrangements: There will be an designated person at each of the state-owned breeding farms and in the county PMO that will liaise on all activities of the Applied Research, Extension and Training Component with the PPMO and implement this project component according to the principles outlined. The TAG will provide overall guidance related to all related activities, reviewing the plans for the Applied Research, Training and Extension Component including activities undertaken on the fine wool and mutton sheep breeding stations.

The role of the PPMO will be to provide coordination, implementation support, and overall monitoring and evaluation. The PPMO will be responsible for disseminating all relevant information from line ministries, the World Bank, and any other institutions involved in the project's activities to all stakeholders. The PPMO will be responsible to identify and collect information and detailed reports on

the progress of activities, and to modify the program in response to beneficiary evaluation, advice from World Bank Supervision Missions or TA supported by the project.

Project Component 5 - US$5.75 million

Project Management, Monitoring and Evaluation (US$5.75 million of which GEF US$1.0 million. TA and training under this component are described below, but costed under the Applied Research, Training and Extension Component.)

Component Output: This component will develop and strengthen the overall project implementation capacity of PMOs and promote effective community participation in project activities. The component includes: (a) project management; (b) strengthening of the provincial, city, county and township level PMOs (goods and training); (c) establishment of a monitoring and evaluation system that includes: (i) project progress monitoring; (i) environmental monitoring; (iii) social monitoring; and (iv) impact monitoring (technical assistance and training); and (d) establishment of community advisory/participation groups. The component will also develop and strengthen overall GEF project implementation capacity in the PMOs.

Expected Benefits: The activities are expected to lead to: (1) improved capacity of project staff to implement project activities; (2) improved capacity to supervise and guide policy studies; and (3) improved monitoring of project impacts.

Description of Sub-Components: The subcomponents will comprise: (1) training in support of project implementation; (2) policy studies; and (3) monitoring and evaluation.

1. ***Training in Support of Project Implementation*** comprising training in project management procedures, English, clerical skills, computer use and maintenance, accounting and financial management, and training program coordination.

2. ***Policy Studies*** comprising topics such as (i) grassland tenure and the division and contracting of grassland; (ii) the conversion of crop land to grassland and forest; (iii) evaluation of specific regulations for grazing (e.g., stocking rates and carrying capacities); (iv) development of a standardized methodology for evaluating the effectiveness of grazing management; (v) evaluation of the enabling environment for voluntary herders' associations; (vi) evaluation of use of public funds in market information service provision; and (vii) valuation of environmental services provided by integrated grassland ecosystem management.

3. ***Monitoring and Evaluation*** comprising development and establishment of a monitoring and evaluation system that includes: project progress monitoring, environmental monitoring (including global environmental impact monitoring), social monitoring, and impact monitoring, and establishment of community advisory/participation groups. Details are provided in Annex 16, Project Monitoring and Evaluation.

Annex 3: Estimated Project Costs

CHINA: Gansu and Xinjiang Pastoral Development Project

Table 3.1: Project Cost by Component

(US$ million equivalent)

Component	Gansu			Xinjiang			Total		
	Local	Foreign	Sub-total	Local	Foreign	Sub-total	Local	Foreign	Sub-total
A. Grassland Management & Forage Improvement									
1. Feed and Forage Development	2.22	0.56	2.78	3.15	0.79	3.94	5.37	1.34	6.72
2. Water Development	0.23	0.06	0.29	0.11	0.03	0.14	0.34	0.09	0.43
3. Range Management	0.43	0.11	0.54	3.72	0.93	4.65	4.15	1.04	5.19
Sub-total	**2.89**	**0.72**	**3.61**	**6.98**	**1.75**	**8.73**	**9.87**	**2.47**	**12.33**
B. Livestock Production Improvement									
1. Breeding Farm	0.59	0.15	0.74	0.85	0.21	1.06	1.44	0.36	1.80
2. AI and Veterinary Station	0.40	0.10	0.51	1.06	0.26	1.32	1.46	0.37	1.83
3. Mutton Sheep Household and Fattening	8.75	2.19	10.94	9.77	2.44	12.22	18.53	4.63	23.16
4. Finewool Sheep Household and Fattening	0.21	0.05	0.26	6.61	1.65	8.27	6.82	1.70	8.52
5. Beef Cattle Household and Fattening	12.00	3.00	15.00	-	-	-	12.00	3.00	15.00
6. Dairy Development	7.60	1.90	9.50	-	-	-	7.60	1.90	9.50
Sub-total	**29.55**	**7.39**	**36.94**	**18.29**	**4.57**	**22.87**	**47.85**	**11.96**	**59.81**
C. Market Systems Development									
1. Fixed Investment	0.85	0.21	1.06	1.03	0.26	1.28	1.88	0.47	2.35
2. Public Service Provision	0.02	0.00	0.02	0.08	0.02	0.10	0.10	0.03	0.13
3. Processing/Marketing Enterprises	4.52	1.13	5.65	0.82	0.20	1.02	5.33	1.33	6.67
Sub-total	**5.39**	**1.35**	**6.73**	**1.92**	**0.48**	**2.41**	**7.31**	**1.83**	**9.14**
D. Applied Research, Training & Extension									
1. Consultant Services	0.42	0.11	0.53	0.12	0.03	0.14	0.54	0.13	0.67
2. Applied Research	1.86	0.47	2.33	1.73	0.43	2.16	3.59	0.90	4.49
3. Technical Extension	0.31	0.08	0.39	0.47	0.12	0.59	0.78	0.20	0.98
4. Training and Study Tours	2.16	0.54	2.71	2.29	0.57	2.86	4.45	1.11	5.57
Sub-total	**4.76**	**1.19**	**5.95**	**4.60**	**1.15**	**5.75**	**9.36**	**2.34**	**11.70**
E. Project Management, Monitoring & Evaluation									
1. Project Management	0.60	0.15	0.75	0.56	0.14	0.70	1.16	0.29	1.45
2. Office Facilities	1.00	0.25	1.25	1.16	0.29	1.45	2.17	0.54	2.71
3. Project Monitoring and Evaluation	0.42	0.10	0.52	0.59	0.15	0.74	1.00	0.25	1.26
Sub-total	**2.02**	**0.51**	**2.53**	**2.31**	**0.58**	**2.89**	**4.33**	**1.08**	**5.42**
Total Base Cost	**44.60**	**11.15**	**55.75**	**34.12**	**8.53**	**42.64**	**78.72**	**19.68**	**98.40**
Physical contingencies	2.13	0.53	2.66	1.59	0.40	1.99	3.72	0.93	4.65
Price contingencies	3.49	0.87	4.36	2.82	0.70	3.52	6.30	1.58	7.88
Total Project Cost	**50.22**	**12.55**	**62.77**	**38.52**	**9.63**	**48.15**	**88.74**	**22.19**	**110.93**
Front-end Fee	-	0.38	0.38	-	0.28	0.28	-	0.66	0.66
Total Financing Required	**50.22**	**12.94**	**63.16**	**38.52**	**9,91**	**48.43**	**88.74**	**22.85**	**111.59**

Note: Totals may not add up totally due to rounding.

Table 3.2: Project Cost by Expenditure

(US$ million equivalent)

Component	Gansu			Xinjiang			Total		
	Local	Foreign	Sub-total	Local	Foreign	Sub-total	Local	Foreign	Sub-total
A. Works	**10.22**	**2.55**	**12.77**	**14.84**	**3.71**	**18.55**	**25.06**	**6.27**	**31.33**
B. Goods									
1. Equipment and Inputs	7.49	1.87	9.37	9.72	2.43	12.15	17.21	4.30	21.52
2. Animal Stocks	19.79	4.95	24.73	3.02	0.75	3.77	22.80	5.70	28.51
3. Vehicles	0.72	0.18	0.90	0.64	0.16	0.80	1.36	0.34	1.70
Sub-total	**28.00**	**7.00**	**35.00**	**13.38**	**3.34**	**16.72**	**41.38**	**10.34**	**51.72**
C. Services									
1. Technical Assistance	3.67	0.92	4.59	3.39	0.85	4.24	7.06	1.77	8.83
2. Training and Study Tours	1.09	0.27	1.36	1.21	0.30	1.51	2.30	0.57	2.87
Sub-total	**4.76**	**1.19**	**5.95**	**4.60**	**1.15**	**5.75**	**9.36**	**2.34**	**11.70**
D. Miscellaneous									
1. Project Management	1.08	0.27	1.35	1.16	0.29	1.45	2.24	0.56	2.80
2. Working Capital	0.55	0.14	0.69	0.13	0.03	0.16	0.68	0.17	0.85
Sub-total	**1.63**	**0.41**	**2.03**	**1.29**	**0.32**	**1.62**	**2.92**	**0.73**	**3.65**
Total Base Cost	**44.60**	**11.15**	**55.75**	**34.12**	**8.53**	**42.64**	**78.72**	**19.68**	**98.40**
Physical contingencies	2.13	0.53	2.66	1.59	0.40	1.99	3.72	0.93	4.65
Price contingencies	3.49	0.87	4.36	2.82	0.70	3.52	6.30	1.58	7.88
Total Project Cost	**50.22**	**12.55**	**62.77**	**38.52**	**9.63**	**48.15**	**88.74**	**22.19**	**110.93**
Front-end Fee	-	0.38	0.38	-	0.28	0.28	-	0.66	0.66
Total Financing Required	**50.22**	**12.94**	**63.16**	**38.52**	**9,91**	**48.43**	**88.74**	**22.85**	**111.59**

Note: Totals may not add up totally due to rounding.

Total project cost is estimated based on information provided during the period of March 2003-May 2003. No further major adjustments are anticipated. Project base cost is expressed in December 2002 prices and the exchange rate used to convert project cost is RMB 8.3 to US $1. Total project cost includes physical and price contingencies.

Physical contingencies are based on an average rate of 5% for costs under all project components except Project Management, Monitoring and Evaluation component where no physical contingencies have been applied.

Price contingencies for costs incurred in foreign exchange are estimated based on an annual international price index of:

2004	2005	2006	2007	2008	2009
3.6%	3.7%	3.5%	2.0%	1.7 %	1.6%

Price contingencies for costs incurred in RMB are based on an annual domestic price index of :

2004	2005	2006-2009
1.6%	2.0%	2.8%

Annex 4: Cost Benefit Analysis Summary
CHINA: Gansu and Xinjiang Pastoral Development Project

Background. China's grasslands provide many and diverse benefits and values to the nation and international community. All grasslands produce water and supply forage for herbivores, both domestic and wild. Grasslands also supply additional products such as minerals, construction materials, wildlife, medicines, and fuel. Grasslands also provide intangible values including areas for the preservation of biodiversity, anthropological sites, recreational activities, and wilderness. These benefits and intangible values depend upon the long-term sustainability of the grasslands to ensure that the ecological, economic, and social benefits and values can be enjoyed.

The grasslands of China also play a very important role in global climate change. Recent studies indicate that grasslands may be responsible for a substantial proportion of total terrestrial carbon production and that grassland biomass could constitute a significant sink of global carbon. The vast area and wide distribution of China's grasslands suggests that they could have widespread effects on regional climate and global carbon cycles.

Summary of Benefits and Costs:

General. The project will approach the development of pastoral systems with an integrated set of interventions and mutually re-enforcing activities across different components. The economic and environmental benefits of these and most other measures can not be assessed individually but only in the context of the comprehensive analysis. For example, improvement of soil and water conservation on slope lands and reduction of sedimentation in downstream areas requires substantive changes in the way natural pastures are managed. This, however, is only sustainable if proposed project investments into pasture improvement and forest rehabilitation will generate among long term environmental benefits also short-term economic benefits to local communities.

The project will produce benefits that are: (a) within the project area; (b) downstream; and (c) global and regional beyond project watersheds and the downstream areas. The main benefits evaluated in economic analysis include:

- **Direct Economic Benefits**. The main direct economic benefits arise from increased farmer/herder incomes and a reduction in production risk. Improved management of pastoral resources and genetic improvement of livestock breeds will result in faster turn-over of livestock, and facilitate the shift from extensive grazing systems to pen-feed animal production systems. This will be enabled by increased fodder production, particularly for winter feed to reduce the livestock mortality and increase animal productivity. Improved access to markets, improved function of markets, and training in financial management will help herders to use their resources in a manner consistent with market signals. For fine wool, re-organized selling systems will ensure that incentives are clearly transmitted to herders. Overall, incentives for product quality improvement will become more meaningful to herders, and will become a long-term source of sustainable income growth.
- **Direct and Indirect Downstream Economic Benefits** Downstream economic benefits will flow from enhanced price transparency, more competitive markets, and a focus on product quality. This will allow new and innovative income-earning activities for all rural people, which assists rural development. Market infrastructure investments will be used by residents of non-project areas and will attract market participants to the benefit of local economies. Quality promotion initiatives in Gansu will enhance the standing of the province amongst food-producing provinces and ease the process of competition with neighboring provinces.

- **Social Benefits.** The project will promote the direct involvement of beneficiary communities in the management of their pastoral systems through supporting the establishment of community driven natural resource management approaches and marketing associations. The establishment of community based natural resources management approaches is based on participatory grassland management plans and the inclusion of all farmers and herders. It is expected that by supporting the participatory approach, the project would promote equal access to land and pasture resources which might lead to improved social cohesion in rural areas.

- **Direct and Indirect Downstream Environmental Benefits.** Downstream environmental benefits come from improved watershed protection such as reduced soil erosion and sediment inflow to surface waters, and water quality and quantity in downstream areas. Sedimentation reduces the quality of drinking water and aquatic ecosystems and causes choking of irrigation canals, which increases the operating and maintenance cost of irrigation systems. Project activities would lower variability in water flows and improve the soil water retention capacity, especially in the deep drainage level, controlling potential floods and improving water storage for downstream areas. In addition to downstream environmental benefits, soil erosion has also direct economic consequences for local farmers, leading to depletion of soil fertility and declining crop yields.

- **Global Environmental Benefits**. The quantifiable global environmental benefits come from restored biodiversity and associated increases in productivity of grassland resources in the globally significant ecoregions of Tien Shan, Altai Shan and Qilian Shan. These benefits result from implementation of participatory grassland management plans - in particular from changed grassland utilization due to delayed commencement of spring and summer grazing and earlier cessation of summer grazing. This results in increased species diversity, increased biomass productivity and improved grazing conditions for wild ungulates as well as herds of sheep managed by local herders. The increased productivity also has a quantitative benefit from improved carbon sequestration - directly relating to the carbon stored in incremental root and above-ground biomass resulting from implementation of participatory grassland management plans. Quantitative benefits will also arise from reduced land degradation resulting from sustainable management of complete grassland agro-ecosystems. In addition to restoring and maintaining resource productivity, the reduction in siltation in waterways and dust mobilization due to siltation has direct economic benefits to communities affected by current levels of land degradation in Western and Central China. Intangible benefits will result from improved understanding of the ecological resources of the globally significant ecoregions of Tien Shan, Altai Shan and Qilian Shan - for example raised awareness and strengthened capacity of herders to manage their agro-ecological systems sustainably and conservation of indigenous mutton sheep breeds.

Main Assumptions:

Analytical Approach. An integrated cost-benefit analysis has been undertaken on all quantifiable economic and environmental benefits generated by the project. It is expected that non-quantifiable benefits, mainly environmental and social benefits, are likely to be several times larger than are the quantifiable economic benefits. The total benefits quantified in cost-benefit analysis should be thus interpreted as a conservative lower bound estimates. The economic analysis of the project focuses on the three major areas of quantifiable benefits: (a) incremental production of livestock products from improved productivity based on net value of production; (b) environmental benefits from reduced sediment retention; and (c) environmental benefits from carbon sequestration from improved pasture management. The economic analysis is based on 6-year project implementation period, and the following assumptions (see Financial Analysis section for a detailed assumptions of farm models):

- The period for evaluation of livestock production activities is 20 years. Environmental benefits are quantified over 30 year period;
- Discount rate of 12% is used in the economic and financial analysis.
- All benefit-cost calculations are carried out in 2001 constant prices;
- The quantified economic benefits are derived using salable incremental livestock products, such as meat and wool. There is a growing domestic demand for livestock products. Therefore it is reasonable to assume that incremental output is saleable; and
- World market reference prices are calculated for major traded products such as fertilizers and livestock products (calculation of wool market reference price is explained in detail below). For all other products, financial prices as observed in the project areas have been used. Calculation of economic prices is presented in Table 1A. For farm labor and unskilled labor a conversion factor of 0.8 is applied to the wage rate of RMB 15/day. This reflects the economic opportunity cost of labor in project areas.

Evaluation of Economic Benefits. To capture the mutual benefits and costs of project investments, the economic analysis quantifies all inputs and outputs. The estimated incremental benefit stream is derived from comparing the "without" and the "with" project net value of production. The "without" project case assumes a continuation of present yields and productivity levels of livestock. The "with" project case reflects the increased fodder productions' gradual improvement of livestock productivity resulted from project interventions. By-products and intermediate products used in the farming systems (manure, crop residuals, fodder, etc.) are valued only so far as they replace traded products. All other by-products are quantified as they mostly determine inter-dependence among livestock production activities. This is a preferable approach as it avoids double-counting of benefits and valuation of problems for intermediate and by-products, and it integrates mutually beneficial interactions between the activities. Evaluation of the net value of livestock production is based on the following analytical modules:

- **Herd Structure**. Herd structure is based on a dynamic relationship among the flock (ewes, replacement ewes, born lambs, etc.) defined by given technical parameters in a time period (birth rate, mortality rate, adult death loss, culling rate, etc.) and linkages between current and previous time periods. Separate herd structures are developed for the with and without project scenarios. This has an important implication as herd structures and size may change regardless whether there is a project or not. For example, the herd size may increase gradually through lambing and replacement decisions even without the project. Keeping without project herd structure constant while letting it change throughout project period would thus overestimate (underestimate) the true project benefits.
- **Fodder Production.** The project will bring some 27,000 ha of pastures under sustainable grazing management in pilot counties and support implementation of community based grassland management plans. Management activities would include limited fencing, construction of watering points, fertilizer spreading and reseeding on intensively grazed areas, pest control, rotational grazing, identification of zones from which grazing is excluded, and timing of grazing to allow establishment and flowering of palatable species. In addition, the project will increase the fodder base by planting 5,000 ha of alfalfa and 10,000 ha of corn. It is expected that these investments would reduce the current levels of in-farm feed deficit by some 60 percent. The model estimates a feed balance for each representative production system without the project, and evaluates how it will change as a result of project interventions. Reduced feed deficit is expected to increase the net value of production through improved productivity of livestock and reduced cost of purchased fodder. The feed balance is calculated for each representative production system, expressed in a digestible dry matter (DDM).

- **Variable Production Costs**. This module estimates the cash expenses associated with livestock production. In livestock production, the largest share of cash expenses is usually associated with the purchases of supplementary feed and in-farm fodder production. It is assumed that in order to maintain the baseline livestock productivity levels herders need to fill the gap in feed deficit by purchasing more forage and fodder. Alternatively, farmer can reduce the cost of purchased forage by producing more fodder in-farm. The optimal production decision of farmers is determined by the relative unit prices of purchased fodder and in-farm fodder unit production costs.

- **Net Value of Production**. Benefits from livestock production are evaluated through improved animal productivity as a result of rehabilitation of natural pastures, increased production of fodder, and genetic improvement. It is assumed that revenues come mainly from crop and livestock production activities. Revenues from livestock production come from the sale of wool, skins and live animals (lambs and culled animals). The analysis ignores possible off-farm labor receipts.
  Average wool prices were derived based on the prices of different classes fiber diameter, measured in microns in the range 16-35 microns.[1] An estimate of wool quality distribution in the project areas has been used to assign the fine wool clip in the range 18-34 microns. It is expected that the project will improve the average quality of wool (i.e. fiber fines) over a 15-year period. The average wool price was determined as the sum of the products across different fiber diameter categories and the price achieved in each category. Under "without project" scenario the average financial price of greasy wool was calculated as 11,06 RMB/kg and economic price as 17,63 RMB/kg.

  Price targets were established as % of economic prices achieved in a phased (3-step) process. The established target is to achieve 80% of the economic farm gate price in 10 years from year zero (current Xinjiang farm gate fine wool prices are 40-70% of the economic farm gate price). The summary of projected price targets in 5-year intervals is given in the table below.

	Year of project				
	RMB/kg greasy, farm gate, Xinjiang				
Scenario	0	5	10	15	20
Without project	11,06	11,06	11,06	11,06	11,06
With project	11,06	13,29	16,05	17,29	17,29

- **"With" and "Without" Project Scenario.** The baseline livestock productivity levels provided by the counties are rather high and reflect the past efforts of the Government to establish breeding programs and develop its livestock industry. For example, in the baseline lambing rate is in the range of 90-95%. The stated lamb mortality rates is in the range of 4-5% and adult sheep death loss in the range of 3-4%. It is assumed that the project will reduce average lamb and adult mortality rates up to 2% and average lambing rates will increase up to 4% beyond the stated baseline levels. The wool yields are expected to increase on average by 12% in pilot counties during the project period. The project would increase the robustness of financial and economic impact of its interventions through careful targeting of farmer and herder households whose current livestock productivity levels are significantly below the stated baseline productivity levels.

- **Incremental Livestock Numbers and Feed Supply.** It is assumed that the breeding animals will be purchased from within the livestock industries of Gansu and Xinjiang provinces, preferably at the county level. As such there would be only a minimal incremental increase in the numbers of sheep and cattle at the county level. These additional breeding animals will be supported either completely from pre-existing household forage and grassland resources or from a combination of current forage resources and new investment in alfalfa and corn as part of the household investment package.

Similarly, the fattening operations should not increase the number of livestock above what is already there because fattening animals will be sourced from the local market or directly from producers. Hence, the fattening activities intend to re-distribute the existing animals from herders to households who will establish appropriate infrastructure and forage resources to finish them to market specification. The establishment of fattening households would have thus a positive impact on rangeland condition through loop back mechanism whereby the grazing pressure is reduced at the breeding household level through the on-selling of lambs and yearlings earlier in the season than would be possible when they try to fatten livestock with their own resources.

In sum, project impacts on herders' incomes entail: (a) improvements in wool price achieved owing to mechanical shearing, improved wool handling and sorting procedures, and more competitive selling arrangements; (b) improvements in the fiber fineness distribution and yield owing to breeding; (c) gradual increase in wool and milk yields and increased carcass weights owing to breeding and nutritional improvements; and (d) gradual increase of livestock turnover rates through reduced mortality rates and increased reproduction. The first two of these impacts is due to improvements under the Market Systems Development component. The last two impacts are associated with the investments under Livestock Production and Grassland Management components.

Economic Valuation of Environmental Benefits. See Annex 14 for incremental cost analysis. The economic analysis incorporates the value of watershed protection and carbon sequestration.

- **Watershed Protection.** Grassland ecosystems in Xinjiang and Gansu are located in upper reaches of Yellow and Black Rivers, and in the catchments of Ertix and Ili rivers that flow into Kazakhstan and Russia. Improved grassland management would contribute towards improved water quality and quantity in downstream areas within, and beyond immediate project areas. These investments are expected to generate improved watershed protection services from reduced soil erosion and sediment inflow to surface waters and structures in downstream agricultural and urban areas. Sedimentation reduces the quality of drinking water and aquatic ecosystems and causes choking of irrigation canals, which increases the O&M cost of irrigation systems. It has been estimated that some 46% and 48% of grassland areas in Xinjiang and Gansu respectively are classified as moderately to severely degraded. Specific information about the extent of soil loss in the project areas is missing, but it may be as high as 40 ton/hectare/year in some denuded areas. Soil erosion is generally considered to be worst in areas which has a greater proportion of steep slopes and arid areas where soils are less stable, both which are common landscape and ecosystem features in the project areas.

  Other important watershed benefits comes from improved water retention. For example, it has been estimated that natural grasslands are capable of storing up to 80-90% of the rainfall in the soil, compared to 55-70% in forest lands.[2] Rehabilitation of grassland vegetation cover through improved management activities would thus improve soil structure and soil water retention capacity, especially in the deep drainage level, controlling potential floods and improving water storage for downstream areas, mitigating the impact of drought periods.

  It has been estimated that economic values of watershed protection services of forests range from of US $7-20/ha for hydrological and ecosystem services within, and beyond, immediate project county boundaries.[3] In this analysis the downstream environmental benefits from pasture rehabilitation and improved management are evaluated at US$15/ha/year over 30 year period. It is assumed that this figure would also include the opportunity cost of retained soil as a result of reduced soil erosion.[4] This should be treated as a conservative lower bound estimate of watershed protection benefits.[5]

- **Carbon Sequestration.** Carbon sequestration benefits will be generated through rehabilitation and improved management of natural pastures. Grasslands and natural pastures are capable of fixing significant amounts of carbon in the soil and vegetation cover. Changes in grassland vegetation, due to overgrazing, conversion to crop land, desertification, fire, fragmentation and introduction of non-native species affect their carbon storage capacity, and may in some cases even lead to contribution of net source of CO2.[6] For example, it has been found that grasslands may loose 20-50% of their soil organic carbon content through cultivation, soil erosion, and land degradation.[7]

  The major potential for increasing soil carbon uptake would come through restoration of degraded grassland soils and vegetation cover and widespread adoption of improved grazing practices. To elicit a gain in carbon storage, the project would assist in the implementation of improved pasture management practices through increasing the amount of carbon entering the soil as plant residues; suppressing the rate of soil carbon decomposition, and reduction of soil loss due to overgrazing. Management factors supported by the project that can impact carbon sequestration levels on intensively managed pastures would include use of production inputs (e.g. organic and inorganic fertilizer) and implementation of improved grazing management practices (e.g. rotational grazing), including community based regulation of grazing intensity and frequency - the main management variables that affect soil carbon levels. It has been estimated that adoption of better management practices on the pastures would elicit a carbon gain of 0.1 – 0.5 Mg/ha/year or about 3 – 15 tons of carbon per year, depending on the degree of pasture degradation[8]. Considering that grassland improvement activities are carried out mainly in relatively degraded winter and spring pastures, which are usually located in arid and semiarid areas and where carbon sequestration capacity may be even lower a figure of 2 tons per ha per year is used in the analysis. It was assumed that carbon sink will build up starting from year 3 over 30 year period up to 50 tons per hectare.

  The economic benefits of carbon sequestration were calculated using the shadow price of CO2 damages at US $20 per ton of CO2 per year (discounted at 12 percent interest rate over the 20 year period), which is equivalent to US$5.5 per ton of carbon. Various studies have estimated the net present value of damages associated with the release of a ton of carbon in ranged from US$5-40.[9] It is considered that the shadow price of carbon damages used here forms the conservative lower bound estimate of global benefits.

Phasing. Implementation phasing of the livestock household activities is crucial for three reasons: To: (a) distribute the number of beneficiaries over the project period to suit the abilities of the county PMOs to support the activities; (b) improve the success of the outcome by ensuring that a logical sequence of developing the physical components within an activity is followed (i.e. implementation of livestock production activities will only go ahead after planting additional fodder crops); and (c) improve the economic viability by spacing out the purchase of capital items within an activity.

Project Costs. The project costs combine the costs of feed production (establishment of artificial and semi-artificial pastures, and corn); breed improvement (purchase of high value breeding animals); construction of silage pits; construction and rehabilitation of animal sheds; grassland and pasture improvement investments (reseeding, pest control, watering points, fencing) and support to county grassland management stations (including monitoring); market information systems and applied research; training and extension, and project management, monitoring and evaluation.

Economic Rate of Return (ERR). A total economic net value of production is derived from the household based investment activities adjusted to economic prices of production factors and output products. Investments into nucleus and multiplier farms and livestock production or processing enterprises are excluded from the economic analysis. A detailed economic and financial analysis of these investments will be carried out on case-by-case basis during project implementation before final approval of loan funds. A detailed business plan and strategic management plan will be developed for each enterprise before releasing any loan funds.

The total ERR of the project is 17.1%. The ERR for Xinjiang province is 19.4%. ERR based on economic benefits only is 17.8%. The total ERR for Gansu province is 15% while ERR based on economic benefits only is 14.8%.

Capitalized value of total project net benefits is RMB 146 million (discounted at 12%). Capitalized value of direct economic benefits from livestock production activities is RMB 119.2 million which represents some 82% of the total project benefits. Capitalized value of environmental benefits is RMB 26 million or some 18% from total project benefits. The value of environmental benefits calculated in this analysis should be considered as a conservative lower bound estimate of total environmental benefits as it does not include many existence and option values associated with environmental resources, or various ecosystem life-support services. Since no detailed studies have been carried out to estimate specific downstream and carbon sequestration benefits in the project areas, the study adopted a lower bound estimates of these benefits which were developed in other studies. Given the extensive soil erosion in the project areas, it may be the case that the actual downstream benefits can be several times higher than assumed here. The share of environmental benefits from total quantified project benefits is 22% in Xinjiang. The share of environmental benefits in Gansu is 8% as there are relatively less investments into grassland management.

Results of Economic Analysis.

	ERR economic benefits only	**NPV economic benefits only (Mill. RMB)**	**ERR economic and environmental benefits**	**NPV economic and environmental benefits (Mill. RMB)**
Xinjiang Province	17.8%	78.1	19.4%	101.0
Gansu Province	14.8%	41.2	15.0%	44.6
Total	**16.3%**	**119.2**	**17.1%**	**145.7**

Sensitivity analysis / Switching values of critical items:

A sensitivity analysis shows that the project returns are robust. Quantified economic benefits of project activities need to decline some 20% in Gansu and even more so in Xinjiang for total ERR to drop below 12 %. The results of sensitivity analysis are presented below.

Results of Sensitivity Analysis

Scenario	**ERR Xinjiang**	**ERR Gansu**
10% increase of investment cost	18.4%	14.6%
20% increase of investment cost	17.5%	14.2%
10% decrease of quantified economic benefits	17.1%	13.1%
20% decrease of quantified economic benefits	14.8%	11.0%
1 year delay of project benefits	17.6%	13.7%
2 years delay of project benefits	16.5%	13.2%

Financial Analysis

Farm models. Financial analysis was carried out based on representative farm/herder household models developed for eight pilot counties. The models represent different livestock production patterns and pastoral systems typical to the project areas. The household production models were developed by combining the project fodder and livestock production and grassland management activities. For all models, changes in livestock and cropping patterns would be accompanied by a greater share of livestock sold on market (see table for detailed description of models and their underlying technical assumptions). Assumption is that family consumption, which is presently relatively high, would remain constant over time. Incremental cash flows are derived from the individual activity budgets available in project files.

The results of financial analysis are presented in the table below (electronic files of farm models are available upon request). For comparison the table also provides calculations of economic rates of return. The size of investments of farm household based sheep and cattle production models varies from RMB 7,600 - RMB 30,000/household. The FRR of these investments is in the range of 17-28%.

Average investment into household based sheep and beef fattening operations varies from RMB 19,834-RMB 97,419/household. The large share of this investment cost is capital for the purchase of animals for the first fattening cycle (i.e. some 70-75%). The FRR of these investments is 20-29%.

Investments into 100 head dairy cow farms total about RMB 2.5 million. The investment will be managed either by individual entrepreneurs or a group of individuals. The FRR of this investment is 17%. The presented models are only indicative and farmers would be free to choose a combination of activities they would invest in as long as they are within the investments limits, have adequate income levels to meet production costs and loan repayment needs, have market opportunity for products, and follow technical norms established for these activities.

Description of Farm Models.

Model	Production system	Cropping and livestock pattern		Economic and financial benefits and main assumptions
		Without project	With project	
Pingliang county, Gansu	Household beef fattening model	Corn -1 mu; wheat -17 mu; beans -1 mu; potato -2 mu; alfalfa-1 mu; silage corn-0 mu.	Corn -3 mu;wheat -5 mu; beans -1 mu; potato-2 mu; alfalfa-6 mu; silage corn-5 mu; 30 heads beef cattle per cycle, 2 cycles/yr.	Sale of fattened animals. Average daily growth rate - 750 grams per day.
Pingliang county, Gansu	Beef cattle raising model	Cattle-1 head; silage corn-0 mu; beans-1 mu; wheat-17 mu; potato-2 mu; oates-0 mu; alfalfa-1 mu; corn-1 mu.	Cattle-4 head; silage corn-1 mu; beans-1 mu; wheat-6 mu; potato-2 mu; oates-1 mu; alfalfa-4 mu; corn-7 mu.	Increased sale of live animals; calving rate increased from 65 to 70%; reduced mortality rates across different age groups.
Jingyuan County, Gansu	Pen-fed mutton sheep production model (local breed)	Ewes-5 heads; corn-1.5mu; flax-1.5mu; wheat-12 mu; alfalfa-0 mu; pasture-400 mu.	Ewes-15 heads; corn-4.5 mu; flax-1.5 mu; wheat-4.5 mu; alfalfa- 4.5 mu; pasture-0 mu.	Increased sale of live animals; increased live weight (ignored in the models).
Sunan county (model A), Gansu	Extensive grazing fine wool sheep production model (Gansu merino sheep); Includes investment into water storage system.	Ewes-90 heads; oats and peas-0 mu; winter pastures-1500 mu; summer pastures-700 mu.	Ewes-90 heads; oats and peas-3 mu; winter pastures-1500 mu; summer pastures-700 mu.	Increased sale of wool and live animals; lamb mortality rate decreased from 6 to 2%; adult death losses reduced from 5 to 2 %; average wool yield increased from 3.5 to 3.8 kg per sheep; increased utilization rate of pastures and increased in-farm production of winter fodder; time spent from walking flock to water source reduced from 2 hours per day to 15 minutes per day.
Sunan county (model B), Gansu	Extensive grazing fine wool sheep production model (Gansu merino sheep).	Ewes-90 heads; oats and peas-0 mu; winter pastures-1500 mu; summer pastures-700 mu.	Ewes-90 heads; oats and peas-3 mu; winter pastures-1500 mu; summer pastures-700 mu.	Increased sale of wool and live animals; lamb mortality rate decreased from 4 to 2 %; adult death losses reduced from 3 to 2 %; average wool yield increased from 3.5 to 3.8 kg per sheep; farm-gate price of wool increased from RMB 11.06 to 14.03 /kg; increased utilization rate of pastures and increased in-farm production of winter fodder.
Sunan county, Gansu	Household fine wool sheep fattening model	Potato-1 mu; wheat-7 mu; oats and peas-3 mu; corn-0 mu; alfalfa-1 mu.	Potato-1 mu; wheat-3 mu; oats and peas-3 mu; corn-3 mu; alfalfa-2 mu; 100 heads sheep per cycle; 3 cycles per year.	Sale of fattened animals. Average daily growth rate 100 to 150 grams per day depending on age group.
Yongchang county, Gansu	Pen-fed mutton sheep production model (local breed)	Ewes-30 heads; corn-0.5 mu; wheat-7.5 mu; barley-8 mu; alfalfa-0 mu.	Ewes-30 heads; corn-4 mu; wheat-4 mu; barley-6 mu; alfalfa-2 mu.	Increased sales of live animals; lambing rate increased from 95 to 99%; lamb mortality rate decreased from 10 to 7%; adult death losses reduced from 4 to 2 percent; reduced cost of feed and fodder due to changes in cropping patterns.
Yongchang county, Gansu	Household mutton sheep fattening model	Corn-0.5 mu; wheat-7.5 mu; barley-8 mu; alfalfa-0 mu.	Corn-3 mu; wheat-3 mu; barley-6 mu; alfalfa-2 mu;200 heads sheep per cycle, 2 cycles per year.	Sale of fattened animals. Average daily growth rate 133 to 155 grams per day depending on age group.
Lintao county, Gansu	Household dairy cattle model	Dairy cows- 1 head	Dairy cows (Holstein)- 3 heads	Milk production (average annual milk yield 5,200 - 5,500 kg per cow); sale of male calves and culled cows
Lintao county, Gansu	Large scale dairy cattle model	None	Dairy cows (Holstein) -100 heads	Milk production (average annual milk yield 5,200 - 5,500 kg per cow); sale of male calves and culled cows

Model	Production system	Cropping and livestock pattern		Economic and financial benefits and main assumptions
		Without project	With project	
Bole county, Xinjiang	Extensive grazing fine wool sheep production model (Xinjiang merino sheep).	Ewes-128; corn-5 mu; alfalfa-35 mu; winter pastures-1800 mu; spring/fall pastures-900 mu; summer pastures-900 mu.	Ewes-128; corn-14 mu; alfalfa-26 mu; winter pastures-1800 mu (including 150 mu of grassland improvement); spring/fall pastures-900 mu; summer pastures-900 mu.	Increased sales of wool and live animals; lambing rate increased from 95 to 97%; lamb mortality rate decreased from 3 to 2 percent; adult death losses reduced from 2 to 1 percent; average wool yield increased from 3.6 to 4.1 kg per sheep; farm-gate price of wool increased from 11.06 to 14.03 RMB/kg; reduced cost of feed and fodder due to changes in cropping patterns.
Bole county, Xinjiang	Extensive grazing mutton sheep production model.	Ewes-128; corn-5 mu; wheat-8 mu; alfalfa-15 mu; winter pastures-2400 mu; spring/fall pastures-1400 mu; summer pastures-800 mu.	Ewes-128; corn-10 mu; wheat-5 mu; alfalfa-15 mu; winter pastures-2400 mu; spring/fall pastures-1400 mu; summer pastures-800 mu.	Increased sales of live animals; lambing rate increased from 92 to 96%; lamb mortality rate decreased from 3 to 2%; adult death losses reduced from 2 to 1%; reduced cost of feed and fodder due to changes in cropping patterns.
Tekesi county, Xinjiang	Extensive grazing fine wool sheep production model (Xinjiang merino sheep).	Ewes-128; corn-10 mu; silage corn-5 mu; wheat-10 mu; alfalfa-10 mu; winter pastures-410 mu; spring/fall pastures-310 mu; summer pastures-480 mu; fall pastures-310 mu; native hay meadows-80 mu.	Ewes-128; corn-15 mu; silage corn-7 mu; wheat-3 mu; alfalfa-10 mu; winter pastures- 410 mu; spring/fall pastures-270 mu; summer pastures-480 mu; fall pastures-310 mu; native hay meadows-120 mu.	Increased sales of wool and live animals; lambing rate increased from 95 to 97%; lamb mortality rate decreased from 5 to 3%; adult death losses reduced from 4 to 2%; average wool yield increased from 3.3 to 3.8 kg per sheep; farm-gate price of wool increased from 11.06 to 14.03 RMB/kg; reduced cost of feed and fodder due to changes in cropping patterns.
Fuyun county, Xinjiang	Extensive grazing mutton sheep production model (Altai local sheep).	Ewes-136; corn-5 mu;wheat-20 mu; alfalfa-20 mu; winter pastures- 5000 mu; spring/fall pastures-2080 mu; summer pastures-1250 mu; native hay meadows-50 mu.	Ewes-136; corn-15 mu;wheat-5 mu; alfalfa-25 mu; winter pastures- 5000 mu; spring/fall pastures-2080 mu; summer pastures-1250 mu; native hay meadows-50 mu.	Increased sales of live animals; lambing rate increased from 95 to 97%; lamb mortality rate decreased from 4 to 2%; adult death losses reduced from 3 to 2 percent; reduced cost of feed and fodder due to changes in cropping patterns.
Xinjiang	Mutton sheep fattening model (agricultural area)	corn-6 mu; wheat- 30 mu; silage corn-4 mu; alfalfa-10 mu;250 heads sheep per cycle, 2 cycles per year.	corn-12 mu; wheat-6 mu; silage corn-10 mu; alfalfa-22 mu; 250 heads sheep per cycle, 3 cycles per year.	Sale of fattened animals. Average daily growth rate 140 grams per day.

Results of Farm Model Analysis

Model	Production system	Investment per household (RMB)	FRR	ERR
Pingliang county, Gansu	Household beef fattening model	97,419	20%	13%
Pingliang county, Gansu	Beef cattle raising model (3 heads)	11,333	23%	20%
Jingyuan County, Gansu	Pen-fed mutton sheep production model.	12,549	19%	20%
Sunan county (model A), Gansu	Extensive grazing fine wool production model. Includes investment into water storage system.	15,062	18%	18%
Sunan county (model B), Gansu	Extensive grazing fine wool sheep production model.	13,541	20%	16%
Sunan county, Gansu	Household fine wool sheep fattening model	19,834	21%	13%
Yongchang county, Gansu	Pen-fed mutton sheep production model.	7,600	17%	14%
Yongchang county, Gansu	Household mutton sheep fattening model	24,500	29%	13%
Lintao county, Gansu	Household dairy cattle model (2 heads)	30,000	24%	20%
Lintao county, Gansu	Large scale dairy cattle model (100 heads)	2,447,160	17%	17%
Bole county, Xinjiang	Extensive grazing fine wool sheep production model.	18,635	18%	16%
Bole county, Xinjiang	Extensive grazing mutton production model.	17,535	17%	28%
Tekesi county, Xinjiang	Extensive grazing fine wool production model.	17,118	28%	29%
Fuyun county, Xinjiang	Extensive grazing mutton sheep production model.	21,240	22%	23%
Xinjiang	Mutton sheep fattening model.	90,121	28%	26%

Sensitivity Analysis. The major risks associated with the financial sustainability of farm investment projects include: (a) reduction of prices of livestock products; (b) increased cost of major inputs (including fodder crops); and (c) increased investment costs. The sensitivity of the FRR has been tested against the following assumptions: (a) 10% and a 20% decrease in the prices of livestock products; (b) 10% and 20% increase in production costs; (c) 10% and 20% increase in investment costs.

The results show that farm household production models are relatively robust to the changes in input and output prices. Decline in output prices has the largest impact on production systems which depend largely on purchased fodder (i.e. Lintao dairy production models and Pingliang beef cattle production model). The models are generally less sensitive to increased input and investment costs.

Other risks which may affect the financial viability of investments would include: (a) inability to achieve the projected livestock productivity targets; (b) lower than expected fodder crop yields which would increase the total cost of feed and fodder (farmers need to purchase more feed from markets); (c) inability to achieve the projected increase of farm–gate level wool prices; (d) loss of livestock due to winter snow storms; and (e) reduced productivity of natural grasslands due to extended drought conditions. Risks (a) are (b) mitigated by providing farmers hands-on training in livestock management and extension services, and through phasing of investments and monitoring their physical and financial impacts. Risk (c) is mitigated through implementation of the project marketing activities. Risks (d) and (e) are mitigated through providing investments into warm sheds and establishment/increase of fodder base; training and extension; and through phasing of investments and monitoring their physical and financial impacts.

Sensitivity analysis of household based fattening operations shows that these investments may be relatively risky. FRR of these activities is sensitive on marginal changes of average daily growth rates; reduction of livestock prices and increase of feed costs. The project design would mitigate these risks through: (a) encouraging the larger share of farm-produced feed from the total annual feed requirements; (b) providing households training in appropriate livestock fattening and business management skills; and (c) phasing of investments and monitoring their physical and financial impacts. Additional factors which would improve the financial viability of household based fattening operations and mitigate the risks not considered in the financial models would include such management variable as: (a) flexibility to maximize margins per sheep (i.e. ability to buy small quantity of lamb at the lower prices); and (b) use of lambs and culled sheep from the own flock.

Careful phasing of investment activities is the underlying risk minimization strategy of the project. It is crucial for the following three reasons: (a) to distribute the number of beneficiary households over the project period to suit the abilities of the county level PMO staff to procure and implement household activities; (b) to improve the success of the outcome by ensuring that a logical sequence of developing the physical components within an activity is followed; and (c) to improve the economic viability by spacing out the purchase of capital items within an activity. The project will establish a monitoring and evaluation system which would create a feedback-loop by providing project management an updated information about the financial viability and sustainability of activities under implementation, which will be in turn then used to adjust the annual project implementation plans.

Sensitivity Analysis of Farm Models (FRR)

Model	Production system	Baseline	Output prices		Input costs		Investment cost	
			-10%	-20%	+10%	+20%	+10%	+20%
Pingliang county, Gansu	Beef cattle raising model (3 heads)	23%	20%	17%	22%	22%	20%	19%
Jingyuan County, Gansu	Pen-fed mutton sheep production model (local breed)	19%	18%	18%	17%	16%	17%	16%
Sunan county (model A), Gansu	Extensive grazing fine wool sheep production model.	18%	17%	16%	18%	17%	17%	16%
Sunan county (model B), Gansu	Extensive grazing fine wool sheep production model.	20%	18%	17%	19%	18%	18%	16%
Yongchang county, Gansu	Pen-fed mutton sheep production model.	20%	17%	16%	15%	12%	16%	14%
Lintao county, Gansu	Household dairy cattle raising model (2 heads)	24%	17%	9%	19%	15%	22%	20%
Lintao county, Gansu	Large scale dairy cattle farm model (100 heads)	17%	12%	7%	14%	11%	15%	14%
Bole county, Xinjiang	Extensive grazing fine wool sheep production model.	18%	16%	14%	18%	17%	17%	15%
Bole county, Xinjiang	Extensive grazing mutton sheep production model.	17%	16%	15%	15%	14%	15%	13%
Tekesi county, Xinjiang	Extensive grazing fine wool sheep production model.	28%	27%	26%	27%	26%	26%	24%
Fuyun county, Xinjiang	Extensive grazing mutton sheep production model.	22%	22%	22%	21%	19%	20%	19%

Financial Viability of Livestock Breeding Infrastructure Investments. Livestock breeding support infrastructure investments supported by the project include dairy and beef cattle AI stations, sheep AI stations, veterinary stations and associated dipping operations, milking centers and milk collection centers. The financial viability and efficiency of livestock breeding investment activities is extremely sensitive to the numbers of livestock served by these entities. Since, the number of livestock in service areas varies largely in case-by-case basis, financial analysis presents a minimum livestock numbers requirements for these investments to become financially sustainable.

- **Township Veterinary Stations.** The services provided by the station's technicians include disease control, parasite elimination, sale of medicine, and quarantine inspection. The average cost of investment into veterinary station in both provinces is about 57,200 RMB per station. The minimum required number of sheep units served by a representative veterinary must be at least 60,000 sheep for these investments to become financially sustainable at current level of service fees and charges based on bull cost accounting. However, assuming that the cost of labor force (i.e. salaries of engineers, technicians and assistants) will be covered by local finance bureaus budgets, the minimum required number of sheep units in the service area is 15,000 sheep for these investments to become financially viable.

- **Dipping Tanks.** Dipping tanks in both provinces will be owned mostly by local veterinary stations. The average cost of a dipping tank is 5,000 RMB. The minimum number of sheep served by one dipping tank should be some 15,000 sheep for the operation to become financially sustainable at current service fees and charges.

- **Fine Wool Sheep Artificial Insemination Stations (Xinjiang).** The average cost of investment in Xinjiang is 26,500 RMB per AI station. The minimum number of sheep served by the representative AI station needs to be 5,500 sheep in order for these investments to become financially sustainable based on full cost accounting and current service fees.

- **Mutton Sheep Artificial Insemination Stations (Gansu).** The average cost of investment is 36,350 RMB per station. The minimum number of sheep served by the representative AI station needs to be 2,500 sheep in order for these investments to become financially sustainable based on full cost accounting and current service fees.

- **Dairy Cattle Artificial Insemination Stations (Gansu).** The average cost of investment is about 16,450 RMB per station. A minimum of 550 dairy cows per AI station is required for the investment to become financially feasible based on full cost accounting and current service fees.

- **Beef Cattle Artificial Insemination Station (Gansu).** The average cost of investment is about 15,350 RMB per station. A minimum of 950 beef cows per AI station is required for the investment to become financially feasible based on full cost accounting and current service fees.

- **Milking Centers.** The average cost of investment is about 500,000 RMB per station. Milking centers will lead to the increase in milk quality by preventing adulteration of milk and allowing mechanical cooling and allow farmers to participate in milk quality premium programs. The concentration of cattle in villages needs to reach a base, which will support the investment in milking centers. The financial analysis shows that concentration of 500 cows within walking distance makes the investment financially viable.

- **Milk Collection Stations**. The average cost of investment is about 200,000 RMB per station. As with milking stations, the financial feasibility of milk collection stations is depends on the distribution of cows in the project area. The collection station needs to service at least 350 cows for its operations to be financially sustainable.

Table 1A. Derivation of Economic Farm Gate Prices

Average 1999-2001				
	Unit	Urea /1	TSP /2	Lamb 7/ ($/kg cc wt)
FOB Gulf	US$/ton	105	127	3
Internal Transport, Trade and Processing Costs:/3				
Unloading /4	US$/ton	26	26	0
Unloading /4	US$/ton	5	5	0
CIF/FOB price	US$/ton	136	158	3
Exchange rate	Y/US$	8.3	8.3	8.3
CIF/FOB price	Y/ton	1,131	1,310	22
Trade margins /5	Y/ton	113	131	4
Domestic transport	Y/ton	75	75	1
Distributor price	Y/ton	1,319	1,516	27
Distributor margin /6	Y/ton	132	152	-11
Economic farm gate price	Y/ton	1,451	1,668	16
Economic farm gate price	Y/kg	1.45	1.67	291.80
Financial farm gate price	Y/kg	1.2	1.62	288
Conversion factor	%	121%	103%	101%

Notes to table above:

1/ Eastern European, fob Black Sea, average of 1999-2001
2/ UK, Smithfield market, average of 1999-2001
3/ 10% of Smithfield price
4/ Chinese costs derived from other WB studies
7/ 10% of local price at port
6/ 15 % on all products except lamb, which is -40%
7/ 36 kg Lamb lwt

Footnotes to Annex 4

1/ 1 micron = 1 x 10-6 m. An alternative (and older) measurement scale, more widely used in China, is "spinning count", denoted by even numbers succeeded by "s". 70s wool is very fine apparel wool, and 52s is at the fine end of carpet wool distributions. Most fine wool in the project areas is in the range 64s (about 23 microns) to 68s (about 19 micron). Microns are used in the analysis.

2/ Chomitz, K. E. Brenes, and L. Constantino. 1998.

3/ Kenneth Chomitz, Esteban Brenes, and Luis Constantino. 1998. *Financing Economic Services: The Costa Rican Experience*. Economic Notes Series No. 10, Central American Country Management Unit, Latin America and Caribbean Region, The World Bank: Washington, D.C.

4/ The World Bank financed China Second Loess Plateau Watershed Rehabilitation Project uses a shadow price of 1 Yuan (US$0.12) per ton of retained soil through erosion control measures.

5/ See http://cnrit.tamu.edu/rlem/watershed.html .

6/ UNEP (1997).

7/ Bruce, J., M. Frome, E. Haites, H. Janzen, R. Lal, and K. Paustian. Carbon sequestration in soils. Paper presented at Carbon Sequestration in Soils Workshop, Calgary, Alberta, Canada, May 21-22, 1998.

8/ It has been estimated that rehabilitation of degraded rangelands in Kazakhstan could enhance their carbon sequestration capacity from 0.1 t to 0.4 t/ha per year to 5 to 20 t/ha per hectare (Kazakhstan: Drylands Management Project, PCD).

9/ Kenneth Chomitz, Esteban Brenes, and Luis Constantino. 1998. *Financing Economic Services: The Costa Rican Experience*. Economic Notes Series No. 10, Central American Country Management Unit, Latin America and Caribbean Region, The World Bank: Washington, D.C. The World Bank financed Second Loess Plateau Watershed Rehabilitation Project in China quantifies economic benefits of carbon dioxide sequestration using a value of US $10 per ton of fixed carbon.

Annex 5: Financial Summary

CHINA: Gansu and Xinjiang Pastoral Development Project

Year Ending: 2009

Table 5.1: Financing Summary (Aggregated)

(US$ million equivalent)

Sources	Implementation Period						
	2004	2005	2006	2007	2008	2009	Total
Total Financing Required							
Project Costs							
Investment Costs	17.15	17.16	22.81	19.20	14.56	4.70	95.59
Recurrent Costs	2.79	2.89	3.20	2.96	2.40	1.09	15.34
Total Project Costs	19.94	20.05	26.00	22.17	16.97	5.79	110.93
Front-end fee	0.66						0.66
Total Financing	20.61	20.05	26.00	22.17	16.97	5.79	111.59
Financing							
IBRD	12.50	11.84	15.39	13.09	10.02	3.42	66.27
Cofinancier - GEF	1.85	1.92	2.45	2.11	1.62	0.55	10.50
Government	5.63	5.67	7.35	6.26	4.79	1.64	31.34
Central	2.12	2.20	2.81	2.42	1.86	0.63	12.05
Provincial/Regional	2.44	2.29	3.07	2.55	1.95	0.66	12.97
Prefecture/City	0.11	0.15	0.17	0.16	0.12	0.04	0.76
County	0.95	1.03	1.29	1.13	0.86	0.30	5.56
Beneficiaries	0.63	0.63	0.82	0.70	0.53	0.18	3.48
Total Project Financing	20.61	20.05	26.00	22.17	16.97	5.79	111.59

Totals may not add up due to rounding.

Table 5.2: Financing Summary (Gansu)

(US$ million equivalent)

Sources	Implementation Period						
	2004	2005	2006	2007	2008	2009	Total
Total Financing Required							
Project Costs							
Investment Costs	11.23	9.22	13.58	10.34	7.89	2.55	54.81
Recurrent Costs	1.48	1.45	1.60	1.65	1.27	0.53	7.97
Total Project Costs	12.71	10.66	15.18	11.98	9.16	3.08	62.77
Front-end fee	0.38						0.38
Total Financing	13.09	10.66	15.18	11.98	9.16	3.08	63.16
Financing							
IBRD	8.05	6.44	9.16	7.23	5.53	1.86	38.27
Cofinancier - GEF	1.06	0.89	1.27	1.00	0.77	0.26	5.25
Government	3.58	3.00	4.27	3.37	2.58	0.87	17.67
Central	1.22	1.02	1.46	1.15	0.88	0.30	6.02
Provincial/Regional	1.89	1.59	2.26	1.79	1.37	0.46	9.36
Prefecture/City	-	-	-	-	-	-	-
County	0.46	0.39	0.55	0.44	0.33	0.11	2.29
Beneficiaries	0.40	0.33	0.47	0.37	0.29	0.10	1.96
Total Project Financing	13.09	10.66	15.18	11.98	9.16	3.08	63.16

Table 5.3: Financing Summary (Xinjiang)

(US$ million equivalent)

Sources	Implementation Period						
	2004	2005	2006	2007	2008	2009	Total
Total Financing Required							
Project Costs							
Investment Costs	5.92	7.95	9.23	8.87	6.67	2.15	40.78
Recurrent Costs	1.32	1.44	1.60	1.32	1.14	0.56	7.37
Total Project Costs	7.23	9.39	10.83	10.18	7.81	2.71	48.15
Front-end fee	0.28						0.28
Total Financing	7.51	9.39	10.83	10.18	7.81	2.71	48.43
Financing							
IBRD	4.44	5.41	6.23	5.86	4.49	1.56	28.00
Cofinancier - GEF	0.79	1.02	1.18	1.11	0.85	0.30	5.25
Government	2.05	2.66	3.07	2.89	2.22	0.77	13.66
Central	0.90	1.17	1.35	1.27	0.98	0.34	6.02
Provincial/Regional	0.54	0.70	0.81	0.76	0.59	0.20	3.61
Prefecture/City	0.11	0.15	0.17	0.16	0.12	0.04	0.76
County	0.49	0.64	0.73	0.69	0.53	0.18	3.27
Beneficiaries	0.23	0.30	0.34	0.32	0.25	0.09	1.52
Total Project Financing	7.51	9.39	10.83	10.18	7.81	2.71	48.43

Main Assumptions:

Financing plan is based on total project cost by year including contingencies and the required front-end fee payment. The IBRD loan of US $66.27 million, requested by the Borrower, would cover about 59% of the total financing requirement for the project.

The first year financing includes required front-end fee of US $662,700 which is calculated at 1 percent of the total IBRD loan amount. Government financing includes a special allocation of 100 million yuan (US $12.05 million equivalent)committed by the central government to support the project activities in both Gansu and Xinjiang. Other government financing includes mainly re-allocation of targeted livestock development funds from MOA, budgetary allocations, comprehensive agricultural and animal husbandry development fund, food for work fund and other funds from various sources available for the Western Development Strategy.

Government financing is to be made by governments at central (11%), provincial/regional (12%), prefecture/city (1%) and county (5%) levels. Beneficiaries' contributions (3%) are mainly in the form of labor, manure by beneficiary households and in cash by participating farms and enterprises.

This financing plan includes a contribution from GEF (9%). No contribution from other potential co-financiers is expected.

GEF supported project activities are expected to be financed by GEF funds and government counterpart funds.

Annex 6: Procurement and Disbursement Arrangements
CHINA: Gansu and Xinjiang Pastoral Development Project

Procurement

The Bank's Guidelines. "Guidelines: Procurement under IBRD Loans and IDA Credits" (January 1995 revised January, August 1996, September 1997 and January 1999, Guidelines) and "Guidelines: Selection and Employment of Consultants by World Bank Borrowers" (January 1997 revised September 1997, January 1999 and May 2002, Consultant Guidelines) will be followed for all Bank and GEF financed procurement. Bank-approved Chinese Model Bidding Documents (MBD) and the Standard Bid Evaluation Form will be revised to ensure consistency with changes that have been incorporated into the Bank's SBDs. The Bank's Standard Documents will be used where no relevant model document exists. To standardize procurement of small civil works, works under force account arrangement and goods under national shopping procedures, PPMO prepared sample forms which have been reviewed by the Bank. They will be used by the PMOs during project implementation. Specialized procurement agent(s) will be selected by PPMO to assist in ICB, NCB and international shopping.

Procurement Capacity Assessment. A procurement management capacity assessment by the World Bank Beijing Office was carried out in July 2002 and updated in October 2002 and April 2003. As the project implementing agencies are not experienced in Bank financed procurement, there is a need for strengthening their capacity to efficiently carry out procurement under the project. The following action plan for this purpose was proposed by the procurement management capacity assessment mission and agreed by PPMOs.

1. Utilization of lessons learned. PPMOs should consult with the other PMOs in their provinces who have been implementing similar Bank projects, learning from their experiences and lessons in project management, and find a way to utilize some of their staff if possible.

2. Workshops. Workshops on Bank financed procurement would be provided to relevant PMO staff by Bank Beijing procurement staff prior to negotiations in Lanzhou and Urumqi. The workshops will focus on practical methodology of NCB and Shopping procedures for the PPMOs and county PMOs staff(trainers). Other staff at county and township levels would be trained by the trainers.

3. Procurement Agents. Specialized procurement agents (PAs) should be hired by PPMOs to assist in ICB, NCB and international shopping and ensure efficient procurement. PPMOs have intentionally engaged Northwest China International Tendering Company as procurement agent who has undertaken several Bank-financed health projects and has been proven to be qualified to undertake Bank-financed procurement of NCB and ICB. The PA will prepare all aspects of the BD except technical specifications which are under PPMOs' responsibility and integration of the documents. With the PPMO's participation, the PA will undertake the bidding activities including advertisement, issuing BD, receiving bids, bid opening, bid evaluation, award notification and contract signing. PPMOs are required to select PA prior to negotiations.

4. Procurement Planning. The procurement arrangement table and the procurement scheduling for the first year project implementation were prepared and submitted by each PPMO in November/December 2002, followed by a revised version in April 2003 which were reviewed by the Bank. The county PMOs will prepare the annual procurement plans and submit them to PPMOs for approval. The PPMOs will prepare a consolidated plan and submit it for the Bank's review based on the county plans. The PPMOs will also closely monitor the implementation of the plans and avoid undue delays.

5. Procurement Management Manual (see also below). Each PPMOs has prepared a procurement management manual, outlining the procurement cycle management, administrative procedures, responsibilities and authorizations of PMOs of various levels, and filing of procurement records, etc. Bank missions have reviewed the manuals and found them generally acceptable. The procurement provisions as set in the final Project Agreement of the project should be fully incorporated into the manuals. The manuals will be issued by PPMOs to prefectures, counties and townships to follow when the project implementation starts. PPMOs should explain in detail the provisions of the manuals to the related PMO staff at prefecture, county and township levels in workshops.

6. Waivers. Waivers should be incorporated in the Procurement Schedule of the Loan Agreement for the differences between the Bank Guidelines and the Tendering and Bidding Law of China and other central and local regulations. The waivers should also require for mandatory use for NCB procurement of the Chinese Model Bidding Documents issued and revised by MOF.

Procurement methods (Table A)

Procurement Arrangements. Procurement Management Manuals have been prepared by each PPMO which clearly define (a) procedures applicable to the project; (b) internal review and the Bank's prior review requirements and its flow chart, including timeframe; (c) roles and functions defined for PMOs at each level and relevant agencies involved in the project; (d) quality assurance and assistance including inspection and acceptance procedures; and (e) filing system requirement. The CPMO will coordinate and assist in procurement effort of PPMOs with import formalities. The PPMOs will be responsible for procurement through ICB, NCB and International Shopping procedures with assistance of procurement agent(s). County PMOs (about 43 in total) will be responsible for procurement under other procedures including national shopping, small works, force account, direct contracting. A detailed procurement plan for the first year has been finalized in accordance with the project's phased approach arrangements and included in PIM. A complete set of procurement packages for the first year of implementation have been agreed upon, and bidding documents for these procurements are under preparation. The procurement plans for the following implementation years have been estimated based on percentage distribution of total project cost and the first year's cost estimation. Detailed procurement plans for the following years' procurement will be submitted for the Bank's approval on an annual basis. US$10.5 million of GEF funding will be available for procurement of goods, payment for consultant services and training, and financing of incremental operating costs of PMOs. The anticipated procurement profile is shown in Annex 6 Table A separately for IBRD funded project costs and GEF funded project costs.

Works. A total of US$35.49 million worth of works would be required for the project. These works would be scattered over several hundreds of villages in 43 project counties, carried out over a period of six years and are not anticipated to be of interest to foreign construction firms.

(i) *International Competitive Bidding (ICB).* Although not anticipated, any contract for works estimated to cost US$10 million equivalent or more, would be procured under ICB procedures specified in the Bank's Guidelines. No domestic preference will apply to domestic contractors should ICB be required.

(ii) *National Competitive Bidding (NCB).* Contracts for works estimated to cost more than US$300,000 equivalent, but not more than US$10 million equivalent may be awarded under NCB procedures acceptable to the Bank and paragraphs 3.3 and 3.4 of the Bank's Guidelines will apply. A total of US$1.05 million worth contracts for construction of workshops for benefiting rural processing plants and enterprises are anticipated to be procured under NCB .

(iii) *Small Works (SW).* The majority of works, about US$26.57 million in aggregate costing less than US$300,000 equivalent per contract, consist of irrigation works (US$0.15 million), market systems development (US$1.29 million), livestock sheds (US$16.77 million), feedlots (US$5.72 million), land

preparation (US$0.40 million) and other small construction (US$2.24 million). These works would be suitable for lump-sum and fixed price contracts awarded on the basis of quotations obtained from at least three qualified domestic contractors in response to a written invitation.

(iv) *Force Account (FA).* About US$7.65 million worth of works in individual assignments not to exceed US$100,000 each would consist of basically various minor water tanks (US$0.16 million), construction of simple silage pit (US$1.51 million), hay storage (US$0.79 million) and auction shelter (US$0.03 million), establishment of forage base (US$0.49 million), renovation of animal shed and AI stations (US$4.45 million) development of river beach grassland and other small scale undertakings (US$0.22 million). These works are small and scattered in 43 project counties for which qualified construction firms are unlikely to bid at reasonable prices. With the prior agreement of the Bank, these works would be most desirable to be carried out under force account arrangement to best utilize the local know-how, available materials and employ labor-intensive technologies. The Bank's payments for works under force account would be made on output basis i.e. unit prices and quantities agreed annually with the Bank.

(v) *Non-Bank Financing (NBF).* A total of US$0.22 million will be non-Bank funded including renovation of project management office buildings (US$0.15 million) at provincial, prefecture and county levels in Gansu province and workshop construction for one benefiting rural processing plant (US$0.07 million) who is willing to finance with its own fund also in Gansu province.

Goods. A total of US$58.27 million worth of goods would be procured for the Project. To the extent practical, contracts for goods would be grouped into bid packages estimated to cost US$250,000 equivalent or more whenever possible to attract competition.

(i) *International Competitive Bidding (ICB).* All contracts for goods costing US$250,000 equivalent or more, would be awarded through ICB procedures. About US$4.16 million worth of goods are expected to be procured by ICB including vehicles (US$1.82 million) and processing equipment for benefiting rural processing plants and enterprises (US$2.34 million). Domestic preference specified in the Guidelines would apply to qualified domestic manufactures bidding under ICB procedures.

(ii) *National Competitive Bidding (NCB).* NCB procedures would be used for procurement of goods costing US$100,000 equivalent or more per contract. A total of US$3.80 million worth of goods are expected to be procured through NCB procedures acceptable to the Bank. These goods would include some processing equipment for benefiting rural processing plants and enterprises (US$2.56 million) and computers and printers (US$0.74 million). About US$0.50 million worth of grassland conservation equipment is for GEF-supported activities.

(iii) *International Shopping* (IS). An estimated total of US$3.53 million worth of breeding animals would be procured through IS procedures with contracts under US $100,000 equivalent each. They would include breeding stocks of dairy cattle, mutton rams and ewes, super fine wool rams, dual purpose rams and ewes and sheep embryos. IS will require quotations from at least three suppliers in two different countries. Paragraphs 3.5 and 3.6 of the Bank's Guidelines will apply.

(iv) *National Shopping (NS).* About US$38.80 million worth goods will be required including grassland equipment (US$0.44 million), livestock production equipment (US$3.88 million), market equipment (US$0.86 million), office equipment and furniture (US$0.48 million), seeds (US$1.48 million), fertilizer (US$0.80 million), fencing materials (US$4.67 million), plastic mulch (US$0.60 million), local animal stocks for fattening, fine wool and milk production (US$21.86 million) and minor other inputs (US$0.21 million) would be procured using NS procedures with contracts under US$75,000 equivalent. About US$3.52 million worth of livestock conservation and office management equipment are for GEF-supported activities. They will be procured in small batches from local markets and suppliers. NS will require at least three price quotations. Paragraphs 3.5 and 3.6 of the Bank's Guidelines will apply.

(v) *Direct Contracting (DC)*. Other breeding animals for fine wool, mutton or milk production, very often only obtainable from one local source in a timely and dependable manner, would be procured by herder households, individually or jointly, directly from local markets and suppliers by direct contracting consistent with paragraph 3.7 of the Bank's Guidelines. Such contracts would cost less than US$50,000 each up to an aggregate of US$7.02 million for the Project. Of which, about US$0.34 million are budgeted for procurement of local indigenous breeding animal stocks under GEF-supported activities. To ensure quality control, reasonable prices and transparency, a Bank-accepted form specially designed for procurement of animals under direct contracting will be used by all households involved. County PMOs and township project working stations will monitor and supervise the procurement. Livestock specialists of local Animal Husbandry Bureaus will provide technical advice.

(vi) *Non-Bank Financing (NBF)*. To improve soil fertility and forage production, a total of about US$0.91 million worth of organic manure will be procured without Bank financing. About US$0.04 million worth of processing equipment for one benefiting rural processing plant in Gansu province will be financed from its own resources.

Consultant Services. A total of US$6.95 million worth of consultant services would be provided for the Project including US$4.58 million for GEF-supported activities. Consultants would be selected using various selection methods in accordance with provisions in the Bank's Consultant Guidelines. Quality-based Selection (QBS) will be used for consultants selected to provide services for comprehensive planning of grassland conservation, marketing strategy and data base development (US$0.50 million) and GEF-supported grassland ecosystem management and biodiversity conservation (US$0.96 million). As all other assignments will be very small (mostly below US $50,000) Selection Based on Consultants' qualification (CQ) will be used. These consultant services will include training of trainers, grassland management, product quality standards system and promotion (US$1.16 million) and GEF-supported indigenous livestock breed conservation (US$2.25 million). Individual consultants are expected to provide services for beneficiary participation, monitoring and evaluation (US$0.71 million) and GEF-supported capacity building for participatory grassland planning (US$1.37 million). Individual consultants will be selected on the basis of their qualifications for the assignment through comparison of qualifications. They may also be selected on a sole-source basis with due justification in exceptional cases and with the Bank's prior agreement. To obtain expressions of interest, the Borrower will include a list of expected consulting assignments in the General Procurement Notice which will be updated annually for all outstanding procurement. All consulting assignments over US $200,000 would be advertised in *Development Business* (*UNDB on-line*).

Training and Study Tours. About US$6.30 million were budgeted for training and study tours with close connections to Project activities of all Project components. This budget was made based on an overall plan for training and study tours prepared by the PPMOs and agreed by the Bank during the Project preparation. Detailed programs will be developed by the PPMOs during project implementation and included in Project annual work plan for Bank's review. The approved detailed programs will be used as the basis for reimbursement. Of the total budget, about US$3.05 million would be used for training of technical and management staff directly related to implementation of project activities in the GEF-assisted Project counties.

Miscellaneous. About US$3.92 million miscellaneous expenses are required for the project. These would include project management fee for PMOs (US$1.56 million), project monitoring (US$0.83 million), working capital (US$0.95 million), operating cost for market system development component (US$0.07 million), land acquisition (US$0.01 million) and incremental operating cost incurred by project management offices in respect of office supplies (excluding equipment) and communications, logistical and translation services, and staff travel and subsistence to carry out field supervision of implementation of project activities in the GEF-assisted Project Counties (US$0.50 million).

Table A (IBRD): Project Costs by Procurement Arrangements

(US$ million equivalent)

Expenditure Category	Method of Procurement				Total Cost
	ICB	NCB	Other [1]	N.B.F. [2]	
1. Works	-	1.05	34.22	0.22	35.49
	-	(0.49)	(17.73)	-	(18.22)
2. Goods	4.16	3.30	45.50	0.95	53.91
	(4.16)	(3.30)	(35.01)	-	(42.47)
Equipment	2.34	3.30	13.43	0.95	20.02
	(2.34)	(3.30)	(10.07)	-	(15.71)
Animal Stocks	-	-	32.07	-	32.07
	-	-	(24.94)	-	(24.94)
Vehicles	1.82	-	-	-	1.82
	(1.82)	-	-	-	(1.82)
3. Consultant Services			2.37	-	2.37
			(2.15)	-	(2.15)
4. Training and Study Tours			3.25	-	3.25
			(2.76)	-	(2.76)
5. Miscellaneous [3]			-	3.42	3.42
			-	-	-
6. Front-end Fee			0.66	-	0.66
			(0.66)	-	(0.66)
Total	4.16	4.35	86.00	4.59	99.10
	(4.16)	(3.79)	(58.32)	-	(66.27)

Note:

1. Other procurement methods include force account for works, procurement for small works, international and national shopping, direct contracting for goods, consultant services and training.
2. NBF denotes non-Bank financing.
3. Miscellaneous include project management, project monitoring, auditing, incremental operating costs for Market System Development component, land acquisition and working capital.

Table A (GEF): Project Costs by Procurement Arrangements

(US$ million equivalent)

Expenditure Category	Procurement Method ICB	NCB	Other[1]	N.G.F.[2]	Total Cost
1. Works	-	-	-	-	-
	-	-	-	-	-
2. Goods	-	0.50	3.86	-	4.36
	-	(0.50)	(2.89)	-	(3.39)
Equipment	-	0.50	3.68	-	4.18
	-	(0.50)	(2.76)	-	(3.26)
Animal Stocks	-	-	0.18	-	0.18
	-	-	(0.13)	-	(0.13)
Vehicles	-	-	-	-	-
	-	-	-	-	-
3. Consultant Services			4.58	-	4.58
			(4.17)	-	(4.17)
4. Training and Study Tours			3.05	-	3.05
			(2.44)	-	(2.44)
5. Miscellaneous[3]			0.50	-	0.50
			(0.50)	-	(0.50)
6. Front-end Fee			-	-	-
			-	-	-
Total	-	0.50	11.99	-	12.49
	-	(0.50)	(10.00)	-	(10.50)

Note:

1. Other procurement methods include national shopping for goods, consultant services and training.
2. NGF denotes non-GEF financing.
3. Miscellaneous includes incremental operating cost incurred by PMOs for field supervision of implementation of project activities in the GEF-assisted project counties.

Table A1 (IBRD): Consultant Selection Arrangements (Optional)

(US$ million equivalent)

Consultant Services Expenditure Category	Selection Method [1]							Total Cost (including contingencies)
	QCBS	QBS	SFB	LCS	CQ	Other	N.B.F. [2]	
A. Firms		0.50 (0.45)			1.16 (1.05)		0.00 (0.00)	1.66 (1.50)
B. Individuals						0.71 (0.65)	0.00 (0.00)	0.71 (0.65)
Total		0.50 (0.45)			1.16 (1.05)	0.71 (0.65)	0.00 (0.00)	2.37 (2.15)

1. QCBS = Quality- and Cost-Based Selection, QGS = Quality-based Selection, SFB = Selection under a Fixed Budget, LCS = Least-Cost Selection, CQ = Selection Based on Consultants' Qualification, Other = Selection of individual consultants.
2. NBF denotes non-Bank financing.
Figures in parenthesis are the amounts to be financed by the Bank.

Table A1 (GEF): Consultant Selection Arrangements (Optional)

(US$ million equivalent)

Consultant Services Expenditure Category	Selection Method [1]							Total Cost (including contingencies)
	QCBS	QBS	SFB	LCS	CQ	Other	N.G.F. [2]	
A. Firms		0.96 (0.88)			2.25 (2.05)		0.00 (0.00)	3.21 (2.92)
B. Individuals						1.37 (1.25)	0.00 (0.00)	1.37 (1.25)
Total		0.96 (0.88)			2.25 (2.05)	1.37 (1.25)	0.00 (0.00)	4.58 (4.17)

1. QCBS = Quality- and Cost-Based Selection, QGS = Quality-based Selection, SFB = Selection under a Fixed Budget, LCS = Least-Cost Selection, CQ = Selection Based on Consultants' Qualification, Other = Selection of individual consultants.
2. NGF denotes non-GEF financing.
Figures in parenthesis are the amounts to be financed by GEF.

Prior review thresholds (Table B)

Prior review of the Bank would include:

- All NCB contracts for works;
- The first Small Works contract for each project prefecture/city;
- All ICB and NCB contracts for goods;
- All contracts for goods by international shopping;
- The first contract for goods by national shopping funded by IBRD or GEF or both whichever comes first for each project prefecture/city;
- The first contract for fine wool sheep and mutton sheep breeding animals for each project province/region, and the first contract for dairy cattle breeding stock in each project county funded by IBRD or GEF or both whichever comes first;
- All contracts for Bank-funded consultant services in excess of US $100,000 for firms and US $50,000 for individuals; and
- All contracts for GEF-funded consultant services in excess of US $50,000 for firms and US $25,000 for individuals.

The first contract for fine wool sheep and mutton sheep breeding animals for each project province/region, and the first contract for dairy cattle breeding stock in each project county funded by IBRD or GEF or both whichever comes first. A prior review ratio of about 20% (one in every five contracts) is expected. All other contracts would be subject to ex-post review by the Bank's supervision missions with a sampling ratio of one in five contracts. Table B indicates the thresholds for prior review.

Table B (IBRD): Thresholds for Procurement Methods and Prior Review

Expenditure Category	Contract Value Threshold [1] (US$ '000)	Procurement Method	Prior Review Threshold[2]	Contracts Subject to Prior Review (US$ million)
1. Works	<10,000 and = or >300	NCB	All NCB contracts	1.05
	<300	Small Works	The first Small Works contract for each project prefecture/city	2.66
2. Goods	= or >250	ICB	All ICB contracts	4.16
	= or >100	NCB	All NCB contracts	3.30
	<100	International Shopping	All contracts for goods by international shopping	3.53
	<75	National Shopping	The first contract for goods by national shopping funded by IBRD or GEF or both whichever comes first for each project prefecture/city	1.76
	<50	Direct Contracting	The first contract for fine wool sheep and mutton sheep breeding animals for each project province/region, and the first contract for dairy cattle breeding stock in each project county funded by IBRD or GEF or both whichever comes first	0.34
3. Consultant Services	N/A	QBS	All contracts = or >100,000 for firms	0.20
	<100	Individual	All contracts = or >50,000 for individuals	0.21
4. Overseas Training and Study Tours	N/A		All overseas training and study tour plans	0.79
Total				**18.00**

Note: 1. N/A denotes not applicable.
2. The first contracts for goods by NS and DC subject to prior review are assumed those funded by IBRD.

Table B (GEF): Thresholds for Procurement Methods and Prior Review

Expenditure Category	Contract Value Threshold [1] (US$ '000)	Procurement Method	Prior Review Threshold[2]	Contracts Subject to Prior Review (US$ million)
1. Works	N/A	NCB		-
	N/A	Small Works		-
2. Goods	N/A	ICB		-
	= or >100	NCB	All NCB contracts	0.50
	<100	International Shopping		-
	<75	National Shopping	The first contract for goods by national shopping funded by IBRD or GEF or both whichever comes first for each project prefecture/city	-
	<50	Direct Contracting	The first contract for fine wool sheep and mutton sheep breeding animals for each project province/region, and the first contract for dairy cattle breeding stock in each project county funded by IBRD or GEF or both whichever comes first	-
3. Consultant Services	N/A	QBS	All contracts = or >50 for firms	0.29
	<100	Individual	All contracts = or >25 for individuals	0.24
4. Overseas Training and Study Tours	N/A		All overseas training and study tour plans	-
Total				**1.03**

Note:
1. N/A denotes not applicable.
2. The first contracts for goods by NS and DC subject to prior review are assumed those funded by IBRD.

Total value of contracts subject to prior review: US$19.03 million

Overall Procurement Risk Assessment: Average. This risk rating will be reassessed during project implementation. Risk rating and prior review thresholds may be revised as the procurement capacity of project implementing agencies improves.

Frequency of procurement supervision missions proposed: One at project launch, then one every six months (includes special procurement supervision for post-review/audits).

Disbursement

Allocation of loan/grant proceeds (Table C)

Disbursement Arrangement. Disbursement arrangements for the project are summarized below in Table C "Allocation of Loan Proceeds" which apply to expenditures under both Bank funded and GEF funded project activities.

- Disbursement for all works would be 44% of expenditures for Gansu and 57 percent of expenditures for Xinjiang.
- Disbursement for all goods including vehicles, equipment, animal stocks, agricultural inputs would be at 100% of the foreign expenditures, 100% of the ex-factory price of locally manufactured items and 75% of expenditures for other goods procured locally.
- Standard Disbursement Percentage (SDP) of 91% for China would apply to technical assistance, consultant services, applied research and extension as agreed with the government.
- The disbursement would be made at 100% for overseas training and study tours and 80% for domestic training and study tours.
- Disbursement from the GEF grant would be made at 100% of incremental operating costs.
- Front-end fee would be disbursed 100% from the Loan proceeds at the Loan effectiveness.

Retroactive Financing. The Bank's requirements for and associated risks with retroactive financing have been discussed with both PPMOs during project preparation. The following project activities, costing about US$8.1 million with an estimated Bank financing of about US$5.4 million (about 8 percent of the proposed Loan amount), have been requested by PPMOs for retroactive financing by IBRD funds: (i) construction of animal shed and artificial insemination stations; (ii) construction of irrigation facilities for grassland development; (iii) construction of holding yards for markets and rural enterprises; (iv) construction of milking and milk collection facilities; (v) procurement of initial fattening and breeding animal stocks; (vi) procurement of computers and office equipment; (vii) procurement of equipment for livestock production and marketing components; (viii) procurement of other equipment for milking and milk collection; (ix) procurement of fencing materials and other inputs for grassland development; and (x) consultant services and training activities. The final list has been agreed upon at negotiations. The relevant procurement methods applicable to these project activities would be followed. These project activities started after April 1, 2003.

Table C (IBRD): Allocation of Loan/Grant Proceeds (US$ million)

Expenditure Category	For Gansu	For Xinjiang	Financing Percentage
1. Works	6.24	11.98	44% for Gansu and 57% for Xinjiang
2. Goods	29.09	13.39	100% of foreign expenditures, 100% of local expenditures (ex-factory or ex-farmgate cost), and 75% for other goods procured locally
3. Consultant Services	1.30	0.89	91%
4. Training and Study Tours	1.26	1.46	100% of foreign expenditures and 80% of local expenditures
Total Project Costs	37.89	27.72	
Front-end fee	0.38	0.28	100%
Total	38.27	28.00	

Table C (GEF): Allocation of Loan/Grant Proceeds (US$ million)

Expenditure Category	For Gansu	For Xinjiang	Financing Percentage
1. Goods	1.694	1.694	100% of foreign expenditures, 100% of local expenditures (ex-factory or ex-farmgate cost), and 75% for other goods procured locally
2. Consultant Services	2.086	2.086	91%
3. Training and Study Tours	1.220	1.220	100% of foreign expenditures and 80% of local expenditures
4. Incremental Operating Costs	0.250	0.250	100%
Total Project Costs	5.250	5.250	
Front-end fee			
Total	5.250	5.250	

Use of statements of expenditures (SOEs):

SOEs would be used for disbursements against: (i) contracts for works costing less than US $300,000; (ii) contracts for goods costing less than US $100,000; (iii) domestic training and study tour expenses; (iv) contracts for Bank-financed consultant services costing less than US $100,000 for firms and less than US $50,000 for individuals; (v) contracts for GEF-financed consultant services costing less than US $50,000 for firms and less than US $25,000 for individuals; and (vi) incremental operating costs for GEF supported project activities. The supporting documents for SOEs would be retained by respective PMOs and made available for review by Bank's supervision missions. In the case of contracts for goods, works and services above these thresholds, disbursements would be made against full documentation of the contracts and other supporting documents.

Special account:

To facilitate disbursement, two Special Accounts (SA) in US dollars for IBRD loan, one for each participating province/region to be operated respectively by provincial finance bureaus, would be established in a bank with terms and conditions acceptable to the Bank. GPBF and XRBF will be directly responsible for the management, monitoring, maintenance and reconciliation of their respective SA activities of the project. The authorized allocation from the Bank would be US $2.7 million for Gansu and US$1.9 million for Xinjiang, the estimated average expenditures for a four month period. Applications for replenishment, supported by appropriate documentation, will be submitted monthly or when the amounts withdrawn equal 50% of the initial deposit, whichever comes first. For the same purpose, SA in US dollars for GEF grant funds would be established in a bank with terms and conditions acceptable to the Bank in each province, operated by the provincial finance bureaus. The authorized allocation from the GEF would be US $500,000 each for Gansu and Xinjiang, the estimated average expenditures for a four month period. Applications for replenishment, supported by appropriate documentation, will be submitted monthly or when the amounts withdrawn equal 50% of the initial deposit, whichever comes first.

Financial Management

Country Issues. To date, no Country Financial Assessment Audit (CFAA) has been performed for China. Dialogue with the government has been initiated in this regard. The Bank's current CFAA approach is to build on the Asian Development Bank's (ADB) year 2000 study of Financial Management and Governance Issues in China, analyzing areas that have changed rapidly in the past few years or that deserve further scrutiny, and over time cover all major areas usually part of a full CFAA exercise. Currently, for reference purpose, the Bank relies on the work conducted by ADB.

Based on observations of developments in the areas of public expenditures, accounting and auditing, and Bank experience with China projects for the past few years, substantial achievement has been made in the area of public financial management, and further improvement is expected in the next few years. As economic reform programs further unfold, the government has come to realize the importance of ensuring transparency and accountability, and minimize potential fraud or corruption.

Due to rather unique arrangement in China, funding of Bank projects is controlled and monitored by MOF and its extensions, i.e. finance bureaus at provincial, municipal/prefecture and county level. However, due to technical expertise required for project implementation, project activities are usually carried out by implementing agencies of a specific industry or sector. This arrangement requires close coordination of project related work, as multilevel management of funding and implementation mechanism often presents a great challenge for smooth project implementation.

Conclusion of Financial Management (FM) Assessment. An assessment of the adequacy of the financial management system of project has been completed and a FM assessment report is available in the project files. The assessment focused on the Provincial and Regional Finance Bureaus, which will handle the Special Account activities, and the PPMOs. The assessment, based on guidelines issued by the Financial Management Sector Board on June 30, 2001, concluded that the project meets minimum Bank financial management requirements, as stipulated in BP/OP 10.02. In the team's opinion, the project will have in place an adequate project financial management system that can provide, with reasonable assurance, accurate and timely information on the status of the project in the reporting format agreed with the project and as required by the Bank. No outstanding audits or audit issues exist with any of the implementing agencies involved in the project.

Funds Flow. The project will be disbursing based on the traditional disbursement techniques and will not be using PMR-based disbursements, in accordance with the agreement between the Bank and MOF. Project funding sources include Bank loan, GEF grant, and counterpart funds. A loan agreement will be signed between the Bank and the Government of China, and an on-lending agreement will be concluded between MOF and Provincial/Regional Governments with their Provincial/Regional Finance Bureaus. Lower level on-lending agreements will be concluded between upper level finance bureaus all the way to county level finance bureaus. The loan proceeds will flow to special accounts to be kept at the Provincial/Regional Finance Bureau - to municipal finance bureaus and county finance bureaus - to contractors or suppliers via bank accounts with major commercial banks acceptable to the Bank. Counterpart funds will come from different levels of finance bureaus, and flow to the project directly.

Implementing Entities. Project Leading Groups, headed by provincial Vice Governors have been formed. Representatives of the provincial finance bureaus, planning commissions, and animal husbandry bureaus function as deputy heads. Relevant agencies/bureaus such as the Water Resources, Foreign Trade, the Committees of Agriculture, and Economic and Trade; Agricultural Bank of China and People's Bank of China; Poverty Reduction Office, and Women's Federation are represented in the PLG. PPMOs, located in the Animal Husbandry Bureaus due to its technical expertise required for the project, have been formed and undertaken principal responsibility for the preparation of the project.

The Foreign Fund Divisions of the finance bureaus will also play a major role in project implementation, including monitoring, financing arrangement, procurement, financial management, etc. They will be responsible for maintaining, monitoring and reconciling special accounts to be established for the project, and reviewing, verifying, consolidating and approving withdrawal applications prepared by respective PPMOs before submitting to the Bank for disbursement processing. Both Foreign Fund Divisions have had prior experience with Bank projects and are familiar with Bank disbursement procedures.

- **Strengths**. There is strong financial support and commitment from Gansu and Xinjiang governments (i.e. Provincial/Regional Finance Bureaus.) Both Finance Bureaus have been involved in more than 20 Bank's projects. The are familiar with Bank requirements and procedures.
- **Weaknesses**. Gansu Agriculture and Animal Husbandry Bureau, the key project management entity in Gansu, has not been involved in Bank-supported projects. Their capacity is relatively weak. Capacity building and strengthening of the Bureau should be a top priority In addition, the PLG has to play a more active role in project coordination and guidance. Project financial and accounting staff should be in position prior to effectiveness; training in project financial management should be provided by the Provincial/Regional Finance Bureau to all relevant staff before effectiveness.

Staffing. Project accounting staff with educational background and work experience commensurate with the work they are expected to perform is one of the factors critical to successful project financial management. Based on discussions, observation and review of educational background and work experience of the staff identified for financial and accounting positions, it is the Task Team's assessment that the staff will be able to carry out a satisfactory work.

Some accounting staff in the various PMOs have prior experience with projects financed by the Bank, but many of the staff are new. To strengthen the financial management capacity and achieve consistent quality of accounting work, training will be provided prior to effectiveness to all key financial and accounting staff of participating municipalities and counties to ensure good understanding of Bank's policies and procedures.

Accounting Policies and Procedures. The administration, accounting and reporting of the project will be set up in accordance with the following regulations/circulars issued by MOF:

- The "Temporary Regulations on Financial and Accounting Management for Projects Financed by the World Bank" (Circular #127 issued in 1993) by MOF will guide bookkeeping and preparation of project financial statements and management reports.
- Accrual accounting and double entry bookkeeping basis will be adopted by the Project.Circular 12: "Regulation for the Submission of Withdrawal Applications" issued in December 1996 by MOF, which includes detailed procedures for preparing and submitting withdrawal applications and retention of supporting documentation.
- Circular #13: "Accounting Regulations for World Bank Financed Projects" issued in January 2000 by MOF. The circular provides in-depth instructions of accounting treatment of project activities and includes: (i) Chart of account; (ii) Detailed accounting instructions for each project account; (iii) Standard set of project financial statements; and (iv) Instructions on the preparation of project financial statements.
- The standard set of project financial statements mentioned above has been agreed to between the Bank and MOF and applies to all Bank projects appraised after July 1, 1998 and includes: (i) Balance sheet; (ii) Statement of source and use of fund; (iii) Statement of implementation of loan agreement; and (iv) Statement of special account.

Both circular #127 and #13 are simplified versions of the Accounting Standards for State-owned, Infrastructure Oriented Projects (the "Standards"), taking into consideration unique characteristics of Bank projects. The Standards are modeled after the principles of International Accounting Standards and provides detailed guidelines appropriate to accounting for activities of Bank projects.

Reporting and Monitoring and Format of Financial Statements. Each level of PMO will be managing, monitoring and maintaining respective project accounting records. Original supporting documents for project activities will be retained by originating PMO. Each PMO will prepare its financial statements, which will then be consolidated by the next higher-level PMO. The Provincial/Regional Finance Bureau will be responsible for final consolidation of financial statements prepared and submitted by participating municipalities and counties, and providing consolidated project financial statements to the Bank for review and comment on a regular basis.

The format and content of the financial statements represent the standard project reporting package agreed to between the Bank and MOF, and have been discussed and agreed with all parties concerned. The unaudited project consolidated financial statements will be submitted as part of the Financial Monitoring Report to the Bank on a semi-annual basis (prior to August 15 and February 15 of the subsequent year) and include the following four statements: (i) Balance Sheet; (ii) Summary of Sources and Uses of Funds by Project Component; (iii) Statement of Implementation of Loan Agreement; and (iv) Statement of Special Account.

All participating municipalities and counties will establish a computerized management information system including a module for project financial management.

Supervision Plan. As many of project financial and accounting staff are new to Bank projects, more frequent supervision missions at the initial implementation stage will ensure proper financial/accounting setup and implementation. Such missions will also ensure proper and timely recruitment of project financial and accounting staff. FM/disbursement reviews will be carried out simultaneously with procurement reviews.

Internal Audits. There will be no formal independent internal audit department for the project. However, the PMOs and finance bureaus at all levels will carry out regular supervision.

Audit Arrangements. The Bank requires that project financial statements be audited in accordance with standards acceptable to the Bank. In line with other Bank financed projects in China, the project will be audited in accordance with the Government Auditing Standards of the People's Republic of China (1997 edition). The Provincial/Regional Audit Bureaus have been identified as the auditors for the project. Audit fieldwork will be carried out by the Audit Bureau and audit reports will be issued, under the guidance and supervision of the China National Audit Office. The Bank currently accepts audit reports issued by China National Audit Office or its local counterpart for which China National Audit Office is ultimately responsible.

Audit reports on annual consolidated financial statements of each project province will be due to the Bank within 6 months of the end of each calendar year, with a separate opinion on Statement of Expenditures and Special Account. Annual audit reports on financial position and operating results of all participating enterprises will be due to the Bank within 6 months of the end of each calendar year:

Annex 7: Project Processing Schedule
CHINA: Gansu and Xinjiang Pastoral Development Project

Project Schedule	Planned	Actual
Time taken to prepare the project (months)		
First Bank mission (identification)	07/28/2001	07/09/2001
Appraisal mission departure	09/30/2002	12/20/2002
Negotiations	09/23/2003	07/14/2003
Planned Date of Effectiveness	01/15/2004	

Prepared by:
Ministry of Agriculture, Foreign Economic Cooperation Center, Gansu Province Animal Husbandry Department, Xinjiang Uyghur Autonomous Region Animal Husbandry Department.

Preparation assistance:
Japanese PHRD Grant.

Bank staff who worked on the project included:

Name	Speciality
Baker, Derek	Agricultural Market Specialist
Banks, Tony	Land Tenure Specialist
Belete, Nathan	Rural Development Specialist
Brandenburg, Abraham	Livestock Specialist
Broadfield, Robin	Regional GEF Coordinator
Brown, Michael	Animal Geneticist
Dadgari, Farzad	Environmental Specialist
de Haan, Cornelis	Senior Livestock Advisor
Eliste, Paavo	Natural Resource Economist
Fock, Achim	Agricultural Economist
Guldin, Gregory	Anthropologist
Karaky, Rabih	Agricultural Economist
Li, Xiaoping	Procurement Specialist
Mackinnon, Kathleen	Biodiversity Specialist
Mangum, Matrice	Program Assistant
Michalk, David	Animal Husbandry Specialist
Miller, Daniel	Pastoral Development Specialist
Nguyen, Hoi-Chan	Country Counsel
O'Leary, Robert	Senior Finance Officer
Png, Margaret	Country Counsel
Reyes, Arlene	Program Assistant
Sheehy, Dennis	Rangeland Ecologist
Soderstrom, Sari	Task Team Leader, Lead Operations Officer

Watson, Robert	Dairy Production Specialist
Wu, Jianping	Animal Husbandry Specialist
Zhou, Weiguo	Operations Officer
Zhuo, Yu	Financial Management Specialist

Annex 8: Documents in the Project File*
CHINA: Gansu and Xinjiang Pastoral Development Project

A. Project Implementation Plan

Gansu Project Implementation Manual
Xinjiang Project Implementation Manual

B. Bank Staff Assessments

Aide Memoire May/June 2001
Aide Memoire July 2001
Aide Memoire September 2001
Aide Memoire November 2001
Aide Memoire February/March 2002
Aide Memoire July/August 2002

Project Concept Document (PCD) July 2001
Peer Review Comments on the Project Concept Document July 2001
Quality Enhancement Review Meeting May 2002
Minutes of Project Concept Document July 2001
Preparation Mission: Back-to-Office Report July 2001
Project Cost Estimate

C. Other

GXPDP Environmental Assessment
Gansu Participatory Rural Appraisal Report
Xinjiang Participatory Rural Appraisal Report
Xinjiang Social Assessment
Gansu Social Assessment
Gansu Baseline Survey
Xinjiang Baseline Survey
Gansu Multi Ethnic Groups Development Plan
Xinjiang Multi Ethnic Groups Development Plan
Gansu Beneficiaries Participation Manual
Xinjiang Beneficiaries Participation Manual
Gansu Feasibility Study
Xinjiang Feasibility Study
GXPDP Feasibility Study
Sheep Genetics Study
Review of Sheep Projects in China
Sheep Product Marketing Report
Gansu Grassland Report
Xinjiang Grassland Report
Gansu Dairy Production
Gansu Training and Extension
Gansu Institutional Arrangement and Project Management
Gansu Model Samples
Gansu Loan Arrangements

Gansu Cost Estimates
Gansu Technical Standards
Gansu Procurement Management, Financial Management, Project Management
Gansu Institutional Arrangement and Main Responsibilities
Xinjiang Financial Management Manual
Xinjiang Procurement Document Samples
Xinjiang Fine Wool Breeding Farms Proposals
Gansu Applied Research Proposals
Xinjiang Applied Research Proposals

*Including electronic files

Annex 9: Statement of Loans and Credits

CHINA: Gansu and Xinjiang Pastoral Development Project

14-Jul-2003

			Original Amount in US$ Millions					Difference between expected and actual disbursements[a]	
Project ID	FY	Purpose	IBRD	IDA	GEF	Cancel.	Undisb.	Orig	Frm Rev'd
P070191	2003	CN-SHANGHAI URB ENVMT APL1	200.00	0.00	0.00	0.00	200.00	0.00	0.00
P068058	2003	CN-Yixing Pumped Storage Project	145.00	0.00	0.00	0.00	145.00	0.00	0.00
P040599	2003	CN-TIANJIN URB DEV II	150.00	0.00	0.00	0.00	150.00	0.00	0.00
P058847	2003	CN-3rd Xinjiang Hwy Project	150.00	0.00	0.00	0.00	128.98	8.98	0.00
P076714	2003	CN-Anhui Hwy 2	250.00	0.00	0.00	0.00	250.00	0.00	0.00
P070441	2003	CN-Hubei Xiaogan Xiangfan Hwy	250.00	0.00	0.00	0.00	223.62	11.62	0.00
P058846	2002	CN-Natl Railway Project	160.00	0.00	0.00	0.00	55.57	-4.43	0.00
P060029	2002	Sustainable Forestry Dev(Natural Forest)	0.00	0.00	16.00	0.00	17.00	0.60	0.00
P071147	2002	CN-Tuberculosis Control Project	104.00	0.00	0.00	0.00	93.33	-10.67	0.00
P070459	2002	CN-Inner Mongolia Hwy Project	100.00	0.00	0.00	0.00	95.50	2.50	0.00
P068049	2002	CN-Hubei Hydropower Dev in Poor Areas	105.00	0.00	0.00	0.00	105.00	12.00	0.00
P064729	2002	SUSTAINABLE FORESTRY DEVELOPMENT PRO	93.90	0.00	0.00	0.00	88.46	-0.10	0.00
P056199	2001	CN-3rd Inland Waterways	100.00	0.00	0.00	0.00	90.74	3.24	0.00
P051859	2001	CN-LIAO RIVER BASIN	100.00	0.00	0.00	0.00	83.15	22.05	0.00
P047345	2001	CN-HUAI RIVER POLLUTION CONTROL	105.50	0.00	0.00	0.00	97.81	-7.69	0.00
P045915	2001	CN-Urumqi Urban Transport	100.00	0.00	0.00	0.00	65.26	40.41	0.00
P056516	2001	WATER CONSERVATION	74.00	0.00	0.00	0.00	47.74	4.04	0.00
P056596	2001	CN-Shijiazhuang Urban Transport	100.00	0.00	0.00	0.00	92.28	45.68	0.00
P058845	2001	Jiangxi II Hwy	200.00	0.00	0.00	0.00	157.14	2.14	0.00
P058844	2000	3rd Henan Prov Hwy	150.00	0.00	0.00	0.00	100.91	39.91	0.00
P058843	2000	Guangxi Highway	200.00	0.00	0.00	0.00	131.71	51.71	0.00
P042109	2000	CN-BEIJING ENVIRONMENT II	349.00	0.00	25.00	0.00	305.84	155.77	0.00
P056424	2000	TONGBAI PUMPED STORA	320.00	0.00	0.00	0.00	296.13	82.73	0.00
P049436	2000	CN-CHONGQING URBAN ENVMT	200.00	0.00	0.00	0.00	171.97	38.87	0.00
P064924	2000	CH-GEF-BEIJING ENVMT II	0.00	0.00	25.00	0.00	24.71	15.51	1.54
P064730	2000	Yangtze Dike Strengthening Project	210.00	0.00	0.00	0.00	129.84	81.84	0.00
P045264	2000	SMALLHLDR CATTLE DEV	93.50	0.00	0.00	0.00	27.58	16.38	0.00
P045910	2000	CN-HEBEI URBAN ENVIRONMENT	150.00	0.00	0.00	0.00	132.54	39.54	0.00
P050036	1999	Anhui Provincial Hwy	200.00	0.00	0.00	0.00	65.42	34.22	0.00
P049665	1999	ANNING VALLEY AG.DEV	90.00	30.00	0.00	0.00	26.26	5.85	0.00
P046051	1999	CN-HIGHER EDUC. REFORM	20.00	50.00	0.00	0.00	16.29	16.91	0.00
P046829	1999	RENEWABLE ENERGY DEVELOPMENT	100.00	0.00	0.00	0.00	12.87	99.87	0.00
P046564	1999	Gansu & Inner Mongolia Poverty Reduction	60.00	100.00	0.00	13.30	62.09	37.39	-7.32
P041268	1999	CN-Nat Hwy4/Hubei-Hunan	350.00	0.00	0.00	0.00	82.59	36.59	0.00
P038121	1999	CN-GEF-RENEWABLE ENERGY DEVELOPMENT	0.00	0.00	35.00	0.00	27.64	21.74	5.03
P060270	1999	CN-ENTERPRISE REFORM LN	0.00	5.00	0.00	0.00	2.69	4.31	4.08
P058308	1999	CN-PENSION REFORM PJT	0.00	5.00	0.00	0.00	1.95	2.05	0.00
P057352	1999	CN-RURAL WATER IV	16.00	30.00	0.00	0.00	27.96	18.33	4.72
P056216	1999	LOESS PLATEAU II	100.00	50.00	0.00	0.00	52.04	46.24	0.00
P051888	1999	GUANZHONG IRRIGATION	80.00	20.00	0.00	0.00	43.71	26.65	0.00
P051856	1999	ACCOUNTING REFORM & DEVELOPMENT	27.40	5.60	0.00	0.00	20.29	20.03	0.00
P051705	1999	Fujian II Highway	200.00	0.00	0.00	0.00	79.52	71.52	0.00
P036953	1999	CN-HEALTH IX	10.00	50.00	0.00	0.00	39.12	18.21	0.00
P041890	1999	CN-Liaoning Urban Transport	150.00	0.00	0.00	0.00	52.78	45.58	0.00
P042299	1999	TEC COOP CREDIT IV	10.00	35.00	0.00	0.00	37.34	-8.26	0.00
P043933	1999	CN-SICHUAN URBAN ENVMT	150.00	2.00	0.00	0.00	97.52	63.07	17.02
P003653	1999	CN-Container Transport	71.00	0.00	0.00	18.61	3.62	22.13	0.00
P037859	1998	CN-GEF Energy Conservation	0.00	0.00	22.00	0.00	2.46	22.06	0.00
P051736	1998	E. CHINA/JIANGSU PWR	250.00	0.00	0.00	86.00	56.03	142.03	4.94
P036414	1998	CN-GUANGXI URBAN ENVMT	72.00	20.00	0.00	0.00	74.63	60.60	10.94
P040185	1998	CN-SHANDONG ENVIRONMENT	95.00	0.00	0.00	1.40	23.23	20.83	0.00
P035698	1998	HUNAN POWER DEVELOP.	300.00	0.00	0.00	145.00	61.37	197.37	-12.54
P003619	1998	CN-2nd Inland Waterways	123.00	0.00	0.00	17.00	52.06	64.06	4.00

			Original Amount in US$ Millions					Difference between expected and actual disbursements[a]	
Project ID	FY	Purpose	IBRD	IDA	GEF	Cancel.	Undisb.	Orig	Frm Rev'd
P003606	1998	ENERGY CONSERVATION	63.00	0.00	22.00	0.00	39.39	14.79	0.00
P003614	1998	CN-Guangzhou City Transport	200.00	0.00	0.00	20.00	109.54	129.54	62.00
P046952	1998	FOREST. DEV. POOR AR	100.00	100.00	0.00	0.00	45.85	-58.54	10.46
P046563	1998	TARIM BASIN II	90.00	60.00	0.00	2.67	40.76	37.86	0.00
P003566	1998	CN-BASIC HEALTH (HLTH8)	0.00	85.00	0.00	0.00	35.75	22.72	0.00
P045788	1998	Tri-Provincial Hwy	230.00	0.00	0.00	0.00	39.69	25.89	0.00
P003539	1998	SUSTAINABLE COASTAL RESOURCES DEV.	100.00	0.00	0.00	2.31	49.92	42.23	11.35
P036949	1998	CN-Nat Hwy3-Hubei	250.00	0.00	0.00	0.00	33.00	23.00	0.00
P049700	1998	IAIL-2	300.00	0.00	0.00	0.00	10.13	10.13	0.00
P003654	1997	Nat Hwy2/Hunan-Guangdong	400.00	0.00	0.00	0.00	61.47	61.47	1.82
P003650	1997	TUOKETUO POWER/INNER	400.00	0.00	0.00	102.50	40.12	133.32	6.88
P003643	1997	CN-2nd Xinjiang Hwy	300.00	0.00	0.00	60.00	7.58	67.58	7.58
P038988	1997	HEILONGJIANG ADP	120.00	0.00	0.00	0.00	9.85	9.85	0.00
P003590	1997	QINBA MOUNTAINS POVERTY REDUCTION	30.00	150.00	0.00	0.00	45.96	49.95	7.99
P036952	1997	CN-BASIC ED. IV	0.00	85.00	0.00	0.00	0.94	3.66	0.00
P003637	1997	CN-NAT'L RURAL WATER 3	0.00	70.00	0.00	0.00	0.71	3.91	3.77
P035693	1997	FUEL EFFICIENT IND.	0.00	0.00	32.80	0.00	7.82	32.81	0.00
P036405	1997	WANJIAZHAI WATER TRA	400.00	0.00	0.00	75.00	48.45	123.45	38.45
P044485	1997	SHANGHAI WAIGAOQIAO	400.00	0.00	0.00	0.00	104.41	65.61	23.95
P034081	1997	XIAOLANGDI MULTI. II	430.00	0.00	0.00	78.53	0.15	118.59	37.96
P040513	1996	2nd Henan Prov Hwy	210.00	0.00	0.00	0.00	42.88	42.88	22.88
P003599	1996	CN-YUNNAN ENVMT	125.00	25.00	0.00	19.48	53.29	73.56	5.44
P003594	1996	GANSU HEXI CORRIDOR	60.00	90.00	0.00	0.00	78.97	59.40	0.00
P003589	1996	CN-DISEASE PREVENTION (HLTH7)	0.00	100.00	0.00	0.00	9.56	18.87	0.00
P034618	1996	CN-LABOR MARKET DEV.	10.00	20.00	0.00	0.00	5.60	7.77	0.00
P003602	1996	CN-HUBEI URBAN ENVIRONMENT	125.00	25.00	0.00	28.32	44.09	74.45	15.45
P003649	1996	SHANXI POVERTY ALLEV	0.00	100.00	0.00	0.00	1.61	10.81	0.00
P003648	1996	CN-SHANGHAI SEWERAGE II	250.00	0.00	0.00	0.00	60.16	60.16	9.30
P003571	1995	CN-7th Railways	400.00	0.00	0.00	119.00	31.03	150.03	31.05
P003642	1995	CN-ZHEJIANG POWER DEVT	400.00	0.00	0.00	0.00	34.34	39.87	0.00
P003639	1995	SOUTHWEST POVERTY REDUCTION PROJECT	47.50	200.00	0.00	0.01	1.21	25.36	25.36
P003596	1995	Yangtze Basin Water Resources Project	100.00	110.00	0.00	1.92	0.34	4.75	4.75
P036947	1995	CN-Sichuan Power Transmission Project	270.00	0.00	0.00	95.00	11.79	106.79	8.19
P003647	1995	China Economic Law Reform -LEGEA	0.00	10.00	0.00	0.00	1.77	2.17	0.00
P003598	1995	CN-LIAONING ENVIRONMENT	110.00	0.00	0.00	8.80	0.00	8.80	0.00
P003603	1995	CN-ENT HOUSING & SSR	275.00	75.00	0.00	50.36	59.80	108.31	20.27
P003644	1994	XIAOLANGDI RESETTLEMENT	0.00	110.00	0.00	0.00	0.04	-1.85	-1.88
P003626	1994	Fujian Prov Highway	140.00	0.00	0.00	18.11	6.65	24.76	24.74
P003540	1994	LOESS PLATEAU	0.00	150.00	0.00	0.00	1.13	0.50	0.00
P003632	1993	CN-ENVIRONMENT TECH ASS	0.00	50.00	0.00	0.00	1.11	1.73	1.41
P003592	1993	REF. INST'L.& PREINV	0.00	50.00	0.00	0.00	2.12	2.48	2.48
		Total:	12969.80	2067.60	177.80	963.31	5708.27	3481.39	414.05

CHINA
STATEMENT OF IFC's
Held and Disbursed Portfolio
May 30 - 2003
In Millions US Dollars

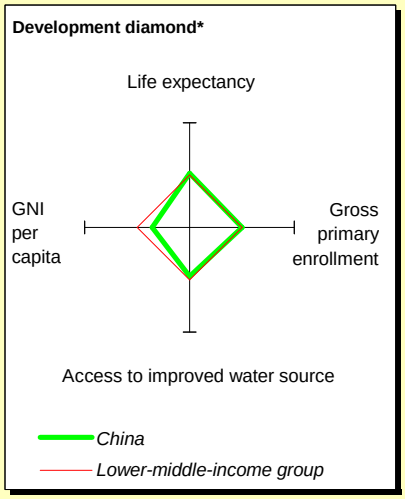
		Committed				Disbursed			
		IFC				IFC			
FY Approval	Company	Loan	Equity	Quasi	Partic	Loan	Equity	Quasi	Partic
1994	China Walden Mgt	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00
1994	China Walden Ven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1994	Dalian Glass	0.00	2.40	0.00	0.00	0.00	2.40	0.00	0.00
1995	Dupont Suzhou	10.90	4.15	0.00	0.00	10.90	4.15	0.00	0.00
1994	Dynamic Fund	0.00	8.76	0.00	0.00	0.00	7.10	0.00	0.00
1999	Hansom	0.00	0.08	0.00	0.00	0.00	0.08	0.00	0.00
2002	Huarong AMC	31.50	3.00	0.00	0.00	22.50	0.01	0.00	0.00
2002	IEC	20.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1998	Leshan Scana	5.36	1.35	0.00	0.00	3.76	1.35	0.00	0.00
2001	Maanshan Carbon	9.00	2.00	0.00	0.00	9.00	2.00	0.00	0.00
2001	Minsheng Bank	0.00	23.50	0.00	0.00	0.00	23.50	0.00	0.00
2001	NCCB	0.00	26.58	0.00	0.00	0.00	26.46	0.00	0.00
0	NWS Holdings	0.00	2.54	0.00	0.00	0.00	2.54	0.00	0.00
1996	Nanjing Kumho	4.87	3.81	0.00	13.84	4.87	3.81	0.00	13.84
2001	New China Life	0.00	30.70	0.00	0.00	0.00	23.32	0.00	0.00
1995	Newbridge Inv.	0.00	1.95	0.00	0.00	0.00	1.95	0.00	0.00
1997/98	Orient Finance	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2003	PSAM	0.00	1.93	0.00	0.00	0.00	0.00	0.00	0.00
1997/00	PTP Holdings	0.00	0.03	0.00	0.00	0.00	0.03	0.00	0.00
2001	Peak Pacific	0.00	0.00	25.00	0.00	0.00	0.00	0.00	0.00
0	Rabobank SHFC	0.68	0.00	0.00	0.68	0.68	0.00	0.00	0.68
2000	SSIF	0.00	6.00	0.00	0.00	0.00	0.89	0.00	0.00
1998	Shanghai Krupp	30.00	0.00	0.00	68.80	25.81	0.00	0.00	59.19
1999	Shanghai Midway	0.00	16.02	0.00	0.00	0.00	16.02	0.00	0.00
1999	Shanxi	16.75	0.00	0.00	0.00	14.20	0.00	0.00	0.00
1993	Shenzhen PCCP	3.76	0.00	0.00	0.00	3.76	0.00	0.00	0.00
	Sino Mining	0.00	0.00	5.00	0.00	0.00	0.00	5.00	0.00
2002	Sino-Forest	25.00	0.00	0.00	0.00	20.00	0.00	0.00	0.00
2001	Suzhou PVC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1995/97	WIT	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1998	Wanjie Hospital	15.00	0.00	0.00	0.00	15.00	0.00	0.00	0.00
2000	Weihai Weidongri	1.30	0.00	0.00	0.00	1.30	0.00	0.00	0.00
1996	Yantai Cement	7.93	1.95	0.00	0.00	7.93	1.95	0.00	0.00
1993	Zhen Jing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0	Advantage	0.00	0.50	0.00	0.00	0.00	0.50	0.00	0.00
2002/03	BCIB	0.00	0.00	11.60	0.00	0.00	0.00	0.00	0.00
2003	Bank of Shanghai	0.00	24.67	0.00	0.00	0.00	24.67	0.00	0.00
1999/00/02	Beijing Hormel	1.79	0.50	0.00	0.55	1.79	0.50	0.00	0.55
1996	CDH China Fund	0.00	20.00	0.00	0.00	0.00	4.85	0.00	0.00
2002	CIG Holdings PLC	0.00	3.00	0.00	0.00	0.00	3.00	0.00	0.00
1998/00	Chengdu Huarong	7.40	3.20	0.00	8.60	7.40	3.20	0.00	8.60
1998	Chengxin-IBCA	0.00	0.36	0.00	0.00	0.00	0.36	0.00	0.00
1998	China Bicycles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1987/92/94									
	Total Portfolio:	196.24	188.99	41.60	92.47	148.90	154.65	5.00	82.86

		Approvals Pending Commitment			
FY Approval	Company	Loan	Equity	Quasi	Partic
2002	ASIMCO	0.00	13.50	1.50	0.00
2003	CSMC	0.00	0.00	12.00	0.00
2003	Cellon	0.00	0.00	5.70	0.00
2002	Darong	10.00	0.00	1.50	8.00
2002	Huarong AMC	15.00	0.00	0.00	0.00
2002	IEC	0.00	5.00	0.00	0.00
2002	KHIT	0.00	0.00	3.00	0.00
2003	Peak Pacific 2	0.00	0.00	10.00	0.00
2003	SAIC	12.00	0.00	0.00	0.00
2002	SML	1.00	0.00	0.00	0.00
2002	Sino Mining	5.00	0.00	0.00	5.00
2003	XACB	0.00	0.00	20.00	0.00
2003	Zhengye-ADC	15.00	0.00	0.00	7.00
2002	Zhong Chen	25.00	0.00	0.00	32.00
	Total Pending Commitment:	83.00	18.50	53.70	52.00

Annex 10: Country at a Glance

CHINA: Gansu and Xinjiang Pastoral Development Project

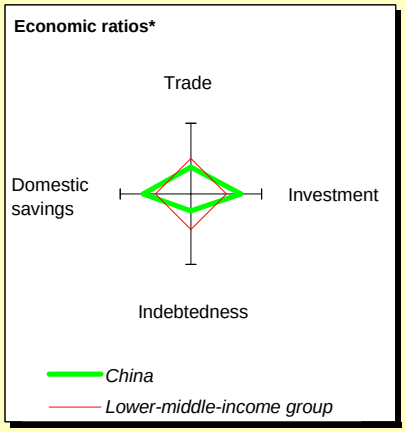
POVERTY and SOCIAL	China	East Asia & Pacific	Lower-middle-income
2001			
Population, mid-year *(millions)*	1,271.9	1,826	2,164
GNI per capita *(Atlas method, US$)*	890	900	1,240
GNI *(Atlas method, US$ billions)*	1,129.3	1,649	2,677
Average annual growth, 1995-01			
Population *(%)*	0.9	1.1	1.0
Labor force *(%)*	1.0	1.3	1.2
Most recent estimate (latest year available, 1995-01)			
Poverty *(% of population below national poverty line)*	5	..	..
Urban population *(% of total population)*	38	37	46
Life expectancy at birth *(years)*	71	69	69
Infant mortality *(per 1,000 live births)*	32	36	33
Child malnutrition *(% of children under 5)*	10	12	11
Access to an improved water source *(% of population)*	75	74	80
Illiteracy *(% of population age 15+)*	15	14	15
Gross primary enrollment *(% of school-age population)*	107	107	107
Male	106	106	107
Female	109	108	107



KEY ECONOMIC RATIOS and LONG-TERM TRENDS

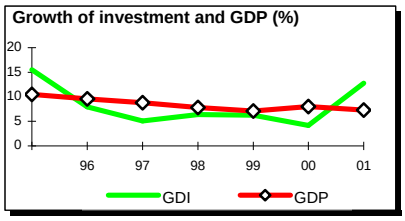
	1981	1991	2000	2001
GDP *(US$ billions)*	228.3	402.6	1,077.5	1,150.1
Gross domestic investment/GDP	32.5	34.8	36.1	37.9
Exports of goods and services/GDP	8.6	19.4	25.9	25.8
Gross domestic savings/GDP	32.9	38.1	38.8	40.3
Gross national savings/GDP	32.8	38.5	38.0	39.4
Current account balance/GDP	0.4	3.8	1.9	1.5
Interest payments/GDP	0.2	0.7	0.6	0.6
Total debt/GDP	2.5	15.0	13.9	14.8
Total debt service/exports	6.9	10.1	7.4	6.8
Present value of debt/GDP	..	..	12.5	11.7
Present value of debt/exports	..	..	46.0	43.5

	1981-91	1991-01	2000	2001	2001-05
(average annual growth)					
GDP	10.0	9.7	8.0	7.3	6.9
GDP per capita	8.4	8.6	7.1	6.6	6.1
Exports of goods and services	12.1	8.3	30.6	5.0	7.7

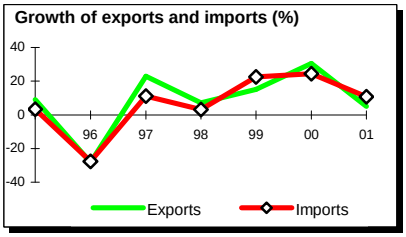


STRUCTURE of the ECONOMY

	1981	1991	2000	2001
(% of GDP)				
Agriculture	31.8	24.5	15.9	15.2
Industry	46.4	42.1	50.9	51.1
Manufacturing	38.5	32.7	34.5	35.4
Services	21.8	33.4	33.2	33.6
Private consumption	..	..	..	..
General government consumption	14.5	13.1	13.1	13.7
Imports of goods and services	8.2	16.1	23.2	23.4



	1981-91	1991-01	2000	2001
(average annual growth)				
Agriculture	5.2	4.0	2.4	2.8
Industry	11.4	12.6	9.6	8.7
Manufacturing	11.1	11.6	9.1	9.0
Services	12.6	8.7	7.8	7.4
Private consumption	8.3	8.6	8.7	6.2
General government consumption	9.9	8.5	12.2	11.5
Gross domestic investment	10.4	10.3	4.2	12.8
Imports of goods and services	9.6	6.4	24.5	10.8

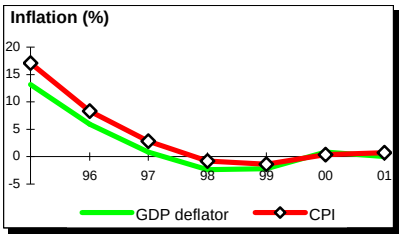


Note: 2001 data are preliminary estimates.

* The diamonds show four key indicators in the country (in bold) compared with its income-group average. If data are missing, the diamond will be incomplete.

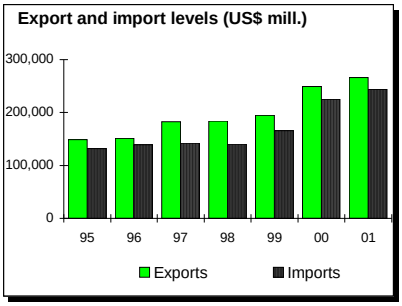
PRICES and GOVERNMENT FINANCE

	1981	1991	2000	2001
Domestic prices				
(% change)				
Consumer prices	25.7	3.4	0.4	0.7
Implicit GDP deflator	2.3	6.7	0.9	0.0
Government finance				
(% of GDP, includes current grants)				
Current revenue	24.2	16.9	15.3	17.2
Current budget balance	..	2.3	0.6	1.0
Overall surplus/deficit	0.8	-1.1	-3.6	-3.2



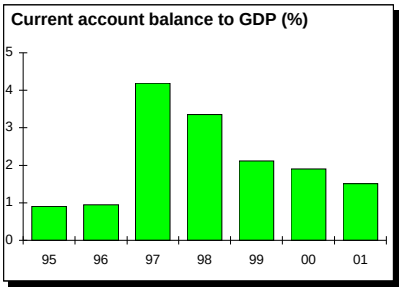
TRADE

	1981	1991	2000	2001
(US$ millions)				
Total exports (fob)	22,007	71,843	249,210	266,155
Food	2,924	7,226	12,282	12,780
Fuel	5,228	4,754	7,851	8,420
Manufactures	11,759	55,698	223,752	239,800
Total imports (cif)	22,015	63,791	225,097	243,610
Food	3,622	2,799	4,758	4,980
Fuel and energy	83	2,113	20,637	17,490
Capital goods	5,866	19,601	91,934	107,040
Export price index *(1995=100)*	16	51	67	65
Import price index *(1995=100)*	13	49	75	73
Terms of trade *(1995=100)*	118	103	90	90



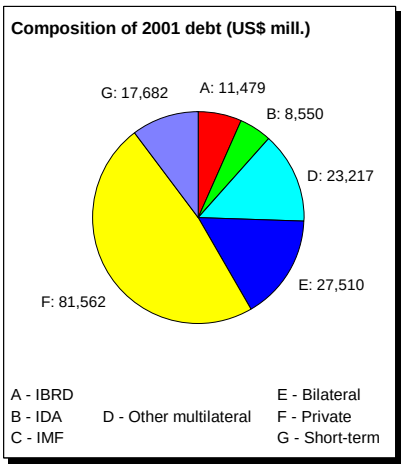
BALANCE of PAYMENTS

	1981	1991	2000	2001
(US$ millions)				
Exports of goods and services	24,410	78,909	279,561	299,410
Imports of goods and services	23,426	65,339	250,688	271,324
Resource balance	984	13,570	28,873	28,086
Net income	-124	840	-14,666	-19,173
Net current transfers	..	830	6,311	8,492
Current account balance	860	15,240	20,519	17,405
Financing items (net)	..	-4,149	-9,971	29,920
Changes in net reserves	..	-11,091	-10,548	-47,325
Memo:				
Reserves including gold *(US$ millions)*	..	48,154	171,753	219,970
Conversion rate *(DEC, local/US$)*	2.1	5.4	8.3	8.3



EXTERNAL DEBT and RESOURCE FLOWS

	1981	1991	2000	2001
(US$ millions)				
Total debt outstanding and disbursed	5,798	60,259	149,800	170,000
IBRD	0	3,494	11,118	11,479
IDA	0	3,672	8,771	8,550
Total debt service	1,744	8,305	21,728	20,900
IBRD	0	357	1,291	1,716
IDA	0	23	131	164
Composition of net resource flows				
Official grants	19	406	147	..
Official creditors	506	2,044	1,927	..
Private creditors	89	2,493	-2,302	..
Foreign direct investment	0	4,366	42,096	47,052
Portfolio equity	0	565	7,814	2,404
World Bank program				
Commitments	196	2,622	1,536	1,230
Disbursements	0	1,280	1,907	1,947
Principal repayments	0	131	644	999
Net flows	0	1,149	1,263	948
Interest payments	0	250	778	881
Net transfers	0	899	485	67



Additional GEF Annex 3: Social Issues
CHINA: Gansu and Xinjiang Pastoral Development Project

Project Location. The main targeted beneficiaries are located in 19 counties/cities in ten prefectures (Jingtai, Jiuquan, Zhangye, Sunan, Yongchang, Liangzhou, Jingyuan, Huining, Lintao, Dingxi, Zhangjiachuan, Qingshui, Linxia, Kangle, Linxia, Lintai, Pinglian, Huating and Ningxian), and one provincial level farm and one prefecture level farm (Huangcheng and Minshen). In Xinjiang, project areas include 24 counties in nine prefectures (Xinyuan, Tekesi, Gongliu, Wusu, Shawan, Yumin, Bole, Wenquan, Altai, Fuyun, Changji, Hutubi, Manasi, Fukang, Jimusaer, Qitai, Hejing, Yanji, Bohu, Kuche, Baicheng, Wensu, Hami, and Tulufan) and 3 sheep breeding farms in Gongnaisi, Tacheng and Bazhou.

In Gansu, Sunan and Huangcheng Nuclear Sheep Farm will focus on the development of fine wool sheep. Development of mutton sheep will be the main project activity in Jingtai, Suzhou, Ganzhou, Yongchang, and Huining., Beef fattening will be the principal activity in Zhangjiachuan, Qingshui, Liangzhou, Lintai, Kongtong, Ningxian, Kangle, and Huating. Linxia County. Lintao, Linxia City, Jiuquan and Dingxi, and Hovill Group, will feature dairy cattle. In Xinjiang, mutton sheep production is the main production activity in Fuyun, Altai, Yumin, Hejing, Kuche Hami and Tulufan. All other counties will be producing dual purpose sheep (fine wool and mutton).

Phase I GEF counties in Xinjiang are Tekesi, Fuyun, Baicheng, Bole, and Hejing. Phase II GEF counties are Altai, Qitai, Hami, Yumin, Xinyuan. In Gansu, Phase I GEF counties are Sunan, Subei, Jingtai, Dingxi and Suzhou. Phase II counties are Yongchang, Ganzhou, and Liangzhou. Specific activities to support white yak will take place in Tienzhu county.

Target Beneficiaries. Many of the targeted beneficiaries are to a large extent ethnic minority semi-sedentary herders (sedentary in winter, nomadic during summer) and farmers belonging to the Dongxiang, Hui, Kazakh, Mongol, Sala, Uygur, and Yugu ethnic groups.

Public Participation. In order to seek local support, to increase transparency and accountability to the public, to reach consensus with various stakeholders, and to enhance the sense of ownership of the proposed project and involvement in the proposed project, consultation of beneficiaries and other stakeholders during the social assessment process has been of great importance. Two rounds of consultations were held with the potentially affected herders and farmers of Gansu and Xinjiang, the first in 2000 and the second in 2001. Insights and recommendations from those Social Assessments (SA) are reflected in the Social Assessment Reports (SAR) forming the bases for the drafting of Beneficiary Participation Manuals and Multi Ethnic Group Development Plans.

Social Assessments

Initial Consultations. A set of Participatory Rural Appraisals (PRAs) were carried out in a selected number of potential project counties in both Gansu and Xinjiang in the spring of 2000. Selection of the PRA sites took into account ethnic minority representation in the project, subsistence format (e.g., semi-pastoral or full herding lifestyle), and economic level. Four PRA sites in each province were selected, each in a village of a different county, and each requiring one full week of consultations.

The PRAs were based on a mix of focus groups and household interviews. Individual in-depth interviews and stratified focus groups of 6-10 people (structured by age, gender, nationality, and income level) were the main sources of data used in the analysis. An interview guide reflecting the issues outlined above was developed for the interviews during training provided in Gansu in January, 2000. The interviews and focus groups consisted mostly of open-ended questions but also included a standard set of questions to develop a socioeconomic and demographic profile of each informant. Care was taken

to maintain the anonymity of all informants as best possible.

In Gansu, 424 people from 86 households were included in the social assessment. In Xinjiang, 28 families were interviewed and twenty-four questionnaires filled out. Over one hundred farmers and herdsmen participated in the investigation. Eighteen informal discussions were held in villages, towns and counties, and seventy-three figures drawn. The investigation covered a distance of eight thousand kilometers. In Gansu, six nationalities including Hui, Tibetans, Yugu, Dongxiang, Sala and Mongol made up approximately 24% of the total potential beneficiaries in the four counties being investigated. The villages investigated were 23% Han, 23% Hui, 33% Tibetans, 16% Yugu, and 5% Dongxiang. The villages were largely multiethnic. In Xinjiang, of the four project counties, the population of Uygur in Baicheng County is the largest proportionally, making up 87% of the population. Huocheng County is about half minority populated, and the other two counties about one-third. Outside of Baicheng, the minorities are about equally split between Uygur and Hui, with Kazakhs prominent in Wusu.

The objective of these PRAs were to identify the needs and interests of the potential project beneficiaries. Main issues and needs identified by the herders and farmers included the need to increase their income from sheep production, lack of availability of improved sheep breeds, lack of adequate support services for livestock development and inadequate winter forage. Findings from the PRAs played an important role in shaping the proposed project as it currently stands.

Social Assessment Process. In order to ensure effective project preparation and implementation, a social assessment (SA) process has been established. The overall purpose of the SA is to assist in designing and implementing the proposed project with the support and active involvement of individuals and groups most directly affected. It is anticipated that this participation will range from simple one-way communication, such as information disclosed in publicity campaigns and surveys, to more intensive interactions involving two-way discussions in which the informant's opinion is recorded and considered in the proposed project's design and implementation arrangements. The SA should be viewed as a continuous process of consultation to take place throughout the project's life cycle.

Activities in the SA process involve a wide range of methodological tools reflecting the multi-faceted nature of the issues to be addressed. Social issues already identified in the PRAs as being important for project design have already been addressed in one or more components of the project. Included as SA activities are also consultations with project beneficiaries and affected groups as outlined in the Beneficiary Participation Manuals. Any issues that arise during the course of the proposed project as a result of the project or socio-economic developments, that may have an adverse impact on one or more population groups, will be investigated and mitigated if necessary.

Objective of the Social Assessment. The SA focused on issues that directly and indirectly impact the key stakeholders in the project. The range of issues that were addressed included: (a) *affordability concerns*: Can the project households afford the anticipated financing terms and other expenses; (b) *land security*: Are the leasing arrangements fair and provide farmer households with tenure security? Are leased lands and forests properly maintained from the viewpoint of farmer households?; (c) *inclusion*: Are there any groups residing inside the proposed area whose needs are not being addressed by the project or who stand to lose from one or more of the project activities? How does the project impact the poor, the elderly, and women? How are these groups involved in the project's decision-making?; (d) *access to employment, credit, irrigated water, land*: Do certain groups of the population have lower access to employment, credit, irrigated water or land than other groups? What is the reason for this differential access? Will these groups participate in the project and if so, how is their access improved as a result of the project?; and (e) *social cohesion, community decision-making*: How are decisions made in the village? Do all residents of the village have an equal say in the matters that affect them? How are resources allocated within the village? Are there any community development projects in the village in which farm households contribute labor? Another important objective of the SA has been to assess whether an ethnic minorities development plan was necessary in accordance with OD 4.20.

Social Assessments (SA) and Social Assessment Report (SAR). During the summer of 2001 extensive social assessments were carried out in Gansu and Xinjiang. In Gansu, 682 people (53% male and 47% female) were consulted drawn from 8 villages in four different counties. In Xinjiang, 841 individuals from 12 villages in six counties (four in northern Xinjiang and two in southern) were involved in the assessment. Participatory Rapid Appraisals involved focus group discussions, village-wide meetings, household case studies, and householder interviews. The focus for this project preparation Social Assessment was to discuss the outlines of the proposed project with these potential stakeholders and gather their suggestions for project design revision. A draft Social Assessment Report was submitted to the Bank during the winter of 2001-2002 which incorporated a number of recommendations. The Social Assessment Report advised the Bank and the PMO to prepare Multi-Ethnic Groups Development Strategies for both Gansu and Xinjiang in accordance with OD 4.20 as the best mechanisms to address minority nationality concerns and issues. These Strategies have been finalized.

In Xinjiang, the 2001 SA analysis was based on the sites in Table 1.

Table 1. Xinjiang SA sites.

PRA Site	County	Township	Ethnic Composition	Forms of Animal Husbandry Production
Maigeti	Kashgar	Anghe Terek Kezileawat	Uygur	Farming area and herding in arid pasture
Baicheng	Aksu	Mijik &Kangqi	Uygur, Kirgiz, Han	Farming area and herding
Changji	Changji	Yushuguo Town	Kazak, Hui, Han	Farming area and transhumant herding
Huocheng	Yili	Guozigou Farm, Qingshuihe Town	Kazak, Uygur, Han, Hui, Sala	Farming area and transhumant herding
Tacheng	Tacheng	Bozdak Farm, Arxir	Kazak, Uygur, Hui, Han, Daur	Farming area and transhumant herding
Fulai	Altai	Jietharele, Kuoke	Kazak	Transhumant herding and settled herding

In Gansu, the SA covered 8 villages, including 4 pastoral ones and 4 semi-pastoral ones with focus on agriculture. Ethnically, they were 2 Yugu villages, 2 Tibetan, a Hui village, a village inhabited jointly by Hui, Han and Dongxiang nationalities, and 2 Han villages. Waxia, Saiding and Xigou are high-income villages, Kangfeng, Honggeda and Beidi belong to middle-income level villages, while Tanyaogou, and Humagou are poor villages. These 8 villages vary greatly in natural conditions and resources. See Table 2 below.

Table 2. Gansu SA sites.

PRA Site	County	Township	Ethnic Composition	Forms of Animal Husbandry Production
Kangfeng	Sunan	Hongshiwo	Yugu, Han, Tibetan	Pastoral
Saiding	Sunan	Hongshiwo	Yugu, Han, Tibetan	Pastoral
Beidi	Yongchang	Shuiyuan	Han	Agriculture
Xigou	Yongchang	Shuiyuan	Han	Agriculture
Tanyaogou	Tianzhu	Zhuaxilongxiu	Tibetan, Han, Tu	Pastoral, Agriculture
Honggeda	Tianzhu	Zhuaxilongxiu	Tibetan	Pastoral
Humagou	Kangle	Mingtanglu	Hui, Dongxiang, Han	Agriculture
Waxia	Kangle	Huguan	Hui	Agriculture

For Xinjiang, about 246 questionnaires were completed and about 242 persons were interviewed, of whom 215 were farmers and herders. Household case studies were also conducted. In Gansu, 424 people from 86 households were included in the SA. For both Gansu and Xinjiang focus groups and interviews were complemented by the collection of various types of participatory time, resource, and social differentiation charts to reveal villager perceptions of and suggestions for the project. These included data on residential pattern, family structure kinship and degree of poverty and wealth, labor productivity, problems in the local development, seasonal activities and daily activities.

Ethnicity in Gansu and Xinjiang. As a minority nationality (Uyghur) autonomous region, Xinjiang is a major center of ethnic diversity in China. Project counties include Uygur, Kazakh, Hui, Kirgiz, Mongol, Sibo and others. Gansu has long been a multi-nationalities crossroads and the minorities now account for 9.38% of its total population. At presently, there are 44 minority nationalities in Gansu, of which the 10 with a population greater than 1,000 individuals are, in order: Hui, Tibetan, Dongxiang, Tu, Manchu, Yugu, Baoan, Mongol, Salar and Kazak. There are 6 minority counties within the directly-affected project areas, including 2 Hui counties, 3 Tibetan counties and one Yugu county. In addition, these counties are also the areas where the other minorities in Gansu live. For example, Tienzhu County is also a key location of the Tu nationality; there is a Dongxiang township under Kangle County; and there is a Mongol township in Sunan County.

The Hui in Gansu mainly live in Zhangjiachuan Hui Autonomous County and Linxia Hui Autonomous Prefecture, accounting for 66.18% of the total Hui population in Gansu. Tibetans largely inhabit Gannan Tibetan Autonomous Prefecture and Tienzhu Tibetan Autonomous County. The Salar, Baoan and Dongxiang people mainly inhabit Linxia Hui Autonomous Prefecture. The Yugu , Mongols and Kazaks mainly inhabit the middle/west section of the Gansu Corridor and the Qilian Mountains.

Pastoral Development and Ethnicity. Many minority nationality groups in both Xinjiang and Gansu rely on livestock for their subsistence, particularly the Kazaks, Mongols, Kirghiz, and Tajiks. Other ethnic groups such as the Uygur, Hui, Han, Xibo, Tartar, and Uzbek, although mainly agricultural, also have a tradition of livestock production. The Hui, Dongxiang, Salar and Baoan nationalities in Gansu are mainly engaged in agriculture, supplemented by commerce, stock raising, slaughter, tanning, oil manufacture, transport and other sidelines. The Tibetans, Mongols, Kazaks and Yugu people in Gansu are engaged in animal husbandry, but also in forestry and other forest related activities. The Hui, long-established traders, are still playing an important role in trade in the pastoral and agricultural areas of western China as one of the key purchasers, processors and consumers of animal products there.

The SA revealed three basic social production approaches to livestock: (i) semi-herding/semi–farming; (ii) pen-feeding; and (iii) fully nomadic pastoralism. The raising animals by farmers in pens, mainly sheep and goats, is becoming increasingly popular. This is due, according to the farmers and herders, to the scarcity of quality natural pastures. The feed needed by the animals is mainly obtained from grass in the farmland, artificial forage or crop by-products. Groups which are primarily farming and pen-raising animals, are the Uygur, Han and Hui. Currently, in the project areas, a semi-pastoral/semi-farming production pattern still is a very popular one in the rural and pastoral areas. Both crop and livestock production is emphasized; this has been the increasing pattern over the past half-century. The advantages to this pattern are seen to be the full utilization by local people of their natural resources, as farmers use the grass in and around their cropland to feed their livestock. Xinjiang has a long–standing tradition of pastoralism (now semi pastoralism) in the area of the Tianshan Mountains, the Altai Mountains, and the region along the Zhungar Basin, and seasonal migrations continue today. The SA data suggest that this pattern has been challenged primarily due to the shortage of good quality pasture. Since 1994, most of the once nomadic families have settled down to a semi pastoral production pattern where they continue to send their animals on the seasonal round, either taken there by children or by neighbors.

In recent years, the project counties have encountered many difficulties in their animal husbandry production. The SA revealed that most local people believe that the major difficulties are those of the degradation of pastures and animal species, low technical knowledge of production and low productivity. It is equally evident that the family income of the rural population rural has been slow to increase, practically stagnating in recent years. It is important for the proposed project to keep in mind the three patterns of livestock production that exist in Xinjiang and Gansu, since each require different methods for the beneficiaries to use any loans to improve their production and to improve their pastures or pen-fed facilities.

Women's Status. The SA Team investigated the women's social status and in particular, their understanding of and hopes for the project. Despite gains of recent decades, women's status throughout the project counties is lower than that of men. There are also some significant differences between ethnic groups. The SAs found that, compared to other pastoral peoples, Kazak women have more power in family decision-making, while pastoral women as a whole participated more in such matters as opposed to farming women. In the herder households, women play a more significant role in the economic activities.

Women are considered as important beneficiaries of the proposed project; and women's participation in the implementation will be closely monitored and followed up through measurable monitoring indicators. The ongoing SA work will pay close attention to appropriateness of the project activities relative to women as well as to make sure that all activities are culturally appropriate and in accordance with the wishes of the various ethnic minority beneficiaries. Recognizing that special efforts need to be made to ensure the fuller participation of women, the Beneficiaries Participation Manuals and the Minority Ethnic Groups Plans all have special provisions and strategies for increasing women's visibility and participation in the project.

Religion and Ethnicity. Of the total population in Xinjiang, more than ten million are Muslims, primarily the Uygur, Kazak, Kirghiz, and Hui. For these populations, mutton is the most important meat and this has a profound impact on the marketing of sheep products. The Hui, Dongxiang, Baoan, Salar nationalities in Gansu also are Muslims, and religious belief plays a very important role in their lives. Many social and other activities (marriages, funerals, slaughter of livestock), involve religious rituals and ceremonies in conformity to the Koran. Muslim community leaders, the imams or *ahong* of the villages, are important local actors. Most rural Muslim communities follow the demands of their religious belief, and most families follow the ritual of five daily prayer times. The Eid and Kurban Festivals are major festivals. Other than at festival times, daily dress is mostly the same for these Muslim people as for the Han, save that men often wear white hats and women wear head scarfs.

The Tibetans, Mongols, Yugu and Tu nationalities in Gansu follow Buddhism (with the Tibetans and Mongols adhering to Lamaist Buddhism). Of these, the Tibetans are most faithful to their spiritual way; Tibetans in Gannan Tibetan Autonomous Prefecture are known for following of their rituals and activities. All the 4 nationalities have their particular garments, the use of which is limited to festivals and important activities only. The Yugu nationality prizes education highly, and it was among them that the nine-year compulsory education requirement was popularized the earliest. The Han believe in miscellaneous religions, including Daoism, Buddhism, Christianity, Catholicism, ancestor reverence, and in an amalgam of beliefs and practices often referred to as Chinese folk religion.

Language. All minorities in Gansu, except for Hui and Manchus who speak *Mandarin*, have their ethnic languages but are to some degree also bilingual in Mandarin. The Mongols, Kazakhs, Kirghiz, Tibetans, and Uygur have their own scripts and are often far less conversant with spoken and written (although they are often illiterate) Chinese. The project thus requires key documents to be translated into locally relevant scripts and for training to be held in locally relevant languages.

About Cultural Preference for Herd Size. In many pastoral areas investigated, the scale of a family's herd has in the past been a key measure of household wealth; herdsmen almost universally wished to possess large herds. However, in recent years, in order to avoid further grassland deterioration arising from overgrazing, the local government has laid down a system to define the unit grazing load, which has restricted the number of animals to be raised by every family, emphasizing quality over quantity. With the increasing awareness of environmental sustainability among the herdsmen, the concept of grassland conservation for productive usages by restricting the number of herds has been accepted by most of them. In agricultural areas where dealing with animal production is merely a channel to increase income, farmers care only about the economic benefit of animal production. Accordingly, the negative impact from the cultural preference to the herd scale on this should not be too great.

The size of production unit has been the focus on Chinese policy to "industrialize agriculture, which might select against some cultural practices and require capital inputs not available to most herders. The project introduces an innovation in this aspect of animal production in that various forms of herder association will be piloted. This re-organization can, in many cases, yield the scale and scope economies associated with a large production unit, while preserving individual household ownership structure.

Coexistence of Marketing System and the Rural Market Bazaar. Bazaars are held at prosperous towns away from pastoral areas. The unfamiliarity with market transactions, high costs, time and efforts expended makes most farmers and herdsmen prefer to wait for itinerant traders to visit their villages to purchase their animals. Such a marketing system has given rise to a team of middlemen in control of market conditions, who profit partially from the rollback on livestock and primary products, or from the markup against consumers by regulating the season to sell livestock. On all accounts, the market is mobile and strongly seasonal. The project will address these issues in several ways, primarily by providing timely and accurate independent market information, but also including training in buying and selling. The transformation of a small number of markets from 1-on-1 to auction markets will also increase farmers' share of value added.

Additional GEF Annex 4: Environmental Issues
CHINA: Gansu and Xinjiang Pastoral Development Project

Project Location. Project areas are located in 19 counties/cities in ten prefectures (Jingtai, Jiuquan, Zhangye, Sunan, Yongchang, Liangzhou, Jingyuan, Huining, Lintao, Dingxi, Zhangjiachuan, Qingshui, Linxia, Kangle, Linxia, Lintai, Pinglian, Huating and Ningxian), and one provincial level farm and one prefecture level farm (Huangcheng and Minshen). In Xinjiang, project areas include 24 counties in nine prefectures (Xinyuan, Tekesi, Gongliu, Wusu, Shawan, Yumin, Bole, Wenquan, Altai, Fuyun, Changji, Hutubi, Manasi, Fukang, Jimusaer, Qitai, Hejing, Yanji, Bohu, Kuche, Baicheng, Wensu, Hami, and Tulufan) and 3 sheep breeding farms in Gongnaisi, Tacheng and Bazhou.

In Gansu, Sunan and Huangcheng Farm will focus on the development of fine wool sheep. Development of mutton sheep will be the main project activity in Jingtai, Suzhou, Ganzhou, Yongchang, and Huining., Beef fattening will be the principal activity in Zhangjiachuan, Qingshui, Liangzhou, Lintai, Kongtong, Ningxian, Kangle, and Huating. Linxia County. Lintao, Linxia City, Jiuquan and Dingxi will feature dairy cattle. In Xinjiang, mutton sheep production is the main production activity in Fuyun, Altai, Yumin, Hejing, Kuche Hami and Tulufan. All other counties will be producing dual purpose sheep.

Phase I GEF counties in Xinjiang are Tekesi, Fuyun, Baicheng, Bole, and Hejing. Phase II GEF counties are Altai, Qitai, Hami, Yumin, Xinyuan. Xinjiang GEF counties are located in the eastern Tien Shan and Altai Shan mountains eco-regions. In Gansu, Phase I GEF counties are Sunan, Subei, Jingtai, Dingxi and Suzhou in the Qilian Shan mountains eco-region. Phase II counties are Yongchang, Ganzhou, and Liangzhou. Specific activities to support white yak will take place in Tienzhu county.

Natural Conditions. The annual average temperature in Gansu varies between 0.2oC- 15.0oC, and the annual average precipitation varies between 35 mm and 742 mm. Precipitation is unevenly distributed within the region and between seasons. Most of the precipitation is in the form of major storm events, causing severe soil erosion in certain parts of the province. Majority of precipitation occurs between July and September accounting for more than 60% of the annual precipitation. Xinjiang has a typical continental climate with cold winters and warm and sunny summers. The average annual daily temperature in Xinjiang project counties varies between 1.8°C to 13.9°C. The southern and central parts of the region have typical desert oasis agricultural development characteristics (ecological zone). Long sunny days, high available degree-days, and long frost-free periods provide a good climatic environment for agricultural and livestock production. However, the annual precipitation is not adequate in many parts of the region and evapotranspiration rates generally exceed precipitation by many folds. Precipitation in the mountainous areas is higher and evapotranspiration more moderate, allowing for the development of alpine and sub-alpine ecological zones and high quality grasslands that are mainly used for grazing. The annual precipitation varies between 17mm to 480mm.

Grassland Conditions. Except for Sunan, the majority of project counties in Gansu rely mainly on fodder, forage and agricultural by-product as animal feed source. The major grassland ecological zones in Gansu include desert, steppe, meadow, alpine and sub-alpine and marsh grasslands. Signs of grassland degradation, are apparent in majority of the project areas. The grassland degradation is as low as 10-20% in Sunan with an average degradation rate of 30%, of which 50-60% are slightly degraded. In Xinjiang (1.65 million km2), a large a variety of different grassland types exist. Main grasslands ecological zones include temperate meadows, temperate steppes, temperate deserts, alpine steppes, alpine deserts, low-lying meadows (wet meadows), mountain meadows, alpine meadows and marshlands. Most natural grassland areas show signs of degradation at different levels of severity. According to available statistics, over 80% of natural grassland in Xinjiang show some degree of degradation, while one third are seriously degraded. The grass yield of natural grasslands have dropped an average of 30-50%,

compared to 1960's.

Water Resources. Both Gansu and Xinjiang suffer from shortage and/or poor distribution of water . In Gansu, the areas to the north of an imaginary line between Liupan Mountain-Qingliang Mountain- and Qilian Mountain have a shortage of water, while most of the areas to the south of the line enjoy abundance of water. Areas to the north of the line include eastern Gansu, the massive loess plateau and areas to the north of Lanzhou, where annual runoff is only 5 to 50 mm, while the areas to the south have an annual runoff of about 100 to 300 mm up to as high as 600 mm in the mountainous areas. River flow regimes have also a poor distribution, providing a small flow during spring and winter months, reaching peak flows in fall and declining again during summer months. Water flow of inland rivers is mainly concentrated in June to September, accounting for 70-75% of the annual flow.

Xinjiang also suffers from scarcity of water resources due to poor distribution of river systems. Even though water resources are rather abundant in some areas like the hilly and mountainous alpine and sub-alpine regions of Altai and Yili, water availability in dryer central and southern counties is poor. There are over 570 rivers in Xinjiang, however, most of the rivers have rather short courses and small catchment basins, with a small water flow. The total surface water runoff in Xinjiang is 88.4 billion m3. The available groundwater resources is around 25.2 billion m3. There are several dozens of rivers that traverse in the project areas and most of them are inland river system. The exceptions are Eerqisi River in northern Xinjiang that flows into the Arctic Ocean via Ebi River in Kazakhstan, and Chabuchar River in the southwest of Xinjiang that flows into the Indian Ocean via India. Among the inland rivers, Yili River and Emin River flow into Kazakhstan. Water resources distribution declines from northern to the southern parts, and from west to east. Northern Xinjiang covers 27% of the region, enjoying 52% of total water resources. Generally speaking, water quality in the project areas is good for irrigation. However, Hami and Tulufan prefectures in central Xinjiang have a shallow and somewhat saline groundwater that in combination with high evapotranspiration rates is causing increase in occurrences of soil salinity and potential sodicity within the areas.

Environmental Impact Assessment. The environmental impact assessment (EIA) has been prepared to meet the requirements of relevant environmental protection and assessment processes of the People's Republic of China, Governments of Gansu Province and Xinjiang, and the World Bank. The report presents the results of the environmental impact assessment for the project, based on two separate studies undertaken in Xinjiang and Gansu. The studies were later combined due to similarities of the environmental issues and the proposed mitigation measures to form a final report. Project counties in Gansu and Xinjiang were divided into different groupings based on the major livestock production systems that are prevalent in each county. Then within each grouping the environmental issues were further assessed under secondary breakdown of counties based on different ecological zones present within the project areas. The studies concluded that the major potential environmental issues and required mitigation measures are more related to different production systems rather than ecological zoning, most likely since the production systems have been adopted by the local herders/livestock farmers based on ecological characteristics of their environment. Furthermore, the proposed processing enterprises and marketing activities were reviewed, potential environmental impacts assessed, and responsive mitigation measures identified.

Public Participation. In order to: (i) seek local support; (ii) increase transparency and accountability to the public; (iii) reach consensus with various stakeholders; and (iv) enhance the feeling of ownership of the project and involvement in the environmental management plan, participation of beneficiaries and other stakeholders was of great importance in the environmental assessment process. The draft EIA report was available in county animal husbandry bureaus in affected communities for review and comment by interested parties. Notices were issued and were put up on notice boards. News media including local newspapers were also used to inform all beneficiaries and potentially affected people within the areas of project impact about the planned environmental study.

Possible Environmental Impacts. The major environmental issues identified are: (i) the present status of majority natural grasslands (overgrazed/degraded); (ii) inadequacy of feed for livestock; (iii) status and availability of other natural resources (water and soils) for the production of irrigated fodder and forage. The environmental assessment of the proposed project indicate that the project would have no negative impact on the natural environment, providing positive overall social benefits. It is anticipated that the project, if successfully implemented, should increase the value of livestock production in the project areas through improvement of the quality of the animals and quality and quantity of animal feed supply. The implementation of a number of project sub-components such as grassland improvement is conducive to the improvement of the natural environment. As long as adequate water supplies and suitable land units for fodder production are insured, the irrigation water supply should increase yield output of irrigated fodder/forage croplands (artificial pastures) and lessen yield reduction during drought periods. Provision of appropriate production technologies, applied research, training and extension services, and an adequate market system should assist project beneficiaries with the technical know how and better means of maximizing income from their efforts without negative environmental impacts.

There are, however, a number of aspects of project implementation, which, if not properly mitigated, might have potential adverse effects on natural and/or social environment within the project areas (identified below). The identified impacts are reversible and their magnitude would depend on how the project specific mitigation plans are implemented. If the proposed mitigation measures are fully adopted and the environmental management plan implemented, these impacts would be mitigated to insignificant levels. The potential negative environment impacts identified in the EIA during construction and implementation phase of the project are of temporary in nature and limited in magnitude. The potential impacts on the environment include: impact on natural vegetation due to temporary land occupation at the construction sites, potential pollution as a result of additional daily waste produced at the construction site and noise and dust of the construction machinery. However, these impacts are minor in magnitude and if the proposed mitigation measures as presented in the EIA report are implemented, no significant impacts are envisaged during this stage of the project.

During implementation and operation phase, as long as the project enforces grassland laws and does not allow any increase in the number of animals beyond the carrying capacity of the grasslands, it is unlikely that project implementation will have any significant negative environmental impacts. The development of irrigated and rainfed fodder and forage crops (artificial pastures) should reduce the pressure on natural grasslands, allowing for the rehabilitation of the presently overgrazed and degraded grasslands. The project will promote use of indigenous grass species, obtained from the project areas for the improvement of natural grasslands through supplementary sowing. This should provide for improvement of natural grassland ecology and have positive impact on biodiversity of grassland plant species.

Possible localized negative environmental impact could come from the potential limitations in availability of irrigation water for the development of artificial pastures within project counties and soil quality within areas earmarked for production of irrigated fodder/forage crops. At present, the available data is inadequate and more substantial water balance studies during pre-implementation and implementation periods are warranted within areas where potentially insufficient water resources exist and/or signs of soil salinity/sodicity and desertification are prevalent. The areas with most imminent cause for concern include counties in the Hexi Corridor, and Dingxi and Liangzhou Counties in Gansu, where water resources are very scarce and where in some parts the groundwater table has deepened significantly. Water resources do not appear to be abundant in Hami, and Tulufan counties in Xinjiang. Three project counties with large areas of irrigated fodder (Tacheng sheep breeding farm, Hejing County and Bole City) could also potentially have problems with adequacy of water resources.

Since the exact location for development of artificial grassland is not identified, it is difficult to determine the potential degree of impact. However, the project will, in line with the water resources planning of the region, make sure that the available water resources are sufficient for the sustainable implementation of the project, ensuring that other water users within the project boundary and downstream are receiving their share. The project will look at adopting alternative, less water demanding forage crops and water saving irrigation methods. Gansu Provincial authorities have agreed to allow for a minimum river flow of some 900 Mm3 in Black River, the main surface water source in Hexi Corridor, to flow to Inner Mongolia. Due to overexploitation of the Black River water resources in upper reaches, river flow has not reached Inner Mongolia since early 1960s. This new decree could potentially reduce the availability of surface water for use within the Hexi Corridor.

Dairy Sub-component. The dairy subcomponent in Gansu has its own specific environmental issues and potential impacts. Three different dairy production models are proposed: (i) small-scale household dairy farmers; and (ii) medium-size dairy farms with up to 100 heads. The small-scale household enterprises with 2 heads of cow per household are not believed to cause any significant impacts. However, medium scale dairy farms could have pollution impacts and health related issues (possible coliform increase), odor and manure, and liquid waste from washing of the equipments.

Environmental Impact Mitigation Measures. Mitigation measures are proposed to prevent/reduce the identified potential environmental impacts of the project. Since the project schemes are scattered throughout Gansu and Xinjiang, effective implementation of the mitigation measures need to be well organized to be effective. In order to cope with this challenge, a detailed environmental management and monitoring plan (EMMP) has been developed including institutional strengthening, environmental training requirements (as a part of the project management component) and environmental monitoring plan. The EMMP includes budgets and allocation of responsibilities of the PMOs and other related institutions.

The project in its design will put strong emphasis on mitigating water use issues by introducing more efficient irrigation techniques to livestock farmers. Most importantly, the project will support extension and applied research in the areas of irrigation and drainage improvement, including: managing application of irrigation water to levels where the yields increase only to economically favorable levels, considering the tangible and intangible value of water resources within the project area and the needs of the downstream users.

The adequacy of ground and surface water needs to be demonstrated through water balance studies and ground water testing such as groundwater yield test (pumping test), and data from observation wells, etc. If adequate ground and surface water data is not available by time of implementation, tests and field studies will be included as a prerequisite for implementation of artificial grassland development (irrigated fodder/forage crops) within areas with potential water resource shortage, to ensure sustainable development of such sub-components.

Before implementation, the medium and large-scale dairy and beef fattening farms need to provide details of the location and sizing of facilities and their plans with regard to manure and liquid waste treatment. Since the exact locations of such enterprises are not yet finalized, it is not possible to determine the details of the environmental impacts of such projects. However, a series of requirements are identified and presented in the EIA report and each project will be assessed to ensure that all requirements are implemented and no major environmental issues are outstanding, before approving such projects, including the sizing of the treatment facilities and location of dairy farms.

Additional GEF Annex 5: Detailed GEF Justification and Sites Proposed for GEF Intervention
CHINA: Gansu and Xinjiang Pastoral Development Project

Introduction

Land degradation and loss of biological diversity are enormous problems and at the root of the poverty being faced by poor herders and farmers in Western China. Given the extent and severity of the degradation, it is unlikely that a demand-driven investment project alone will be able to effectively address the problems without considerable technical assistance, capacity building, research, and targeted investments to pilot new development paths that integrate economic growth, the environment, and social equity. In addition, traditional and current attempts to address land degradation, biodiversity loss, and the management challenges they pose are based on narrow, sector-by-sector approaches, which results in fragmentation of policies and interventions. These contemporary approaches have largely been ineffective in tackling the land degradation problem because the linkages and interactions among the natural systems as well as with the various stakeholders have not been taken into account.

For this reason, and to ensure that individual herder and local community actions translate into global environmental benefits, the project will be complemented through financing from the Global Environmental Facility (GEF), under the Operational Program #12, Integrated Ecosystem Management (OP12). In this way, the development focus of the project will also address China's increasingly severe problems of land degradation, which is threatening much of Western China with desertification, and biodiversity loss. By linking GEF funding closer to rural development lending, new directions for mainstreaming biodiversity and ecosystem management will also be set as part of China's Great Western Development Strategy of environmental protection and economic development in its western regions.

Global Environmental Significance of the Project

Biodiversity in China. China is one of the world's richest countries in terms of biodiversity with one of the greatest ranges of ecologic diversity. It owes its great natural richness to its large size, great physical range of conditions and the fact that it contains ancient centers of evolution and dispersion and that main areas served as Pleistocene refugia during the temperate species decimations of the Ice Ages. China is also one of the eight original centers of crop diversity in the world. It is estimated that there are over 27,000 species of higher plants and 2,300 species of terrestrial vertebrates, including nearly 1,200 birds, 500 mammals, 380 reptiles and over 280 amphibians. These also include a reasonably high proportion of endemics. A wide variety of domestic plant and animal species are harvested and used for economic purposes. Notwithstanding the richness of these resources, almost all of China's biodiversity is under stress, and many species are seriously threatened. It is estimated that 20 percent of the species are now endangered. This significantly exceeds the global average, in which about 10 percent of species are considered threatened. For example, of the 640 species listed in CITES, 25 percent are found in China.

Biodiversity in Gansu and Xinjiang. To evaluate the biodiversity importance of the provinces of China, *A Biodiversity Review of China* established a scoring system of biodiversity importance. Raw species richness score (R) is simply the number of species of the taxa that occurs in the province in question. Endemism Value (Ev) is weighted for the distinctiveness of the province in the following way: each species is given 10 points. If it is endemic to one province, that province scores all 10 points; if it is shared between two provinces, then each scores 5 points; if it is common to 20 provinces, they all score only 0.5 points. Ev is the total of all such scores for a province. A third score Endemism Ration (Er) is the mean endemism weighting for each province (i.e., Er=Ev/R).

In Gansu, there are 30 species of endangered plants (R) , giving an Ev of 156 and Er of 5.2. A total of 454 bird species have been recorded for Gansu (R), with Ev and Er of 319 and 0.7 respectively. There are 13 species of first class protected birds in Gansu. There are 169 species of mammals in Gansu, of which 15 are first class protected animals, with Ev and Er of 276 and 1.6 respectively.

In Xinjiang, twenty-four species of endangered plants have been recorded with an Endemism value (Ev) of 167 and Endemism ratio (Er) of value of 7.0, which is the fourth highest in China. Three hundred species of birds have been recorded (R), eight of which are first class protected species, while 48 others belong to the second class. For birds, the Ev 328 and Er is 1.1, which ranks Xinjiang sixth in the country. There are 146 species of mammals in Xinjiang (R) of which 11 are first class protected species and 16 are second class. Both Ev and Er are high being 345 and 2.4 , respectively. As a result, Xinjiang ranks fourth and second of all Chinese provinces in these two biodiversity measures.

Like elsewhere in China, the two project provinces have lost much of their original natural habitat. Gansu has lost 43 percent of its original natural habitat and half of its original forest cover. Xinjiang has lost 21 percent of its natural habitat and half of its original forest cover. With respect to protected area status, only 7 percent of Gansu and 4 percent of Xinjiang's total land area is currently under formal protection. In both Gansu and Xinjiang, *A Biodiversity Review of China* recommended establishing additional protected areas to protect examples of desert and steppe grassland habitat (MacKinnon et al. 1996).

Biodiversity in the Project Areas. The project areas are situated at an important biological crossroads between the Palearctic and Oriental Realms and are rich in biodiversity, with many endemic grassland species such as *Helianthemum songaricul, Calligonum yingisaricum, Amondendron bifolium, Tamarix sachuensis, Cistanche salsa, Astralagus mongolicus, Fritillaria walijewii, Ferula sinkiangensis, Saussurea involvucrata*, and *Haloxylon persium.* Many of these species are endangered elsewhere in their range and are globally threatened. Major vegetation types include desert, steppe and alpine-steppe ecosystems. The project area contains three ecoregions that are included in World Wide Fund for Nature (WWF's) Global 200 list of priority areas for conservation of biodiversity: the Tibetan Steppe, the Middle Asian Mountain Temperate Forest and Steppe, and the Altai-Sayan Montane Forests.

Grasslands in the project areas include a number of plant species of global agricultural significance – legumes such as *Trifolium* sp, *Medicago* sp. and *Astragalus* sp. and grasses such as *Festuca* sp., *Dactylis* sp. and *Poa* sp. - that form the foundation of temperate grazing pastures worldwide. In addition, the indigenous knowledge inherent in local grazing systems that have evolved with these grassland ecosystems include indigenous sheep breeds of regional significance. This includes Tibetan sheep, Altai fat-tailed sheep and Bayinbulak fat-tailed sheep. These are globally significant genetic resources for future use in plant and animal breeding for the global temperate grazing economy.

The key project areas which will receive support under the project have been identified as priority sites of global importance in China's National Environmental Action Plan (NEAP) (1998), Biodiversity Conservation Action Plan (1994), and the China's Biodiversity – A Country Study (1998). These plans have identified the Tian Shan and Altai Shan regions in Xinjiang, and the Qilian Shan in Gansu as priority ecosystems for conservation of biological diversity. The GEF interventions will be implemented within geographically targeted landscape units, which cover a wide range of grassland habitats from high elevation alpine meadows to low elevation desert shrublands. It is anticipated that the GEF-supported activities will focus mainly on production landscapes – grasslands currently being utilized by pastoralists for livestock grazing – but since livestock grazing is allowed in some protected areas, project activities will include those parts of reserves or protected areas located on pastoral migration routes or areas included in a local communities' designated grazingland.

Carbon Sequestration. International concern about greenhouse gases and their impact on climate change has added to increased interest in the role of grassland ecosystems in the carbon cycle. Grasslands play a very important role in global climate change through the process of carbon sequestration (Box 1). Grasslands occupy about half of the world's land area, and contain more than a third of above and below-ground carbon reserves. Grazing can affect soil carbon storage in grasslands, as can converting marginal croplands to grasslands. Proper grazing management can increased soil carbon storage. Any change in carbon storage in plants or soils has significant implications for atmospheric carbon dioxide (Schuman et al. 2002). A key component for sustaining production in grassland ecosystems is the maintenance of soil organic matter, which can be strongly influenced by management. Many management techniques intended to increase forage production may potentially increase soil organic matter, thus sequestering atmospheric carbon.

Box 1. Carbon Sequestration

Carbon sequestration occurs in an ecosystem when the amount of carbon dioxide absorbed by growing plants is greater than the amount of the gas released by decomposing plant material. Changes in grassland management that increase the photosynthetic uptake of carbon dioxide and the subsequent decomposition and stabilization of plant residues in soil, maybe be a significant carbon sink option that can be applied to much of the grassland area of the earth at relatively low cost and with numerous environmental and socioeconomic co-benefits.

Carbon Sequestration in China. China has about 400 million hectares of grassland and the vast area and wide distribution of these grazinglands means that the cumulative carbon sequestration of these ecosystems has the potential to be significant at regional, national and global scales. Although China's rangelands cover only about 8% of the earth's grassland area, they comprise 16% of total carbon in the world's grasslands (Ni, in press). In grassland ecosystems, vegetation has low carbon storage and most carbon is stored in soils. In China, the alpine meadow vegetation type has the highest carbon storage both in vegetation and in soils, making up 26% of total carbon in the grasslands of the country. The alpine steppe (15%) and temperate steppe (11%) also have high carbon storage. Together these three grassland types make up more than half of all of the carbon being stored in China's grasslands (Ni, in press). As significant as the gains in soil carbon are the avoided losses; therefore preserving existing carbon reserves through sustainable grazing management and soil conservation is important. In extensively managed grasslands there are high rates of carbon sequestration – typically they can sequester carbon in soils with improved grazing management at rates of 0.05-0.15 MgC ha-1 yr-1.

There are strong reasons for encouraging carbon sequestration schemes in degraded grassland ecosystems in western China: (i) land degradation is as urgent an environmental issue as climate change. The sequestration of carbon in these soils, if properly managed, has the potential to counter degradation, and, by increasing water-holding capacity, cation exchange capacity and resistance to erosion, even to increase productivity, resilience and sustainability of these ecosystems. This would also increase food security and reduce poverty among the pastoral population; (ii) the low-input pastoral system of western China, which would benefit most from such a program, may have a higher potential for net carbon accumulation than do intensive forms of agriculture, where the inputs already have a high carbon cost; and (iii) low-input agriculture is less damaging to biodiversity than intensive forms of agriculture.

Carbon Sequestration in Project Areas. Alpine meadow and alpine steppe vegetation types constitute a major share of the GEF project areas in the Qilian Shan, Tian Shan and Altai Shan mountains. Temperate steppe also encompasses considerable areas on the lower slopes of these mountain ranges. Grasslands of western China are a large repository of soil carbon because of their high carbon density and the vast land area they occupy. Widespread deforestation, land degradation and desertification in the proposed project areas, however, reduces local, regional, and global carbon sequestration and potentials for carbon sinks. Improved grassland management strategies and practices could greatly increase soil carbon sequestration, while improving their production potential and other environmental benefits.

Increasing carbon sequestration in the project areas will require targeted research, development of improved management systems, and more sustainable use of the grasslands. Schuman et al. (2002) also cautioned that any program to measure and manage for carbon sequestration on grasslands must deal with the incredible variability in soils and vegetation at multiple spatial scales ranging from the plant-interspace to the landscape. It must also account for the redistribution of soil carbon by soil erosion at multiple time scales. In semiarid and arid regions, such as is found in much of the proposed project area, the inherently patchy spatial and temporal distribution of soil and vegetation resources creates a challenge to both increasing and monitoring carbon sequestration in grassland soils (Bird et al. 2002, Reeder and Schuman 2002).

Eco-Regions in Western China and Conservation of Global Biodiversity

Eco-Region. Strategically focusing biodiversity conservation planning in western China is hindered by the absence of maps with sufficient biogeographic resolution to accurately reflect the complex distribution of the varied grassland ecosystems. Recently, a system of land classification based on the ecoregion concept has gained popularity among conservation biologists and ecologists as a tool for conservation planning (Box 2).

Box 2. What is an Ecoregion?

Ecoregions are relatively large units of land containing a distinct assemblage of natural communities and species, with boundaries that approximate the original extent of natural communities prior to major land-use changes. Ecoregions share a large majority of their species, ecological dynamics and environmental conditions and are defined by climate, landforms and native species. Ecoregions are large enough to encompass natural processes and to capture ecological and genetic variation in biodiversity across a full range of environmental gradients. Ecoregions reflect the distribution of species and communities more accurately than do units based on vegetation structure or from remote-sensing data and can highlight those areas that are most distinctive or have high representation value and are therefore worthy of greater attention.

For ecoregion mapping, Olson et al. (2001) subdivided the terrestrial world into 14 biomass and eight biogeographic realms and nested within these identified 867 ecoregions. This detailed map of terrestrial ecoregions is better suited to identify areas of outstanding biodiversity and representative communities. This ecoregion map offers features that enhance its utility for conservation planning at global and regional scales: comprehensive coverage, a classification framework that builds on existing biogeographic knowledge, and a detailed level of biogeographic resolution. Ecoregion maps can be used as a biogeographic framework to highlight those areas of the world that are most distinctive or have high representation value and are therefore worthy of greater attention. Ecoregions are ranked by the distinctiveness of their biodiversity features – species endemism, the rarity of higher taxa, species richness, unusual ecological or evolutionary phenomena, and a global rarity of their habitat type. Ecoregions can also be ranked by threats to biodiversity, the status of their natural habitats and species, and degree of protection. New ways of assessing biodiversity loss and global threats – from climate change to logging, and overgrazing – are facilitated by this detailed map of ecoregions. Ecoregion maps can also be a strategic tool to determine conservation investments. Conservation strategies that consider biogeographic units at the scale of ecoregions are ideal for protecting a full range of representative sites, conserving special elements, and ensuring the persistence of populations and ecological processes.

Eco-Regions in Western China. In Western China, 25 different grassland and desert ecoregions have been identified. Table 1 lists the different ecoregions found in northern and western China. The proposed project provinces of Xinjiang and Gansu contain 16 of the 25 ecoregions (see project maps, that outline the ecoregions in each province). Three of the most important rangeland ecoregions in the proposed project areas are the Qilian Mountains Sub-alpine Meadows (Box 3), Tian Shen Montane Steppe and Meadow (Box 4), and Alashen Plateau Semi-Desert (Box 5).

Ecoregion mapping exercises complement global priority-setting analyses, such as the Global 200, by providing an even finer level of resolution to assess biodiversity features. For example, Global 200's Tibetan Plateau Steppe amalgamates the following ecoregions: Central Tibetan Plateau Alpine Steppe, Tibetan Plateau Alpine Shrublands and Meadows and the North Tibetan Plateau – Kunlun Mountains Alpine Desert.

Table 1. Grassland and Desert Ecoregions of China.

Ecoregion	Area (km2)
Mongolian – Manchurian Grassland	887,300
Taklimakan Desert	741,900
Alashan Plateau Semi-desert	673,400
Central Tibetan Plateau Alpine Steppe	629,500
Southeast Tibet Shrublands and Meadows	460,800
North Tibetan Plateau – Kunlun Mountains Alpine Desert	374,400
Junggar Basin Semi-desert	304,200
Eastern Gobi Desert Steppe	281,800
Tian Shan Montane Steppe and Meadow	280,100
Tibetan Plateau Alpine Shrublands and Meadows	272,100
Ordos Plateau Steppe	215,500
Qaidam Basin Semi-desert	192,000
Karakorum – West Tibetan Plateau Alpine Steppe	143,300
Altai Montane Forest and Forest Steppe	142,400
Amur Meadow Steppe	123,200
Eastern Himalayan Alpine Shrub and Meadows	121,200
Pamir Alpine Desert and Tundra	118,000
Altai Alpine Meadow and Tundra	90,200
Qilian Mountains Sub-alpine Meadows	73,200
Western Himalayan Alpine Shrub and Meadows	70,200
Emin Valley Steppe	65,000
Yarlung Tsangpo Arid Steppe	59,500
Tarim Basin Deciduous Forest and Steppe	54,500
Suiphun – Khanka Meadows and Forest Meadows	33,800
Nanjiang River Grassland	23,200
Total	6,430,700

Box 3. The Qilian Mountains Subalpine Meadows Ecoregion

This ecoregion is found in the northeastern corner of the Tibetan Plateau in northwestern Gansu Province and adjoining Qinghai Province in the Qilian Mountains and encompasses a total area of 73,200 sq.km. Elevations above 3,000 m support extensive meadow and scrub vegetation on a landscape of rolling hills against a backdrop of rocky scree slopes and glaciated peaks. The ecoregion is divided into two main vegetation types. Meadows occur below 3,300 m and shrublands generally above. The extent of the shrub area is determined by moisture availability, since extrazonal riparian areas at lower elevations support shrubs, while drier south-facing slopes support grassy meadows. At elevations above 4,500 m, vegetation becomes very sparse, dominated by cushion plants. Dominant shrub species include *Potentilla fruticosa*, willow (*Salix oritopne*) and *Caragana* spp.

The ecoregion supports wildlife species typical of the Tibetan steppe, including snow leopard (*Uncia uncia*), wild yak (*Bos grunniens*), white-lipped deer (*Cervus albirostris*), argali (*Ovis ammon*), Tibetan wild ass (*Equus kiang*), musk deer (*Moschus moschiferus*), Tibetan gazelle (*Procapra picticaudataa*) and blue sheep (*Pseudois* nayaur). Many of these species are classified as endangered and they are vulnerable due to poaching and habitat destruction.

Alpine meadow and shrub habitats are used by local people for summer-fall livestock grazing and plants are collected for medicinal purposes, as bedding for livestock, and as fuel. The lower elevation meadows are used for winter-spring pasture (grasslands have been allocated and contracted to individual families). In recent years there has been a significant increase in fencing which has a potentially disruptive, but as yet unstudied effect on wildlife. The condition of the grasslands are reported to have declined in recent years because of an increase in livestock numbers and mismanagement of grassland resources. These increases are due to both demographic and economic factors that are occurring throughout Western China. More people have moved into the area; each family now owns more animals than in past years; and pastoralists are more sedentary which tends to concentrate patterns of livestock grazing, leading to overgrazing. Due to their perceived effect on the quality of grasslands for livestock, marmots have been subjected to marmot eradication programs but the effect of these reductions on ecosystem function has not been investigated.

The ecoregion also plays a vital watershed role, since glacial and snowmelt water from the Qilian Mountains flows from rivers into the Hexi Corridor, where agriculture relies on irrigation water from the upper watersheds in the alpine meadows and shrublands. The Qilian Mountains subalpine meadow ecoregion can also be considered the northeastern edge of the broader Tibetan Steppe ecoregion, identified as one of WWF's Global 200 ecoregions for priority biodiversity conservation.

Box 4. The Tian Shan Montane Steppe and Meadows Ecoregion

This ecoregion is located in the Tian Shan Mountains, an extensive mountain system that extends for 2,500 km east-to-west across Central Asia. The range is surrounded by desert basins on both the north (Junggar Basin) and south (Taklimakan Desert). Middle elevations of the mountains get enough precipitation to support a park-like landscape of meadows and spruce/larch forests. Above lie alpine meadows, rocky slopes and glaciers. Below, steppes extend outward to the desert basins. Because of their size and variety of habitat types, the Tien Shan are ecologically diverse, with more than 2,500 plant species. Overall plant species richness of the Tian Shan is very high, relative to other desert mountain ranges in northwestern China; this is partly due to the fact that the Tian Shan is larger than other desert ranges and, due to its height, receives more precipitation and therefore has a greater range of climatic zones than other desert ranges.

Vegetation shows the following general floristic trends. At 800 to 1,100 m *Artemisia* steppe with grasses is more abundant in the moist western part of the range than in the drier eastern regions. At 1,100 to 1,500 m, on south-facing slopes, desert steppe is replaced by dry, sparse grassland dominated by the grasses *Stipa* spp. and *Festuca* spp. with associated shrubs, mainly *Artemisia*spp. in the west and *Reaumuria soongorica* and *Anabasis brevifolia* in the east. This "grassland-steppe" vegetation persists over a broad altitude range to merge with alpine vegetation above 2,700 m. The alpine zone is dominated by low-growing herbaceous sedge (*Kobresia* spp.) in the meadows. These are very extensive, especially in the eastern part of the Tian Shan. Floristically, the high elevations of the Tian Shan are very similar to the Tibetan Plateau. North-facing slopes support more shrubs at low elevations (*Caragana*, *Spiraea*, *Cotoneaster*) and give way at about 2,500 m to a park-like forest meadow dominated by various species of grass and forbs. Forests are dominated by spruce (*Picea schrenkiana*) that occurs on northern slopes from 2,700 to 3,700 m. Like the Himalaya and eastern Tibetan Plateau, alpine elevations support shrubbier vegetation on northern exposures because these hold a protective blanket of winter snow. Another important factor at the highest elevations is soil stability. Soils disturbed by solufluction support, a restricted assemblage of plants adapted to sliding while stable sites support slow-growing turf-sedges and cushion growth form plants.

In the Tian Shan, mammals include Asiatic wildcats (*Felis sylvestris*), snow leopard (*Uncia uncia*), wolves (*Canis lupus*), brown bear (*Ursos arctos*), argali (*Ovis ammon*), Asiatic ibex (*Capra ibex*) and goitered gazelle (*Gazella subgutturosa*). The Tian Shan lacks adequate protected areas for its steppe-meadow ecoregion. There are few protected areas, although more are planned for. Livestock grazing at higher elevations is a serious issue for the ecoregion. Hunting for meat or income, or in response to livestock depredation is also responsible for diminished populations of some mammal and bird species.

Box 5. The Ala Shan Plateau Semi-desert Ecoregion

This ecoregion extends from the Tibetan Plateau northward into Mongolia's Gobi Desert and encompasses an area of 673,400 sq.km. The Ala Shan Plateau Ecoregion is a region of low mountains separated by basins. Ridges attain elevations of 2,000 to 2,500 m while the basins tend to be 1,000 to 1,500 m. The whole ecoregion is enclosed by the Helan Mountains to the east and the Qilian Mountains to the southwest. Because the region is enclosed by mountains and lies a great distance from the sea, conditions are arid. Large areas consist of shifting sands but areas that are more stable support communities of salt-tolerant xerophytic shrub species such as saxual (*Haloxylon ammodendron*) and *Reumuria soongorica*. Once sand dunes become more stable with sufficient cover of shrubs like these, they cease to shift and soil development can occur, enabling a more diverse assemblage of plants to colonize the site. Other places slightly less arid support semi-desert shrub communities, composed of wormwoods (*Artemisia* spp.), beancaper (*Zygophyllum xanthoxylum*) and *Calligonum mongolicum* . Along the few rivers that cross the region, riparian forests are dominated by poplar (*Populus diversifolia*) where water is fresh and *Tamarix* spp. where water is brackish. Low-lying depressions support meadows and flooded reed beds of *Phragmites communis*. The ecoregion used to support saiga antelope (*Saiga tartarica*) but they have been extirpated. Captive-breeding efforts are underway and there has been talk of re-introducing saiga. The Bactrian camel (*Camelus ferus*) used to roam widely through this region but is now reduced to only a few hundred animals in China, although larger populations exist in Mongolia. Goitered gazelle (*Gazella subgutturosa*), Mongolian gazelle (*Procapra gutturosa*) and Asian wild ass (*Equus hemionus*), were also widespread in the past but are now largely extirpated from the region in China. One mammal, Przewalski's gerbil (*Brachiones przewalskii*), is endemic to the region.

Globally Significant Grassland Ecosystems in the Project Area. A number of biological regions in the proposed project area display highly distinctive species, ecological processes, and evolutionary phenomena and are now recognized as habitats of global importance for conservation of biological diversity. These areas include the Tibetan Plateau Steppe Ecoregion and the Middle Asian Mountain Temperate Forest and Steppe Ecoregion, and the Altai-Sayan Montane Forests (Box 6). These ecoregions have been determined to be some of the richest, rarest, and most biological important and outstanding examples of the Earth's diverse habitats and are included in WWF's recent Global 200 ecoregion priority setting exercise. The Global 200 is a science-based global ranking of the Earth's most biologically outstanding terrestrial, freshwater and marine habitats. It provides a critical blueprint for biodiversity conservation at a global scale. The aim of the Global 200 analysis is to ensure that the full range of ecosystems is represented within regional conservation and development strategies, so that conservation efforts around the world contribute to a global biodiversity strategy. By focusing on large, biologically distinct areas, the Global 200 sets the stage for conserving biodiversity on the broadest scale at which natural systems operate.

Box 6. Globally Significant Grassland Ecosystems in the Proposed Project Areas

A number of regions of China are now recognized internationally as global priority ecoregions for conservation of biodiversity because of their highly distinctive species, ecological processes and evolutionary phenomena. These Global 200 ecoregions include the Tibetan Plateau Steppe, the Middle Asian Montane Steppe and Woodlands in Xinjiang, the Altai-Sayan Montane Forests in Xinjiang, the Daurian Steppe in Inner Mongolia, the Eastern Himalayan Alpine Meadows in Tibet and Yunnan, and the Southwest China Temperate Forests in Sichuan. The following three Global 200 ecoregions occur in the proposed project areas and all are considered vulnerable.

The *Tibetan Plateau Steppe* is situated on the Tibetan plateau in Tibet, Qinghai, and Gansu and encompasses 1.5 million sq. km. It is made up of a number of terrestrial ecoregions. Due to its size and its position at the juncture of the Palearctic and Oriental zoogeographic zones, the Tibetan Steppe is one of the most ecologically diverse alpine communities on Earth. It also includes the most intact example of montane rangelands in Eurasia with a relatively intact vertebrate fauna, and is also one of the largest remaining terrestrial wilderness areas left in the world. The Tibetan Plateau Steppe ecoregion supports numerous rare and endangered wildlife species such as the Tibetan wild yak, Tibetan wild ass, Tibetan antelope, Przewalski's gazelle, argali, white-lipped deer, snow leopard, Tibetan sand fox, wolf, and brown bear. Despite low human population density, hunting and livestock grazing threaten natural habitats and biodiversity.

The *Middle Asian Montane Steppe and Woodlands* is located in the Tian Shan and Pamir mountain ranges in China and neighboring countries of Afghanistan, Kazakhstan, Tajikistan, Kyrgyzstan, Turkmenistan, and Uzbekistan and encompasses 879 thousand sq.km. As is common in mountain regions, the altitudinal complexity in the Tian Shan leads to formation of a wide range of habitats and associated species diversity. This ecoregion exhibits high levels of endemism and is recognized as a center of plant diversity. Forests of walnut, wild apple, spruce and juniper form unique biotic communities. Subalpine and alpine meadow communities are found on the mountains and the lower slopes of the Tian Shan support steppe and desert steppe communities. Endangered plants include wild almond, pistachio, and a number of species of wild iris. Endangered mammals in the Tian Shan include: Xinjiang goitered gazelle, argali, Siberian ibex, elk, markhor, roe deer, snow leopard, and Siberian marmot , and otter. Regarding endangered birds, both snowcock and the Houbara bustard and the gyrfalcon are all listed on CITES I. Water diversion projects, industrialization, and human expansion threaten the biodiversity of this ecoregion, particularly at lower elevations. In mountain zones, livestock grazing is of significant concern.

The *Altai-Sayan Montane Forests* is found in the Altai Shan mountain ecosystem in China and neighboring areas of Kazakhstan, Mongolia, and Russia and comprises 862 thousand sq.km. This ecoregion includes coniferous forests, intermontane steppe and alpine meadows. It has some of the most outstanding and intact examples of montane conifer ecosystems in central Asia and contains exceptionally high level s of plant richness and endemism. It is also a center of plant diversity for montane conifer and alpine meadow ecosystems in central Asia. Like the Tian Shan mountains, the Altai Shan also mammals such as argali, ibex, elk, markhor, and snow leopard. There are also a number of wildlife species unique to the Altai Shan, including wolverine, beaver, and musk deer, and several large forest gallinaceous birds, such as capercaille, hazel grouse and Altai snowcock. Xinjiang goitered gazelle and *kulan*, or wild ass, cam also be found in the deserts bordering the ecoregion. Alpine and subalpine areas suffer from overgrazing by livestock and over collection of non-timber forest products also affects natural habitat and biodiversity.

Land Degradation and its Root Causes

Land Degradation In China. An estimated 330 million ha – one third of China's total area – is prone to desertification. Of this total, desertification is actually occurring on about 262 million ha. This is believed to be the highest ratio of actual-to-potential desertification of any country in the world. There are two main geographical areas where significant desertification is occurring: (i) the agro-pastoral transitional zone in northwestern China, mainly in Inner Mongolia, but extending into neighboring provinces as well; and (ii) areas surrounding agricultural oases on the internally draining river systems in Xinjiang and Gansu.

China's growth and development is having a significant impact on its land systems. The most significant contributor to desertification over the last 50 years was excessive reclamation of grassland to cropland during the 1960s and 1970s, combined with excessive buildup in livestock numbers. Both were driven by the Government's drive for food self-sufficiency. As a result, land degradation is widespread, especially in Western China. China is now considered one of the most seriously eroded countries in the world, with nearly 40% of the country affected by moderate to severe erosion.

Land degradation brings additional problems such as water and wind erosion, followed by salinization. Over the 20-year period from 1975 to 1996, the total area of land moderately to severely affected by water erosion increased by an estimated 20-30%. The Loess Plateau region is the most susceptible to water erosion, although the government's massive erosion control campaign in the last decade on the Loess Plateau is reducing erosion rates. Apart from the Loess Plateau, most erosion is taking place on marginal cultivated land and "barren land". Water erosion also has significant off-site effects, including the reducing the hydraulic capacity of river systems.

Salinization is mainly a problem associated with poorly designed and/or managed irrigation development in arid and semiarid zones. Salinization is also a natural phenomenon; there are vast areas of natural salt pan in western China. The area of salinized land is estimated at 100 million ha, including about 8 million hectares in areas of cultivated land. Most of the salinized land is located in three geographical regions: the North (30% of the total), the Loess Plateau (26%), and the Northeast (16 %).

Impact of Grassland Degradation. Grassland degradation not only results in a loss of productive capacity to produce forage for wildlife and domestic animals, but also reduces other grassland benefits, including (i) biodiversity values, which have declined in terms of the number, variety, and range of wild animals on the grasslands of China; (ii) watershed protection; and (iii) air quality in eastern China. The total area of degraded grassland increased by about 95 percent between 1989 and 1998, from about 65 million hectares to 130 million ha, with a notable acceleration in the middle-to-late 1990s.

Identified Causes for Land Degradation in China. As part of the preparation for the PRC/GEF Operational Program 12 on Land Degradation, the Government of China identified the following root causes of land degradation.

- Inadequate Concepts and Methodologies for Ecological and Environmental Development. Lacking adequate scientific knowledge about environment, social and economic development, people have been only concerned about exploiting natural resources in pursuit of rapid economic development in the short term, but neglecting to conserve the ecological environment management in the long term. Furthermore, high population density has resulted in unsustainable human activities, such as overgrazing, illegal felling of trees, hunting and mining, which have intensified land degradation.
- Lack of a Comprehensive Mechanism for Micro Policy Making. Problems include: (i) lack of comprehensive assessment and consultation system for ecological conservation before policy decisions; (ii) development planners are not concerned with ecological conservation in the process of policy making; (iii) inadequate supervision for ecological conservation in the implementation of policies; (iv) no audit and assessment system for ecological management; (v) lack of participation of farmers and herders who are the main land users; (vi) top-down policy making by the administration, which makes national and local policies, strategies, laws, and regulations that are difficult to carry out at the village and community levels; and (vii) lack of a system to prevent local and departmental protectionism, thus resulting in repetition, waste of resources, and environmental damage.
- Extensive Economic Models. Extensive economic development is one of the direct causes of ecological damage. On one hand, low output with high inputs has expanded the consumption of resources thus placing pressure on the ecological carrying capacity; on the other hand, techniques and management at lower levels also have intensified the destruction of the environment. Irrigation and grazing using large amounts of water without sustainable management have resulted in waste of water resources, land degradation, unbalanced ecosystem development, and the loss of biodiversity.

- Inadequate Supervision Systems for Ecological Protection. At the present, China has no strong and efficient supervision system for ecological protection and macro-policy management. Responsibilities for relevant departments have not been made sufficiently clear. Responsibilities of departments related to administration and management have not been separated. Regional protectionism for local natural resources utilization and river management has been powerful. Based on the present administrative systems in China, natural resources have been managed by too many different departments, according to specific environmental elements, which results in policy making, implementation, and coordination related to natural resources management, conservation and desertification control becoming the mandate of different departments. So policies related to the respective departments are not able to complement each other and there are gaps and even contradictions. Generally, uncoordinated environmental management by departmental divisions has destroyed the environment to a certain degree.

- Lack of Complete Regulatory System. The laws and regulations related to environmental management have not been built up systematically, especially regulations for managing the different kinds of natural resources in a holistic manner. At present, those regulations have only been related to special natural elements without consideration of the organic integrity of ecosystems, thus resulting in conserving one kind of resource but destroying others at the same time. Regulations for wetland conservation, desertification control, and biological safety are not able to get appropriate support. The laws and regulations are not enforced and there is insufficient authority assigned to enforcement agencies. The phenomenon of not (or at least not seriously) executing laws and regulations is common. Inadequate fines are levied in place of sentencing. Implementation measures at lower levels by unskilled executive personnel have impacted on the efficiency of law enforcement to an extent that many illegal activities are not penalized at all.

- Present Policies for Eco-System Conservation Are Note Able to Meet Real Management Needs. During the periodic formulation of strategies for economic development in China, mature and stable policies for sustainable development have not been built up. Local policies and the land tenure system are unstable. Financial support for investment and scientific techniques on long term ecosystem conservation has not been formed. A policy on the compensation system for ecological conservation has not been set up. Unreasonable pricing of natural resources has resulted in destruction and waste. Coordination between regions along the main rivers or departments in different administrative areas is inefficient. The scientific techniques for national ecological programs are difficult to be carried out without appropriate policy support, thus resulting in programs with low level scientific techniques and poor quality.

The World Bank report: "*China: Air, Land, and Water*" identified the major land management issues in China as: losses of cultivated land, grassland degradation, the declining state of natural forests, and increasing threats to biodiversity resources. The report concluded that although the causes for land degradation were many, the government's badly chosen natural resource management policies have been the major contributing factor.

In summary, land degradation in western China is caused by a combination of climatic variation and human factors such as inappropriate land use policies, inadequate grassland management, and over-harvesting of grassland products. The main human-induced factors are: (i) lack of awareness or sensitivity of government officials to the medium and long-term environmental impact of interventions and government policies; (ii) poor understanding of the functioning and resilience of ecosystems; (iii) contradicting policies among various line agencies which affect the sustainable utilization of the natural resource base; and (iv) deep-rooted resource exploitation patterns by local communities and increasing population pressure, including high levels of poverty, which will place increasing pressure on marginal areas.

Biodiversity Loss and Its Root Causes

Biodiversity Loss in Western China. The main driving forces behind biodiversity loss in western China arise from human activities, and can be distinguished in terms of proximate and underlying causes (Box 7). Biodiversity loss in China arises from a combination of historic and modern factors. There has been a long and gradual historical process of conversion of natural ecosystems for agricultural and other purposes. In the post-revolutionary period, and particularly since the 1970s, the process was accelerated and was augmented by other major developments that have been detrimental to biodiversity conservation, including creation of a large-scale forest industry; implementation of a vast program of water resources development, which has severely impacted aquatic habitat values; and development of a massive and heavily polluting industrial sector.

Box 7. Driving Forces Behind Biodiversity Loss

Proximate causes refer to the direct over-exploitation of species (for example, through hunting, fishing, collection) and the indirect impact of ecosystem degradation or destruction that leads to species loss (for example, through habitat alteration and conversion). Underlying causes refer to the economic, social and cultural factors that lie behind the economic activities that lead to the direct depletion of species, and the destruction and degradation of their habitat. These underlying causes include the scale and growth of human population, culture and ethics, economic incentives and institutions.

Biodiversity Loss on Grasslands. With respect to grassland ecosystems, it has been estimated that about 7 million hectares of natural grassland were converted to crop production, with the majority of this taking place in Inner Mongolia and Xinjiang. Much of the converted grassland subsequently became salinized or otherwise degraded and the remaining pasture in the area was usually overstocked.

The impact of biodiversity loss in grasslands is not limited to the direct costs of species extinction. In rangeland ecosystems in western China, it is the impact of a change in the mix of species that is important. A shift in vegetation composition from palatable plants to unpalatable plants and shrubs reduces the ecological support function of the grassland ecosystem for grazing animals, both domestic and wild. A decrease in the capacity of grasslands for grazing animals has serious implications for current and future generations of people in the pastoral areas. Since so many pastoralists are dependent upon the grasslands for a livelihood, the socio-economic effects of grassland degradation are also serious.

Biodiversity Threats in the Project Areas. For the project areas, *The Biodiversity Review of China*, identified the major threats to biodiversity: logging, fencing and ranching, population pressure, hunting and trapping, fuel collection, and desertification. While logging is no longer a serious threat because of the implementation of a country-wide logging ban, livestock grazing in forested areas and collection of non-timber forest products is still a threat. Unsustainable livestock production practices, which results in overgrazing and leads to habitat degradation and displacement of wildlife is undoubtedly one of the greatest threats to biodiversity throughout western China (see Box 8). The project areas have been one of the least-populated areas of China until recently, but it is now seen as an area for human expansion and population density has climbed steeply. This is associated with the establishment of agricultural areas, borehole irrigation and ranching, all at the expense of natural wildlife and vegetation. Due to the shortage of natural forest cover, the region is poor in fuel resources. The growing human demand has resulted in rapid over-harvesting of sparse shrub cover and a general increase in desertification. Finally, increasing aridity, diminishing vegetation cover and the spread of sandy deserts are a major threat not only to biodiversity but also to the livelihoods of the local people.

Box 8. Impacts of Livestock Grazing on Grassland Biodiversity

Livestock can have a wide range of effects on grassland ecosystems. The impact of livestock grazing on grasslands are varied and complicated. Livestock grazing can directly and indirectly impact plants, wildlife, and soils and have secondary or ecosystem-level effects that can be immediate or take decades to manifest. Some effects are long-lasting and others are only temporary. Some effects apply only in certain areas and not in others. Because several impacts often occur concurrently and that overall effects may be synergistic rather than additive, ecological impacts from livestock grazing are difficult to study or analyze with traditional reductionist methodologies. For example, livestock grazing may simultaneously reduce plant cover, alter plant species composition, increase erosion, and decrease infiltration. Livestock grazing can have secondary effects on wildlife by changing bird and small mammal composition through shrub and herbaceous cover reduction. The collective impact of all these processes may be far more severe than any impact in isolation.

The problem of biodiversity loss is not limited to just the direct cost of species extinction. In grassland ecosystems, it is the impact of a change in the mix of species that is important. For instance, a shift in vegetation composition from palatable plants to unpalatable plants and shrubs reduces the ecological support function of the grassland ecosystem for grazing animals, both wild and domestic.

It is necessary to keep in mind that livestock constitute only one component of grassland ecosystems, and many extrinsic factors, especially weather variations are instrumental in altering ecosystem components. There is little argument that poor grazing practices were, and in some areas still are, a primary cause of redirecting or accelerating plant succession towards less desirable new plant communities. However, the practice of unwise livestock grazing has not been the sole factor contributing to changes in plant composition on rangelands. Grazing along with both natural and anthropogenic factors has had a cumulative influence on plant succession and when interpreting vegetation trends on grasslands, it is often difficult or impossible to separate the effects of heavy livestock grazing from the myriad of interacting environmental parameters. Detecting biodiversity changes in grasslands is also complicated because of the rather subtle nature of many rangeland ecosystems. Among the more subtle impacts of livestock grazing are the effects of reduced habitat size, the lack of endemic species, and the highly developed ecotypic differentiation in grassland, which is not detected in conventional measures of biodiversity.

Loss of Carbon Sequestration Capacity and Its Root Causes

Loss of carbon sequestration capacity is largely a result of declining soil organic matter. Leading causes of decline in soil organic matter include different soil degradative processes (e.g., erosion, compaction, decline in soil structure, mineralization, or oxidation of human substances). These soil degradation processes are set-in-motion by anthropogenic activities that include plowing, biomass burning, drainage of wetlands, improper grazing practices, and mining of soil fertility by low productivity subsistence agricultural practices. Soil organic carbon content is generally high in virgin soils under grass cover or forest vegetation. Conversion of grass and forest land to cropland leads to losses of soil organic carbon. Grassland and forest soils lose from 20 to 50% of the original soil organic carbon within 40 to 50 years after land use change. Severely eroding land erodes at a rate exceeding four times the tolerable soil loss. Eroding at an excessive rate for a long time depletes soil organic carbon content, lowers soil quality, and reduces biomass production. In addition to eroded land, western China has considerable area of salt affected soils and large areas at high risk of salinization.

The effects of grazing management on the ecosystem processes that control carbon cycling and distribution have not been sufficiently evaluated in native grassland ecosystems in China. Differences in the response of ecosystem carbon to grazing are the result of differences in climate, inherent soil properties, landscape position, plant community composition, and grazing management practices.

Project Approach In Addressing Root Causes of Biodiversity Loss and Reduced Carbon Sequestration Capacity

General. The overall capacity of ecosystems in western China to deliver goods and services is declining. Yet the human demand for ecosystem products – from water to food to timber and forage – continues to increase. In recent decades China has achieved remarkable growth in the output of food and fiber for human consumption from natural ecosystems and agro-ecosystems. However, when you examine the full range of goods and services produced by agro-ecosystems, forest ecosystems, grassland ecosystems, and freshwater ecosystems the increased output of food and fiber for humans has resulted in steep declines in water quality, biodiversity and carbon storage.

Adopting An Integrated Ecosystem Approach. To cope with the serious environmental degradation taking place in western China nowadays and the inevitable increases in consumption that will come in the future, an integrated ecosystem approach needs to be adopted. Biodiversity conservation, ecological sustainability, and economic sustainability are inexorably linked and sustaining ecosystem function and retaining ecosystem resilience requires new methods to maintain the productive potential of rangeland ecosystems. The principles of an ecosystem approach, described in Box 9, are gaining recognition among resource managers worldwide and the concept has been growing in both theory and application. For the pastoral areas of Western China, Table 2 provides examples of the differences between current approaches to range and livestock development and an integrated ecosystem approach to development of pastoral areas.

The World Resources Institute Report (2002), in its global analyses of ecosystems made the following four recommendations for guiding adoption of an ecosystem approach: (i) tackle the science and information gap; (ii) recognize and measure the value of ecosystem services; (iii) engage in a public dialogue on goals, policies, and tradeoffs; and (iv) involve all stakeholders in ecosystem management.

Box 9. What is an Ecosystem Approach?

• *An ecosystem approach is an integrated approach.* Currently, we tend to manage ecosystems for one dominant good or service, such as timber or forage for livestock without fully realizing the tradeoffs we are making. In doing so, we may be sacrificing goods or services more valuable than those we receive – often those goods and services that are not yet valued in the marketplace such and biodiversity and flood control. An ecosystem approach considers the entire range of possible goods and services and attempts to optimize the mix of benefits for a given ecosystem. Its purpose is to make tradeoffs efficient, transparent, and sustainable.

• *An ecosystem approach reorients the boundaries that traditionally have defined our management of ecosystems.* It emphasizes a systematic approach, recognizing that ecosystems function as whole entities and need to be managed as such, not in pieces. Thus it looks beyond traditional jurisdictional boundaries, since ecosystems often cross state and national lines.

• *An ecosystem approach takes the long view.* It respects ecosystem processes at the micro level, but sees them in the larger frame of landscapes and decades, working across a variety of scales and time dimensions.

• *An ecosystem approach includes people.* It integrates social and economic information with environmental information about the ecosystem. It thus explicitly links human needs to the biological capacity of ecosystems to fulfill those needs. Although it is attentive to ecosystem processes and biological thresholds, it acknowledges an appropriate place for human modification of ecosystems.

• *An ecosystem approach maintains the productive potential of ecosystems.* An ecosystem approach is not focused on production alone. It views production of goods and services as the natural product of a healthy ecosystem, not as an end it itself. Within this approach, management is not successful unless it preserves or increases the capacity of an ecosystem to produce the desired benefits in the future.

Source: World Resources Institute (2002)

Table 2. Current Grassland and Livestock Management in China versus an Integrated Ecosystem Approach

Topic Area	Grassland Management and Current Livestock Production	Grassland Management and an Integrated Ecosystem Approach
Objectives	• Maximizes livestock production • Aims to increase livestock offtake • Maximizes net present value	• Maintains grassland ecosystems as an interconnected whole, while allowing for sustainable grassland *and* livestock production • Aims to sustain grassland productivity over time while simultaneously considering tradeoffs with other grassland goods and services • Maintains future options
Scale	• Works within political, administrative or ownership boundaries	• Works at the ecosystem and landscape level
Role of Science	• Views grassland management as an applied science focused on grassland resources	• Views grassland management holistically, combining science and social factors
Role of Management	• Focuses on outputs (goods and services demanded by people) such as forage, livestock products, and timber. • Strives for management that fits industrialization of the animal husbandry sector • Focuses on preventing land degradation • Emphasizes intensification of agriculture through more efficient use of land, labor and capital • Strives to avoid food insecurity and famine • Values economic efficiency	• Focuses on inputs and processes, such as soil, biological diversity, and ecological processes since these give rise to goods and services • Strives for management that mimics natural grassland processes and productivity • Focuses on protecting and conserving grassland ecosystem goods and services • Emphasizes maintaining or increasing the capacity of grasslands to provide goods and services • Strives to preserve the entire array of grassland ecosystem goods and services • Values cost-effectiveness and social acceptability

Source: Adapted from White, et al. 2002. *An Ecosystem Approach to Drylands*

Managing Eco-Systems in China. Without strong scientific knowledge, assessing grassland ecosystems' productive capacity is difficult. Better scientific understanding of grassland ecosystems' carrying capacity and thresholds for change will also benefit holistic and sustainable management efforts. In addition to a better scientific base, understanding of grassland ecology, improved indicators, consistent monitoring, and reporting on ecosystem condition and performance are needed. For the pastoral areas of western China, an essential element of an ecosystem approach is recognizing and measuring the value of grassland ecosystem services, so that the government and communities can factor these values into their production and consumption choices. For example, heavily subsidized water prices, especially for irrigated agriculture, has promoted the inefficient use of water. Various policies and public-investment strategies have distorted the price of ecosystem inputs and outputs to the detriment of the environment.

With an ecosystem approach, knowledge of ecosystem processes and conditions serves as a foundation for public dialogue on goals, policies and trade-offs. All those who have a stake in the health of an ecosystem need to be brought together and participate in the development process. When all interest groups are part of the solution, the results are usually more sustainable than those achieved without stakeholder participation. Local governance systems that encourage community decision making can also create incentives for conservation and improved natural resource management at the local level.

Challenges in Tackling Biodiversity Loss. Tackling biodiversity loss in the pastoral areas of western China presents numerous challenges, including: (i) the need to improve information on the extent and state of the grasslands, and how they are changing over time; (ii) the need for ecologists to refine models of grassland ecology and to work with economists, planners, managers, and local herders to design appropriate management systems for livestock production in these complex, ecosystems. Economists and

development planners need to take into account the wide range of productive uses of pastoralists' varied livestock species, and the production objectives of the herders, when determining appropriate management regimes; and (iii) the need to examine appropriate responses to the changing grassland tenure regimes. Improving the efficiency and sustainability of the prevailing system of land tenure, based on traditional groups, may be more effective in managing the complex web of needs that the existing system had evolved to cope with problems such as uncertainty and risk aversion, flexible livestock herds and grazing patters, and multiple uses of livestock. There is also the need to appraise fully the effects of policy interventions on land use decisions.

Biodiversity and Livestock Grazing. To address biodiversity conservation issues as they relate to livestock grazing in grasslands, more information is needed on: (i) how livestock grazing can be managed to have the fewest impacts on biodiversity and ecosystem integrity; (ii) what elements of biodiversity are most affected by livestock; (iii) under what conditions (e.g., of rainfall or livestock stocking levels) grazing effects will be magnified or reduced; (iv) what management actions can ameliorate livestock grazing problems; (v) information on the growth requirements and life histories of principal forage plants and how these plants respond to environmental pressures; (vi) the interactive effects of range management practices on plant communities; (vii) what the grazing tolerance, water relations, morphology, seed germination, and other factors are of key forage plants; (viii) the critical thresholds for plant communities and understanding succession, stability and resilience; and (xi) time frames for grassland resilience to changes from grazing pressure.

Where to Start? Tackling biodiversity loss has to be addressed on many levels, but as a recent World Bank assessment of land degradation in China noted, all efforts will be wasted if there is inadequate *in situ* protection (World Bank 2001). Interdisciplinary collaboration on research and management of grasslands in the pastoral areas of western China will be necessary in order to extend beyond the current frontiers of ecology, economics and other disciplines to deal with the fundamentally important phenomenon of biodiversity loss. Traditional ecological knowledge, or indigenous knowledge, of grassland environments held by the local herders in western China will provide many clues to incentives that influence local people's behavior and could assist in the design of new incentive systems in situations where traditional resource management systems break down or are superseded (Box 10).

Box 10. Herders' Indigenous Knowledge Systems

Over hundreds of years, herders in the pastoral areas of Western China acquired intricate ecological knowledge about the grassland ecosystems in which they live and upon which their livestock production economies depend. Herders' husbandry of land, water, plant, and livestock resources and their strategies are highly skilled, complex and organized, reflecting generations of acute observation, experimentation, and adaptation to a harsh environment. Local climatic patterns and key grazing areas were recognized, allowing herders to select favorable winter ranges that provided protection from storms and sufficient forage to bring animals through stressful times. Forage plants were identified that had special nutritive value. Other plant species were known for their medicinal properties or as plants to be avoided since they were poisonous. A wide diversity of livestock and grazing management techniques were employed which enabled herders to maintain the natural balance of the land upon which they were dependent. For example, herders usually raise a mix of livestock species; each species has its own specific characteristics and adaptations to the environment. This multi-species grazing system maximizes the use of rangeland vegetation. Maintaining mixed species herds is also a risk management strategy employed by herders to minimize loss from disease or harsh winters.

The organization of traditional nomadic pastoralism in much of Western China, which emphasized multi-species herds, complex herd structures, regular movements of livestock, and linkages with agricultural communities developed as a rational response to the unpredictability of the rangeland ecosystem. Complex forms of social organization within nomadic pastoral societies also developed that aided allocation of grassland resources and, through trade networks with other societies, secured goods not available within the pastoral systems. Pastoralism evolved through long-term adaptation and persistence in a harsh environment and the grazing and livestock management systems that developed were rational responses by herders to the resources and risks of an inhospitable environment. Nomads mitigated environmental risks through strategies that enhanced diversity, flexibility, linkages to support networks, and self-sufficiency. Diversity is crucial to pastoral survival. Nomads keep a diverse mix of livestock in terms of species and class; they use a diverse mosaic of grazing sites, exploiting seasonal and annual variability in forage resources; and they maintain a diverse mix of goals for livestock production. The organizational flexibility of traditional nomadic pastoralism, which emphasized mobility of the multi-species herds, was a fundamental reason for nomads' success on the steppes.

Greater awareness of the need to understand existing pastoral systems will help ensure that the goals and needs of pastoralists are incorporated into new programs and that local herders become active participants in the development process.

Addressing Reduced Carbon Sequestration Capacity

Basic Strategies for Carbon Sequestration. The basic strategies of soil carbon sequestration are to decrease losses of carbon from the soil and increase net primary productivity of the soil. Reducing soil carbon losses can be achieved in many ways: (a) through restoration of degraded soils; (b) adoption of revised agricultural practices; (c) desertification control (through increases in biomass produced and by means of soil inorganic compounds returned to the soil through formation of secondary carbonates); (d) erosion management; (e) strategies of fire management as fire can increase runoff and soil erosion and also emits gases into the air; and (f) rehabilitation of degraded grasslands. The objective is to improve vegetative cover and enhance net primary productivity through reseeding with appropriate species, or grazing management, and through managing riparian zones.

Carbon Sequestration Through Land Management. While land use and land management changes are widely recognized as key drives of global carbon dynamics, the role of grassland management has only recently received attention as a substantial potential carbon sink. Improved grazing management and sowing improved grass and legume species can lead to considerable carbon sequestration in grasslands. In intensively managed pastures, there are high rates of carbon sequestration (0.1-3.0 MgC ha-1 yr-1). Even extensively managed rangelands have the potential to sequester carbon in soils with improved grazing management at rates of 0.05-0.15 MgC ha-1 yr-1.

Altering management practices on marginal lands can increase carbon sequestration. Factors affecting carbon retention in soils include: increasing the cycle time of carbon in plant materials and soil organic matter by reducing tillage; taking full advantage of the growing season to produce more plant and root material by including perennial forages in the crop rotation; increasing the use of fertilizer to enhance plant and root production; optimal forage varieties selected for yield and root mass production affects carbon retention. Planting of trees on land in forage can enhance carbon sequestration efforts. In addition to improved crop yields and erosion control, 50% of the biomass of trees is carbon. In addition to the value of carbon sequestered, converting marginal lands to permanent cover provides other tangible benefits including: reduced soil degradation; improved water quality in surface and aquifer waters; enhanced wildlife habitat; reduced summer fallow acreage; and reduced fossil fuel use per unit of output.

Carbon Sequestration Through Grazing Management. Grazing management techniques that have been developed to increase forage production for livestock have the potential to increase soil organic matter and carbon sequestration. However, increases in carbon sequestered as soil organic matter have been reported even when grazing management results in decreased production. This can occur where grazing-induced changes in species composition result in lower forage production but greater root-to-shoot ratios and thus increased allocation of carbon below ground.

Well managed grazing can stimulate growth of herbaceous species, increase tillering and rhizome production, and improve nutrient cycling in grassland ecosystems. Livestock defecation and urination also significantly affect nutrient cycling and relocation in grazing systems. All of these factors may contribute to the observed increases in soil carbon storage (Schuman et al. 2002). The grazing process also significantly impacts the rate of turnover/decomposition of the aboveground component of the plant community (litter, standing dead). Soil organic carbon content could also potentially increase if decreased aboveground plant inputs to the soil are offset by manure inputs of if grazing results in lower standing stocks of biomass but increased production and turnover. Finally, because grazing affects photosynthetic rate and carbon allocation patterns differently among grass species, grazing management has a varying effect on the magnitude, distribution and cycling of carbon in different grassland ecosystems.

Estimating Carbon Sequestration. Estimating potential carbon sequestration is more difficult for grasslands than for cultivated crops. Spatial distribution of soil organic carbon in semiarid and arid grasslands tends to be highly correlated with vegetation patterns and plant community dynamics. However, our understanding of how soil carbon is distributed at different spatial scales in semiarid and arid grasslands is limited (Bird et al. 2002). Rangelands include a wide diversity in plant communities, soils and landscapes. Furthermore, ecosystem responses are complex, because management practices may induce shifts in plant communities that may, over time, exert secondary effects on carbon storage. Need for more research directed at understanding the mechanisms of management alternatives on carbon storage in rangeland ecosystems. As better research information becomes available, a more thorough and accurate estimation of carbon sequestration potential of grasslands can be achieved (Schuman et al. 2002).

In semiarid and arid ecosystems, there is heterogeneity of carbon distribution at both patch and landscape scales. Different landscape areas will respond very differently to organic inputs based on vegetation, soil structure and stability, soil organic matter, and the spatial and temporal dynamics of each. Being able to identify areas of the landscape that potentially respond more effectively to such inputs has both ecological and economic benefits (Bird et al. 2002).

To be able to cost-effectively monitor and manage for carbon sequestration in these ecosystems, we need to know (1) the spatial distribution of soil carbon at different spatial scales, and (2) how soil structure interacts with soil organic carbon and its different fractions. We need to understand spatial variability in order to design sampling protocols to accurately quantify soil carbon at the landscape scale with the lowest possible sampling effort possible. Defining or characterizing soil organic carbon-soil structure interactions is key to understanding the complex feedbacks between soil organic carbon, spatial variability in infiltration and soil water-holding capacity, and plant community dynamics (Bird et al. 2002). One of the key research objectives would be to characterize the spatial distribution of aggregate stability, total organic and inorganic carbon, and different carbon fractions in soil of different vegetation communities. Especially from fine scale heterogeneity in grass-dominated systems to coarse scale heterogeneity in shrub-dominated systems. It will also be important to develop methods to assess grassland management and the implications of carbon dynamics and carbon cycling.

Sites proposed for GEF financing

Characteristics	Qilian Shen	Altai Shen	Tien Shen
Provinces/Region	Gansu	Xinjiang	Xinjiang
Project focus (counties)	Sunan, (Aksai and Subei)	Fuyun, Altai City	Hejing, Tekesi, Xinyuan, Gongliu, Bole, Qitai
Size	5,032 km2 useable pastoral area	3,710 km2 useable pastoral area	3,132 km2 useable pastoral area
Population	53,000 people reside in the area; 50% of them pastoralists dependent on the rangelands for their livelihood	151,000 people reside in the area, with about 40% of them pastoralists.	500,000 people reside in the area with about 55% of them pastoralists.
GEF Justification	A critical watershed area for China. Part of the Global 200 Tibetan Steppe Ecoregion. Recognized as sites of national and global significance in the *Biodiversity Review of China*. Mismanagement and inappropriate policies have led to widespread land degradation. Improved rangeland management would reverse land degradation and conserve biodiversity. Improved rangeland management and reseeding of degraded rangeland would increase carbon sequestration.	A globally significant transboundary mountain ecosystem. Included in the Global 200 Altai-Sayan Montane Forests Ecoregion. Listed as a priority area in the *Biodiversity Review of China*. Improved range management would reverse land degradation and conserve biodiversity. Reseeding degraded range would increase carbon sequestration. The Ertix River, with its headwaters in the Altai Shen, flows into Kazakhstan and Russia and eventually reaches the Arctic Ocean is an important international river.	The region is included in the Global 200 Middle Asian Mountain Temperate Forest and Steppe Ecoregion. Listed as a priority area in the *Biodiversity Review of China*. Improved rangeland management would reverse land degradation and conserve biodiversity. Reseeding of degraded rangeland would increase carbon sequestration. The Ili River, which drains the region, flows into Kazakhstan, is an important international river.
Biodiversity	The Qilian Shen contains populations of endangered species such as snow leopard, argali, and wild yak and globally threatened species such as musk deer, blue sheep, red deer, Tibetan gazelle, and Tibetan wild ass. Ecologically very diverse alpine plant communities.	The Altai Shen region contains populations of endangered species such as snow leopard, Asian wild ass, and argali and globally threatened species such as goitered gazelle, ibex, red deer, Eurasian beaver, jerboas, and Cheng's jird, and endemic gerbil. Przewalski's horse has been reintroduced in the region.	The Tian Shen region provides habitat for endangered species such as snow leopard, argali, ibex, goitered gazelle, and Asiatic wildcats. The area also contains an important wetland, Bayin Buluk, which provides habitat for rare waterfowl such as swans.
Main threats	Overgrazing by livestock, NTFP harvesting, gold mining, poaching.		
Key interventions (proposed)	(1) Rangeland Planning: rangeland and biodiversity surveys, preparation of ecological land unit maps, village-based rangeland resource management plan development, provision of equipment, and rangeland-related research. (2) Community-based Integrated Rangeland Management: development of grazing and livestock management systems, reseeding degraded rangelands with native forage species. (3) Native Forage Seed Production: germplasm collection of native grasses, forbs and shrubs and development of seed production. (4) Native Livestock Breed Conservation: selection, improved breeding and management of local breeds of sheep and yak to maintain indigenous livestock germplasm. (5) Training and Capacity Building: in-service training at all levels, building local capacity for training delivery and institutional capacity building of relevant government agencies at county and township level. (6) Management, Monitoring and Evaluation: project management training, monitoring, periodic sampling as well as policy studies.		
Cultural features	Yugu and Kazakh ethnic minorities	Kazakh	Kazakh and Mongol
Existing or proposed programs	Several central and provincial funded programs to conserve and manage the Qilian Shen watershed, focusing mainly on forest protection and reforestation. Gansu Agricultural University has conducted rangeland research in the Qilian Shen for many years. The University of Montana (USA) has been involved in argali conservation work in the western Qilian Shen.	Centrally and provincially funded grassland development and rehabilitation activities and herder settlement programs. FAO has supported forage development. Plans by Forest Bureau to expand the protected area system in the Altai Shen. Japanese project on desertification control. GEF projects being developed for neighboring areas in Mongolia and Russia.	Numerous central and provincial funded programs for grassland development and rehabilitation and herder settlement. FAO project on alfalfa production.

Additional GEF Annex 6: GEF - Incremental Cost Analysis
CHINA: Gansu and Xinjiang Pastoral Development Project

Context

Background. Rangeland (pastoral grassland) ecosystems cover about 40 percent (400 million hectares) of China's total land area. Seventy-five percent of the rangelands are located in the country's arid and semi-arid Western Region, mainly in the provinces and autonomous regions of Tibet, Inner Mongolia, Xinjiang, Qinghai and Gansu. Although China's semi-arid rangelands are not highly productive, they are the major base for the country's animal husbandry activities and home to about 40 million people. Due to the low productivity and degraded condition of much of these rangelands, these 40 million people are amongst the poorest in China. The project targets degraded rangeland ecosystems and their dependent populations in Gansu province and Xinjiang Autonomous Region, which together cover almost one-quarter of China and are experiencing both severe poverty and land degradation.

Project Target Areas. Gansu and Xinjiang are situated at an important biological crossroad between the Palearctic and Oriental Realms, which are rich in biodiversity and contain many endemic grassland species, such as *Helianthemum songaricul*, *Calligonum yingisaricum*, *Amondendron bifolium*, *Tamarix sachuensis*, *Cistanche salsa*, *Astralagus mongolicus*, *Fritillaria walijewii*, *Ferula sinkiangensis*, *Saussurea involvucrata*, and *Haloxylon persium*. Many of these species are endangered in these locations and also globally threatened. Major vegetation types include desert, steppe and alpine-steppe ecosystems in the Altai, Tien Shan and Qilian Mountains. Gansu and Xinjiang also contain two eco-regions that are included in World Wide Fund for Nature (WWF's) Global 200 list of priority areas for conservation of biodiversity: the Tibetan Steppe and the Middle Asian Mountain Temperate Forest and Steppe.

The project's specific target areas are located in important biodiversity corridors in the eastern Tien Shan, Altai and Qilian mountains covering a wide range of grassland ecosystems across a full elevation gradient from cold alpine meadows to low-lying arid and semi-arid rangelands. Together these grassland habitats form a network of landscape systems which support existing transhumant pastoral systems (i.e. summer, spring/fall, and winter pastures). Given their considerable capacity to sequester carbon, they are also a globally-important carbon sink.

Grassland Degradation. Despite their productive and environmental importance, China has experienced a significant loss of natural grasslands over the last 40 years. It is estimated that about 34% of all grasslands in China are moderately to severely degraded, and about 90% are degraded to some degree. Xinjiang and Gansu are experiencing land degradation levels well above the national average. Some 46% and 48% of their grassland areas, respectively, are classified as moderately to severely degraded.

Causes of Grassland Degradation. The causes of grassland degradation are multiple and complex, with over-exploitation of the natural resource base through unsustainable land use practices and poor development policies relating to grassland areas among the key factors. From the 1950s-1970s, about 6.7 million ha of grasslands in China were converted to agricultural land as part -national food self-sufficiency policy in a context of increasing population pressure. In Xinjiang, the total cultivated area increased from 1.28 million ha to 4.67 million ha between 1949-1985 through conversion of grassland, while the total sheep units increased from 20 million to nearly 50 million in the same period. By the early 1980s, the government withdrew its support for grassland conversion and started to promote animal husbandry in the pastoral areas. However, the emphasis was on maximizing production output, with much less attention on the sustainability of the production systems. As grassland degradation due to

overgrazing continued to worsen during the 1980s, the government started to pay increased attention to the ecological functions of grasslands. Rehabilitation of degraded grasslands became an important factor in national environmental programs, but the focus was mainly on "technical fixes." Little attention was paid to the underlying management and institutional problems, which were often the root cause of the grassland degradation. Other unresolved causes that were also largely ignored include:

- Poor animal husbandry practices and inadequate supply of supplemental forage and winter feed, which caused overstocking and overgrazing of natural grasslands, especially in winter and spring-fall pastures by as up to 30 percent since 1960s. Overgrazing also increased rodent populations, which flourish in overgrazed pastures; and
- Unsustainable collection of herbal medicinal plants and collection of shrubs and grass sods for fuel, which severely degraded natural grasslands near population centers. In some counties in Gansu, up to 45 percent of native shrubs have been destroyed this way.

Project Approach. The Government of China is strongly committed to reversing the degradation of its natural grasslands. However, it is facing a major challenge in dealing with the complex short and long-term trade-offs that this involves, such as raising the incomes of people living in pastoral areas while also maintaining the numerous long-term economic and environmental benefits provided by their grassland ecosystems. It also realizes that traditional attempts to address this challenge were based on excessively narrow, sector-by-sector approaches which did not adequately reflected linkages and interactions between natural systems and the various key stakeholders.

In contrast to the technically-focused and sector-based approaches of the past, this project: (a) adopts a holistic, integrated and participatory approach to the management of natural resources and to the process of rural development in pastoral rangeland ecosystems; and (b) recognizes and consciously attempts to minimize the trade-offs between short-term poverty alleviation and longer-term local, national and global environmentally-sustainable development.

Related Development and Environmental Goals and Strategies

Since the early 1980s, China has achieved remarkable agricultural and rural growth, greatly reduced poverty, and addressed many of its environmental problems. The roots of its success were stable economic policies, a high literacy rate, an industriousness labor force and the support of a wealthy Chinese Diaspora. However, these positive features of Chinese society are confronted by an array of challenges to environmentally sustainable development, particularly in the Western Region, where severe poverty and land degradation have created a vicious circle.

This challenge and a broad strategy to address it are articulated in China's Tenth Five-Year Plan 2001-2005 (10FYP). With respect to fragile rural environments, the 10FYP emphasizes: (a) sustainable utilization of water resources; and (b) protecting land, forests and grasslands. Of the 18 key national projects identified in the 10FYP, 14 address the environment and/or natural resource management. The 11th Five-Year Plan, now under preparation, also emphasizes environmentally sustainable development. This issue is the major focus of the recent Western Development Strategy (WDS). Launched in June 1999, the WDS has two main objectives: (i) reduce economic disparities between the western and other regions; and (ii) ensure sustainable natural resource management of the Western Region.

To help implement the WDS, the Chinese Government asked the GEF, led by the Asian Development Bank in collaboration with the other GEF International Agencies, to form a Partnership on Land Degradation in Dryland Ecosystems that would mobilize catalytic GEF assistance and co-financing to help counter land degradation and promote integrated ecosystem management in the Western Region. This project is the first large-scale demonstration project under that Partnership.

GEF Operational Programs and Focal Areas

The project's integrated approach to ecosystem management, and the linkages and synergies it will promote between land degradation, biodiversity conservation, climate change and international waters, makes it fully consistent with the GEF's Integrated Ecosystem Management Operational Program (OP12) and with the GEF's emerging Land Degradation Operational Program. Consistent with OP12, the project will develop and implement a comprehensive, participatory framework for integrated ecosystem management across sectors and administrative boundaries and within the context of sustainable development.

The project also contributes OP4, Mountain Ecosystems, and OP13, Agro-biodiversity. OP13 is especially relevant to the project because the project area includes complex and unique transhumant livestock systems and practices that rely on plant genetic resources of forage legume and grass species that are widely used in temperate agriculture globally. Management of these resources will not only reduce herder poverty in project areas, but also contribute to the objective of the UN Convention on Biological Diversity to conserve agricultural biological diversity, in accordance with GOP guidance, as well as the objectives of the Convention to Combat Desertification.

Baseline Scenario

The Baseline Scenario includes a series of IBRD, bilateral donor and government-financed activities in the pastoral sector through promotion of integrated approaches to livestock and pastoral development. The Baseline project will be implemented in two of the most severely degraded provinces/autonomous regions in of North-west China – Gansu and Xinjiang. Within those two provinces/autonomous regions, it will target semi-arid upland pastoral areas that are experiencing the area's worst poverty and most severe land degradation. Though the project is expected to have positive environmental benefits through promoting sustainable management of grassland resources, the project would primarily address the empowerment of farmer and herder households in project counties to better manage their grassland resource base and improve forage and feed production, in order to increase their income through more efficient and quality focused livestock production. The GEF Alternative would build on the baseline, focusing on the global environmental impacts.

The baseline consists of activities aimed at achieving the sustainable development and poverty reduction objectives. These activities will be financed by a combination of IBRD loans, bilateral donor grants, and local government inputs. The baseline comprises five activities: (1) Grassland Management and Forage Improvement, which includes grassland surveys, strengthening of grassland monitoring, forage improvement, and development of improved grazing systems; (2) Livestock Production Improvement, which includes fine wool and mutton breeding and multiplier stations, sheep fattening, beef cattle breeding, beef cattle fattening, and dairy production; (3) Market Systems Development, which includes support for livestock product marketing and development of herders' associations; (4) Applied Research, Training and Extension, which will finance applied research on grassland and livestock-related issues, training of herders and technicians, technical assistance, and development of extension material; and (5) Project Management and Monitoring, which includes strengthening of management capacity, monitoring and evaluation, and policy studies.

Cost. Under the project it is expected that Government of China expenditures related to grassland management and livestock development to be delivered through the Animal Husbandry Departments in the project sites over the project period will be about US $32.45 million. IBRD baseline co-financing for the project is estimated to US $65.61 million. The total cost of the Baseline Scenario is US $98.06 million.

Benefits. Under the project, the majority of the expenditures will target poverty reduction in poor herder communities. The Baseline Scenario will achieve some modest global environment benefits by increasing the capacity of herders and government technicians for natural resource management in the project areas. However, it will not promote: (a) integrated ecosystem management of degraded pastoral areas that optimizes development and global environment benefits; or (b) targeted biodiversity conservation or carbon sequestration initiatives.

Relevant Grassland Rehabilitation and Development Pilot Projects. The Baseline Scenario encompasses, in addition to the project, other national, provincial and local initiatives in both Gansu and Xinjiang. These initiatives aim at conserving and rehabilitating the grassland resource base. There has been quite a few number of projects launched and planned in the last two to three years across different counties of both Gansu and Xinjiang A complete list of relevant grassland management and protection pilot projects in Gansu and Xinjiang, for the years 2000, 2001, and 2002 can be found in the project files. Increased awareness to the land degradation problem motivated these efforts. The primary objectives of these efforts are to improve soil conditions, establish artificial fodder production bases, propagate original seed, and improve existing grassland through fencing, rodent control and purchase of equipment for grassland monitoring stations. Specific activities included establishing of original seed propagation, rotating grazing, drilling wells, constructing roads, purchasing additional seeds, rehabilitating and constructing livestock shelters.

In the year 2000, more than 160,000 *mu* Chinese area measurement, 1 mu=0.07 ha. 1 ha=15 mu of grassland were fenced for improvement in Xinjiang. Furthermore, more than 190,000 *mu* of artificial fodder production base was established. The total cost was estimated at approximately RMB 114 million. The central government contributed to 58%, and the rest is counterpart funds from local government levels and self raised funds by farmers and herders. In Gansu, 291,500 *mu* of artificial production base were established, 330000 *mu* of grassland were fenced, and 70,000 m2 of livestock shelter were rehabilitated and/or constructed in 2001. The total cost is estimated at RMB 134 million of which 61% was centrally financed, with the residual raised as counterpart.

Included in these initiatives were applied research and training activities. Research projects in Gansu focused on extension of technologies of integrated improvement of grassland crops and livestock feed development. In Xinjiang, research topics included desertification control, ecological environment protection and fodder production, and the reform of the traditional pastoral/ livestock systems. Most of these research projects are conducted at the regional agricultural universities and in grassland stations at county levels. However, the chain between research and extension remained rather weak with very few farmer/herder training activities conducted over the last three years. The GEF Alternative would help fill in this gap.

Global Environmental Objectives

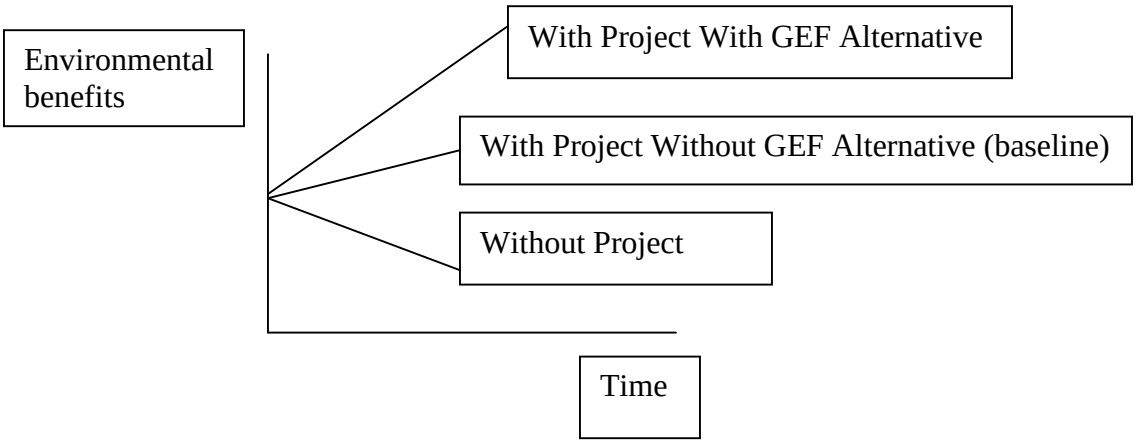
The global environment objectives of the GEF Alternative are to more effectively mitigate land degradation, conserve globally important biodiversity and enhance carbon sequestration through promotion of integrated ecosystem management in the grassland, desert, and forest ecosystems of the Qilian Shan, Tian Shan, and Altai Shan mountain ranges in Western China. The development and implementation of integrated ecosystem management approaches in the proposed project sites will: (a) better conserve their rich upland pastoral biodiversity; (b) maintain ecological and evolutionary processes of unique global importance; (c) reverse the process of land degradation; and (d) enhance carbon sequestration.

The GEF Alternative

Geographic Scope. The GEF Alternative will be implemented within geographically-targeted landscape units and natural grasslands of high biodiversity value and with significant carbon sequestration potential, initially in Qapqal and Fu Yun Counties of Xinjiang Province (eastern Tien Shan and Altai mountains eco-regions) and Sunan County in Gansu (Qilian mountains eco-region). Landscape units, in the context of the project interventions, are geographical landscape systems which cover a wide range of grassland habitats from summer pastures (i.e. cold alpine meadows) to arid and semi-arid winter rangelands along the elevation gradient, the boundaries of which match with the traditional transhumant pastoral systems. It is anticipated that the GEF-supported activities will not be implemented inside existing protected areas, because the project's primary focus is on production landscapes. But since livestock grazing is permitted in some protected areas, grazing management will include protected areas located on pastoral migration routes.

Strategic Approach. The Baseline Scenario will produce some global benefits. However, the participating provincial and county governments wish to focus most of the baseline resources on activities that have short-term poverty benefits. Given the area's natural resource, biodiversity and agro-biodiversity assets, there is thus an opportunity to achieve additional global environment benefits with incremental investment.

With GEF assistance to address the project's global environmental objectives, the Government of China would be able to undertake a more participatory and ecologically-based program of integrated ecosystem management, and specifically promote biodiversity conservation and carbon sequestration, thereby optimizing the project's development and global environment benefits. The GEF Alternative will do this by significantly expanding the project's ecological and social aspects and by developing targeted biodiversity conservation and carbon sequestration initiatives in these production landscapes. The resulting difference in global environment benefits between the Baseline and GEF Alternative scenarios is illustrated by the figure below.



The Baseline Scenario would produce modest global environment benefits by improving livestock production techniques and management of the natural resource base. The rationale for the GEF Alternative is that it will directly achieve more effective conservation of globally-significant indigenous grassland plants and animals, sequester more carbon, and it will promote integrated, participatory and more sustainable ecosystem management, thus producing more long-term sustainable development and land degradation benefits than the Baseline Scenario.

The GEF Alternative will build on the Baseline Scenario by supporting participatory natural resource management initiatives, conserving globally significant plant ecosystems and endangered ungulate biodiversity, increasing stakeholder awareness of the benefits of integrated, resource management approaches, and building capacity of county and township staff to promote and engage in this approach. The GEF Alternative will also support research, training and extension on the most cost-effective grassland ecosystem management techniques and their global environment benefits and the dissemination of lessons learned.

Technical Composition. The total incremental cost of the GEF Alternative amounts to US $10.5 million (see Incremental Cost Matrix below) with investments in the:

1. *Grassland Management and Forage Improvement Component*. This component will help herder communities conserve biodiversity through the protection of mountain ecosystems that support indigenous species of global significance. Incremental activities will include the establishment of biologically-rich exclusion zones, adjusted timing of commercial grazing to provide better grazing for indigenous wild ungulates, and balanced grassland management for multiple uses. Better conserving the grassland vegetation will increase its carbon sequestration capacity. The GEF Alternative will achieve these changes by piloting the development and implementation of participatory resource management plans by village communities for a number of biologically-rich valleys and ecosystems in Gansu and Xinjiang Provinces. The GEF Alternative activities will promote learning by doing and adaptation in the light of experience gained. The proposed approach is based on and will adapt the experience from other GEF-financed projects in similar ecosystems (e.g., Turkey, Armenia, and Mongolia) to Chinese circumstances. To realize the global environment benefits from the Grassland Management Component, will involve an incremental cost of US $6.42 million, as detailed in the Incremental Cost Matrix below.

2. *Livestock Production Improvement Component*. In addition to the Baseline Scenario livestock-related activities of improving animal husbandry, animal health, breeding, and management, the GEF Alternative will preserve local livestock breeds – particularly those of the hardy mountain sheep whose genetic material is important to all Central Asian grassland herding economies that use natural grassland ecosystems. The estimated incremental cost of this activity is US $640,000.

3. *Market System Development Component* has no additional funding under the GEF Alternative. This is because most of the potential benefits resulting from this component are domestic in nature and do not pertain directly to the project's global environmental objectives.

4. *Applied Research, Training and Extension* Component. Under this component, the GEF Alternative will support targeted and applied research on grassland and forage improvement using endemic rather than exotic species, and on the benefits, mechanisms and techniques of integrated natural resource management. This would include applied research on grassland ecology, herbivore ecology, grassland rehabilitation, forest grazing by commercial flocks, watershed management, and socioeconomic research on pastoral production practices. Demonstration pilots in different areas such as forest protection, wildlife protection and habitat improvement, indigenous forage plant seed collection and multiplication, will be supported and disseminated in this component. Under the GEF Alternative, herders and provincial/county bureau staff will be trained in the core competencies required for integrated ecosystem management and achieving effective tradeoffs between maximizing livestock output and conserving the environment. Training for trainers is essential in order to convey the principles and guidelines of the integrated natural resource management approach to the grassroots, where the main concern is subsistence. Extension is key in order to put the benefits of research in practice. Part of the GEF funds will be allocated for ecological surveys, efforts to increase herders' environmental awareness, and environmental workshops. The incremental cost of this component is estimated at US $2.44 million.

5. *Project Management, Monitoring and Evaluation Component*. Under this component, the GEF Alternative will finance design and implementation of a system to assess and monitor the project's global environmental impacts. Key stakeholders will actively participate in designing and implementing this plan to promote understanding, ownership, sustainable implementation of the new techniques and enforceability of management decisions. The plan will focus on globally-significant plant and animal species and on the ecosystems that support them, as well as the project's carbon sequestration impact. Results and lessons will be carefully documented and disseminated within China and to ecologically similar areas around the world, such as the upland pastures of Kazakhstan, Mongolia and Russia, to encourage replication. The incremental cost of this component is estimated to be US $1 million.

Global Environmental Benefits of the GEF Alternative. The GEF Alternative would result in positive changes in ecosystem and natural resource management use patterns and conditions and thereby generate global benefits, particularly in the areas of carbon sequestration and biodiversity conservation. Through improved management of natural grasslands, the GEF Alternative would improve the likelihood of survival for threatened or endangered species, protect endemic species habitat, and contribute to the carbon sequestration through mitigating further degradation of vegetation cover and reducing wind and water erosion of organically rich topsoil - a main sink for sequestration of atmospheric carbon. Support to decision-makers in policy formulation should assist in the development and implementation of long-term strategies for global environment-friendly integrated ecosystem management at the landscape level. More specifically, the project's global benefits would include:

- *Biodiversity Conservation*. The Tien Shan mountains in Xinjiang contain many wild relatives of valuable bulb plants, such as wild garlic (*Allium sp*.), tulips and daffodils, which are found in the mountain meadow communities, and wild fruit forests of apples, pears, plums, cherries, apricot, and walnut. In addition, a number of flowering plants, including species of the *genera Gentiana*, *Geranium*, *Aster*, *Potentilla*, *Delphinium*, *Saussurea*, and *Berberis* are present in the mountains. Endangered plants include wild almond (*Amygdalus spinosis sima*), pistachio (*Pistacia vera*), *Iris ficaria*, *Iris hoogiana*, *Tulipa albertii*, and the endemic *Eremurus robustus*. Further, the mountain forest and steppe-meadow, and temperate desert ecosystems provide habitat and migration corridors to several endangered mammals such as Mongolian gazelle; two species of wild mountain sheep (*Ovis ammon ammon* and *Ovis orientalis*); elk (*Cervus elephus*); Siberian marmot (Marmota sibiriea); markhor (Capra falconeri); roe deer (*Capreolus capreolus pycargus*); wolf (*Canis lupus*); and snow leopard (*Uncia uncia*) (See http://www.worldwildlife.org/global200/). The project would increase the likelihood of survival of these threatened and endangered species, and protect endemic species' habitats in the project areas through improvement of grassland quality and vegetative cover and through reduced stocking levels, which reduces conflicts and competition with native wildlife.

- *Carbon Sequestration*. Grasslands are capable of fixing significant amounts of carbon through the soil and vegetation cover. Changes in grassland vegetation, due to overgrazing, conversion to crop land, desertification, fire, fragmentation and introduction of non-native species (link to biodiversity), affect their carbon storage capacity, and may in some cases even lead to contribution of net source of CO2 (UNEP, 1997). For example, it has been found that grasslands may lose 20-50 percent of their soil organic carbon content through cultivation, soil erosion, and land degradation (Bruce, J., M. Frome, E. Haites, H. Janzen, R. Lal, and K. Paustian. Carbon sequestration in soils. Paper presented at Carbon Sequestration in Soils Workshop, Calgary, Alberta, Canada, May 21-22, 1998). Grasslands in China represent only 6-8% of total world grasslands, but they store some 9-16% of the total carbon in the world's grasslands. It has been estimated that the total carbon storage of Chinese grasslands is some 44 PgC, out of which 41 PgC (93%) is stored in soils. The montane grasslands are especially important as carbon sinks. More than half of the carbon is stored in montane grasslands eco-systems typical to the project areas, such as alpine meadows (25.5%); alpine steppe

(14.5%); and temperate steppe (11%) (Jian Ni. Carbon storage in grasslands of China: http://www.bgc-jena.mpg.de/bgc_prentice/publi/inpress/ni/text.pdf.). Since most grasses are annual crops, they significantly contribute to carbon sequestration through transformation of decomposed grasses and their root system to organic matter in soils. Increased grass cover due to better grassland management practices should reduce soil erosion and substantially increase the carbon sequestration capacity of the project area grasslands. To promote increased carbon storage, the project would introduce improved grassland management practices that will increase the amount of carbon entering the soil as plant residues, suppress the rate of soil carbon decomposition, and reduce soil loss due to wind and water erosion of otherwise bare lands. Management factors supported by the project that can impact carbon sequestration levels on intensively managed grasslands would include improved grazing management, and implementation of demonstration activities such as re-seeding with native seed mixes, and use of appropriate inputs (e.g. organic and inorganic fertilizers, if necessary). In addition the project would support better monitoring and regulation of grazing intensity and frequency - the main management variables that affect soil carbon levels. It has been estimated that adoption of better management practices on the pastures alone would elicit a carbon gain of 0.2 Mg/ha/year, resulting in about 11 Tg (t) C per year over two decades, for a total of about 220 Tg (t) (C Bruce, J., M. Frome, E. Haites, H. Janzen, R. Lal, and K. Paustian, 1998).

- *Watershed Protection*. Grassland ecosystems in Xinjiang and Gansu are located in upper reaches of Yellow and Black Rivers, as well as in the catchments of international rivers, such as Ertix River and Ili River that flow into Kazakhstan and Russia. It is anticipated that improved grassland management activities would contribute towards improved water quality and quantity in downstream areas within and beyond the immediate project areas, thereby contributing to the health of international waters. Grasslands are capable of storing up to 80 to 90 percent of the rainfall in the soil, compared with 55 to 70 percent in forest lands (Chomitz, K., E. Brenes, and L. Constantino. 1998). Rehabilitation of grassland vegetation cover through improved management activities thus would improve soil structure and soil water retention capacity, especially in the deep drainage level, controlling potential floods and improving water storage for downstream areas. Other downstream benefits from watershed protection activities include reduced soil erosion and sediment inflow to surface waters from soil water erosion, as well as benefits to aquatic biodiversity.

In summary, the global environment benefits generated by the GEF Alternative would be: (a) improved biodiversity conservation; (b) increased carbon sequestration; and (c) improved watershed protection and reduced soil erosion. Most of these global environment benefits are long term (i.e. benefits take time to materialize but accrue for many years after the project has terminated), which makes them less attractive to local populations, who struggle to make a living on a day-to-day basis. The GEF Alternative would help to bridge the gap between the long term benefits and short term economic needs of local population by giving them incentives to change their currently destructive resource utilization practices. It will also demonstrate to the local population the long-term economic and environmental benefits of adopting of more sustainable grassland management approaches.

Incremental Cost Matrix

Component	Cost Category	US $ Mill.	Domestic Benefits	Global Benefits
1.Grassland Management and Forage Improvement	Baseline	10.03	-More efficient use of grasslands. -Increased supplies of quality feed and forage. -Improved monitoring of grassland conditions and advanced technologies for forage production and grassland management.	- Degradation of grassland ecosystems arrested. - Increased carbon sequestration due to reduced degradation. - Some improvement in water quality and quantity contributing to health of international waters.
	GEF Alternative	16.45	Same as above, plus: - Local communities able to design and implement village-based grassland management plans that optimize long-term development and local environmental benefits.	- Effective conservation of indigenous species. -Increased carbon sequestration. - Reduction in sandstorms. -water quality/quantity improvement contributing to health of int. waters.
	Increment	6.42		
2. Livestock Production Improvement	Baseline	66.02	-Improved animal productivity -Improved livestock breeding and management	Land degradation arrested in project areas.
	GEF Alternative	66.66	Same as above, plus: - Native livestock breeds are not lost.	- Conservation of native livestock breeds, including hardy mountain sheep. - Promotion of indigenous forage seed for grassland rehabilitation
	Increment	0.64		
3. Market System Development	Baseline	11.11	-Higher herders' incomes (lower costs, higher prices and better quality animals). -Better risk management (market fluctuations, seasonal factors). - Livestock products more competitive in international markets.	- Improved quality of local wool and meat sheep breeds of global significance. - Increasing returns per head reduce incentives for increasing animal numbers and hence land degradation.
	GEF Alt.	11.11	Same as above	Same as above
	Increment	0		
4.Applied Research Training and Extension	Baseline	6.44	- Herders empowered to achieve sustainable livestock production. -Strengthened public management institutions	- Limited research in grassland ecology and ecosystem management
	GEF Alternative	8.88	Training in grazing dynamics.	-Applied research in grassland ecosystem management. -Herders practice integrated ecosystem management. - Production, and global env. benefits optimized. - Increased herder and staff environmental awareness. - Better conservation of wildlife habitats.
	Increment	2.44		
5.Project Management, Monitoring, Evaluation and Dissemination	Baseline	4.46	- More community participation in grassland management. - More grassland management capacity in provincial, city, county and township governments. - Monitoring and evaluation system includes :(i) project progress; (ii) environment; (iii) social issues; and (iv) impacts.	- Monitoring of local environment impacts.
	GEF Alternative	5.46	Same as above, plus capacity built in community-based integrated ecosystem management and participatory natural resources management.	-Monitoring&evaluation plan for biodiversity/carbon sequestration/land degradation impacts designed and implemented. - Lessons shared within China/globally.
	Increment	1.00		
Totals	Baseline	98.06		
	GEF Alternative	108.56		
	Increment	10.50		

Technical Review of World Bank Gansu and Xinjiang Pastoral Development Project

By Hu, Tao
GEF-STAP Reviewer and
Policy Research Center of State Environmental Protection Administration (SEPA), China

1 Review of the draft Project Appraisal Document

General speaking, it's a great project proposal that reveals the realities of current rangeland ecosystem management problems in China and designs appropriate activities with innovativeness. It's the first time in China to have such a project on integrated ecosystem management related to climate change, biodiversity, rural development, poverty alleviation, rural environmental protection as well as other wide social and environmental significances. The project, having both global benefits and regional benefits, is a well-designed win-win project.

1.1 How the proposed GEF activities blend with the other project activities

Beside the regional interests, the project has considered the global environmental benefits. Generally speaking it is a well-designed win-win project both for global and regional benefits. The proposed GEF activities match to other project activities well.

It would be better if one more aspect could be considered to have added activities – that is air quality. Every spring in Xinjiang and Gansu normally the air qualities are very bad. Their APIs could reach even 500. The reason of so bad air quality in spring is just because of sand storm from degraded rangeland ecosystems in these regions. This project is to mainly target on land degradation, associated with climate change, biodiversity etc. However, the global benefits of sand and dust storm control in these areas are also very obvious. The tiny dusts of sand storm could affect not only China but also neighboring countries and even North America as well.

1.2 The environmental sustainability of the project

The sustainability of the project depends on the conditions. Only if all of the necessary conditions are met, the project could be sustained. Generally speaking, the biggest necessary condition is the project could meet the demand of project applicants. It's no doubts that top leaders of China have understood the importance of natural resources and environmental protection in western part of China, which are river and wind upstream for eastern part of China. Chinese Central Government's decision of ensuring natural resources management stated in Western Development Strategy has provided the most important substantial necessary condition to sustain the project. Fortunately there are several important domestic programs at national level, which are helpful to sustain the project:

- Western China Development Strategy and detailed projects, plans etc
- Ecological Agriculture County by MOA
- Micro-financing by Poverty alleviation by PA Office of State Council and MOA
- Ecological Demonstration Area by SEPA
- Sustainable Development strategy by SDPC/MOST
- 10th five year plan by SDPC
- Green accounting by State Statistics Bureau

The other important necessary conditions to sustain the project are legislation, institutional arrangement, policy reforming etc, which are recognized by the project proposal. Among the necessary conditions, personally I think the institutional arrangement for an integrated government management mechanism corresponding to integrated ecosystem management is the most important.

So far, as I can image, there is only one particular risk to threaten the sustainability of the project – political stability of Western China. Muslin fundamentalists make terrors in these areas sometime.

1.3 Innovativeness and the replicability of the project

The greatest innovativeness of the project is Integrating. It's the first time in Western China to have such an integrated project combining carbon sequestration, biodiversity protection, local environmental benefits, poverty alleviation and local economy development as well as other social aspects. There are several existing programs in China related to land degradation and combating desertification, but difficult to let them integrate together. This project could help the relevant departments of provinces, central government ministries as well as international bodies to work together for promoting the land degradation program further.

If the designed project is successful, the project could be replicable in places with technical, economic and social similarities of the project. So, the project could be possibly expanded to other provinces of China, especially in the poor remote and mountain areas where they need more integrated ecosystem management as well. For example, an expanded project in the future could be Integrated Wetland Ecosystem Management in Southwestern China.

The project also could be followed by other developing countries that have similar conditions with China, such as India, African countries, especially Central Asian countries nearby Western China.

1.4 The implementability of the proposed GEF activities

Generally speaking, the activities are well designed. I won't doubt its implementability. On the special activities, I'd like to stress two points:

- On component 1, the key of grassland ecosystem management is, personally I think, the proper institutional design and arrangements. No proper institutional arrangements, no success.

- On component 3, China's accession to WTO will change China's economy structure and agriculture structure. China is going to import more wheat, beans and other land-intensive products and to export more vegetables, fruits and other labor-intensive products by taking its comparative advantage and avoiding comparative disadvantage. According to my study, this trend will dramatically help China at macro economy level to easily implement the combating desertification programs. Otherwise, China has to heavily use the land for producing foods to feed the people, in order to implement its traditional food-self sufficiency policy. Therefore China might enlarge imported livestock products from Kazakhstan, Uzbekistan, and Mongolia etc. For China, it directly imports livestock products and indirectly imports environmental quality by releasing environmental pressures in rangelands.

1.5 The level of stakeholders participation/consultation in the project preparation

For different stakeholders, they play different roles and have their own niches in the project system. There are many stakeholders involved in the project at different degrees and scales:

- WB: load lender for the project in the future
- GEF: grant provider of project for global environmental benefits
- MOA: playing a key role as parts of integrated rangeland ecosystem management at central government level
- Gansu province and Xinjiang Regions governments: the loan borrowers and project implementers
- Local County/municipality governments: playing key roles of organizing the herders and farmers to implement the project
- Headers/farmers: playing critical roles of the project implementation
- NGOs: should play a role but very weak in China
- Researchers: provide technical services and policy recommendations
- And others

China traditionally is a fragment Authoritarianism, according to political science. Normally the institutional reform is top-down model but bottom up model. It seems one critical role of making institutional arrangements should be played either by State Could or by one of the existing powerful stakeholders. Otherwise, integrated ecosystem management couldn't be integrated together. MOA seems not easy to play such a role. At least, the other ministries should be involved into the project. They are:

- MOF: playing a key role as national focal point as well as coordinator for the project
- SDPC: playing a key a role of developing national economy
- MOST, SETC, MOFTEC, SEPA: all related to the sustainability of project

The most difficult stakeholders for the project implementation, I think, are herders and farmers who are money-driven. They are the real implementers. To keep their interests is the key to carry out the project. So, more appropriate market-based mechanisms need to be put in place to facilitate participation during implementation.

1.6 The level of technical assistance, training and capacity building

The project would be definitely helpful for capacity building of the 2 provinces/autonomous regions in the following aspects beside the contents mentioned in the project report:

- To increase the capacities of integrating different sectors and co-coordinating different level governments
- To learn how to manage the project at the local level. The local projects normally have very low efficiency and corruption problems.
- To learn how to value the environment and integrate environment value into economy.
- To strengthen the natural and environmental management in rural area. So far, environmental management in rural area is very weak with few staff, little budget, and less equipped.

Personally I think the capacity building contribution is even more important than the financing support from WB/GEF. China could find money to support projects but don't have enough capabilities to manage the project. Institutional coordination and support are always a weakness in China. As mentioned earlier, China traditionally is a fragment Authoritarianism. At least, the following ministries are not much involved into the project and not easy to be coordinated in this project: MOF, SDPC, MOST, SETC, MOFTEC, SEPA.

1.7 The monitoring and evaluation indicators for the GEF activities

The monitoring and evaluation indications for the GEF activities are designed well. I have only one small suggestion for future supervision missions – to hire qualified interpreters to directly communicate with herders and farmers, in order to understand the realities and learn real situations.

2 The compatibility of the stated global environmental objective with the focal area goals set by GEF

2.1 Whether the project adheres to the operational strategies and focal areas set by GEF

The project, as described in the proposal, is to directly focus on OP12 integrated ecosystem management. It is also to focus on the carbon sequestration and biodiversity protection, which are exactly the goals of GEF and related to CBD, CCD and UNFCCC. At the same time, I think the project also links to other operating programs, such as OP6 promoting and adoption of renewable energy by removing barriers and reducing implementation costs. The functional rangeland ecosystem is also a sustainable biomass source as energy resource for local people.

2.2 The fitness of the project to GEF Operational Program (OP) 12

The project fits into GEF OP12 quite well. As mentioned in the proposal, it's part of demonstration project under China/GEF partnership Framework.

2.3 The linkages to GEF focal areas

For this project, it's directly to focus on climate change and biodiversity and has almost no direct linkages with Ozone issue.

On international waters issue, a few rivers in the project locations are international rivers, for example Ertix River in Xinjiang flows through China, Kazakhstan, and Russia. If Xinjiang used too much water, it would affect the neighboring countries. The project linkage with international waters should be also paid attentions due to its potential long-term impacts.

3 The anticipated global environmental benefits in the area of intervention of the project

Obviously the global environmental benefits of the project, as clearly described in the report, are biodiversity conservation and carbon sequestration as sink. One more global benefit, which is mentioned in the project but I want to stress, is sand and dust storm control in the rangelands. The tiny dusts of sand storm could affect not only China but also neighboring countries and even North America as well.

3.1 The role of the different proposed GEF activities in achieving the global environmental objective of the project

The role of GEF activities would play well in the project. As mentioned above, just the sand storm control is not paid enough attentions.

3.2 Whether the project complements other initiatives undertaken by the local government, the central government and/or other international implementing agencies

The project would complement the other existing projects, programs and plans. Actually the project has many linkages with other programs and action plans at regional level, sub-regional level and national level. At international level, the report has mentioned a couple of project funded by GEF, ADB, WB as well as other bilateral donors. At national level, the project has also mentioned WDS, the 10th five-year plan as well as other programs. Additionally, I just add more programs in the following:

- Sustainable Development strategy and Agenda 21 of China by SDPC/MOST
- Ecological Agriculture County Program by MOA
- Micro-financing by Poverty alleviation by PA Office of State Council and MOA
- Ecological Demonstration Area by SEPA
- Green Accounting Study by State Statistics Bureau
- Xinjiang Regional and Gansu Provincial level 10th five-year plan

3.3 The incremental cost analysis to determine how additional costs have been allocated to supplement actions beyond the national project objective to achieve the global objective

It seems OK to estimate the incremental cost of GEF. However, if effects of dust and sandstorms are to be included, the cost and benefits need to be mentioned in the proposal. As mentioned above, the project's contributions to the global benefits of sand and dust storm control in the rangelands are also very obvious. The tiny dusts of sand storm could affect not only China but also neighboring countries and even North America as well. Thus, the establishment of project could contribute experiences to help GEF setup a new operating program on land degradation, focusing on the global environmental impacts of stand and dust storm.

Bank Task Team's Responses to STAP Reviewer Comments

A. REVIEW OF THE DRAFT PROJECT APPRAISAL DOCUMENT (GEF BRIEF)

A1. HOW THE PROPOSED GEF ACTIVITIES BLEND IN WITH OTHER PROJECT ACTIVITIES:

The reviewer believes that the proposed GEF activities match the other project activities well. However, he suggests that, in view of the global impact of sand and dust storms originating from the project areas, the project should also consider air quality related activities.

The Task Team agrees with the reviewer's comments that the project will have positive impacts on sand/dust storms and air quality. The Task Team is aware of on-going international research on these issues (a collaborative program between China, Japan and the USA), and will take this into account during the implementation phase. Monitoring of air quality is currently conducted within both Gansu and Xinjiang provinces, and the project will not duplicate these efforts.

A2. THE ENVIRONMENTAL SUSTAINABILITY OF THE PROJECT:

The sustainability of the project depends on whether all necessary conditions are met. The biggest necessary conditions might be the project beneficiaries demand and institutional arrangements for an integrated management approach. Necessary Government programs are in place to assist sustaining the project. There is also the risk of political stability in Western China.

Increased government awareness to address the national environmental challenges underlines the demand and commitment for these kind of projects. Governments of six western provinces/regions including Gansu and Xinjiang have been involved in preparing a Country Programming Framework (CPF) which addresses the changes needed in the institutional instruments to strengthen the enabling environment. The political risk will always be there, but it should not seriously hinder the implementation of the project.

A3. INNOVATIVENESS AND REPLICABILITY OF THE PROJECT:

The greatest innovative aspect of the project is its integrated nature. This project could help the relevant departments of provinces, central government ministries and international bodies to work together for promoting the land degradation program further.

The project is among seven demonstration projects proposed in the PRC/GEF partnership. It is a pilot project that can serve as a platform for different interested local, regional, provincial , national and international bodies to work together on controlling land degradation. It will provide experience that could be replicated and would be beneficial in other regions of similar ecosystem.

A4. THE IMPLEMENTABILITY OF THE PROPOSED GEF ACTIVITIES:

Key for successful implementation of the grassland management component is proper institutional design and arrangements.

The umbrella for proper institutional design in environmental projects has been set by the government commitment to address environmental problems. The Task Team fully agrees with the reviewer and has paid great attention to the institutional arrangements of the project during its preparation. The Task Team would like to point out that continued emphasis on the institutions involved is in deed a key for success of this project. The governments of Gansu and Xinjiang are committed to provide all proper institutional flexibility to ensure success of the various activities.

A5. THE LEVEL OF STAKEHOLDER PARTICIPATION/CONSULTATION IN THE PROJECT PREPARATION:

Many stakeholders are involved in the project to different degrees. It is critical that all of the existing powerful stakeholders (e.g. MOF, SDPC, MOST), play a key role in the institutional arrangements. Also, it is important to keep the interest of the final beneficiaries, the herders and farmers. Appropriate market-based mechanisms need to be put in place to facilitate their participation during implementation.

The project will serve as a platform for a number of activities such as workshops, and conferences that would involve key stakeholders (e.g. MOA, MOF, SDPC, MOST), in addition to the International community. This strengthens the engagement and commitment of the different bodies. The project is community driven in design and implementation. Its development objective is to introduce sustainable grassland-based livestock production system that would improve rural income while preserving the natural resource base. Beneficiaries are aware of the tradeoff, and would be provided continuous technical assistance to increase their sense of ownership and keep them actively involved in all phases of the project.

A6. THE LEVEL OF TECHNICAL ASSISTANCE, TRAINING AND CAPACITY BUILDING:

The capacity building contribution of the project is even more important than the financing support. Institutional coordination and support is always weak in China and will need a lot of strengthening.

Two of the project components seek to address this point. The Applied research , training and extension and the Project Management, monitoring and evaluation. In the former, herders and county staff will be trained in Integrated Ecosystem management. Environmental workshops will be held to strengthen local capacity . Moreover PMO s at the local, regional, and provincial level will receive training in project management and monitoring techniques.

A7. THE MONITORING AND EVALUATION INDICATORS FOR THE GEF ACTIVITIES:

Project supervision should be facilitated by hiring qualified interpreters to directly communicate with herders and farmers, in order to understand their real situation.

The Task Team agrees. The Task Team has during preparation included specialists and interpreters able to communicate directly in local languages/dialects. This practice will continue during implementation.

B. THE COMPATIBILITY OF THE STATED GLOBAL ENVIRONMENTAL OBJECTIVE WITH THE FOCAL AREA GOALS SET BY THE GEF

B1. WHETHER THE PROJECT ADHERES TO THE OPERATIONAL STRATEGIES AND FOCAL AREAS SET BY GEF:

The project focuses on OP12, Integrated Ecosystem Management and relates to CBD, CCD and UNFCCC. It also links to other operational programs.

The project also contributes to OP4, Mountain Ecosystems, and OP13, Agro-biodiversity. OP13 is especially relevant to the project because the project area includes complex and unique transhumant livestock systems and practices that rely on plant genetic resources of forage legume and grass species that are widely used in temperate agriculture globally. Management of these resources will not only reduce herder poverty in project areas, but also contribute to the objective of the CBD to conserve agricultural biological diversity, in accordance with GOP guidance, as well as the objectives of the Convention to Combat Desertification (CCD).

B2. THE LINKAGES TO GEF FOCAL AREAS:

The project focuses on climate change and biodiversity. However, one should pay attention to the project's links to international waters in Xinjiang.

The project is not directly linked to international waters as it doesn't affect the share of water use from rivers crossing international borders (Ertix river in Xinjiang). Nevertheless, one could consider that there exists a potential link because of the integrated nature of the project with multiple focal areas.

C. THE ANTICIPATED GLOBAL ENVIRONMENTAL BENEFITS IN THE AREA OF INTERVENTION OF THE PROJECT

C1. THE ROLE OF THE DIFFERENT PROPOSED GEF ACTIVITIES IN ACHIEVING THE GLOBAL ENVIRONMENTAL OBJECTIVE OF THE PROJECT:

The obvious global environmental benefits of the project are biodiversity conservation and carbon sequestration. One should also mention the project's potential impact on sand and dust storms.

The Task Team agrees. Reducing sand and dust storms will be incorporated in the Incremental Cost Analysis matrix, as a global environmental benefit of the project.

C2. WHETHER THE PROJECT COMPLEMENTS OTHER INITIATIVES UNDERTAKEN BY THE LOCAL GOVERNMENT, THE CENTRAL GOVERNMENT AND/OR OTHER INTERNATIONAL IMPLEMENTING AGENCIES:

The project complements and links to other existing projects, programs and plans at national, regional, and sub-regional levels. The reviewer mentions additional national and regional programs.

The project forms an integrate part of the various regional and local development programs. Resources will be coordinated and combined to obtain maximum effect. All relevant programs have been mentioned in the GEF Project document.

C3. THE INCREMENTAL COST ANALYSIS TO DETERMINE HOW ADDITIONAL COSTS HAVE BEEN ALLOCATED TO SUPPLEMENT ACTIONS BEYOND THE NATIONAL PROJECT OBJECTIVE TO ACHIEVE THE GLOBAL OBJECTIVE:

The benefits (or foregone costs) of sand-and dust storm control and the cost of should be mentioned.

The Task Team agrees that controlling land degradation, reducing soil and wind erosion, and improving vegetation will help control the serious problem of sand and dust storm, which has regional and global environmental repercussions. Activities under project components (Grassland Management and Improvement, and Applied Research) will feed into this objective. The benefits from reducing sandstorm effects will be underlined.

Additional GEF Annex 16: Project Monitoring and Evaluation
CHINA: Gansu and Xinjiang Pastoral Development Project

Objective of Monitoring Program. Monitoring of the project implementation progress and impact is designed to systematically observe or measure changes in the economical, financial, environmental, and human resources of project areas. Evaluation of the project is designed to measure the appropriateness, effectiveness or efficiency of project investments. Evaluation does not occur only in the end of the project. It is a useful way to measure performance at key stages of the various investments and activities.

Methodology. The monitoring and evaluation plan for the project focuses on measuring effectiveness and efficiency of inputs, outputs and outcomes under the "with project scenario" using a suite of leading and lagging indicators. Stakeholders participation is key in every step of the monitoring exercise to ensure that their needs are reflected in project activities and desired outcomes.

All project monitoring activities will be carried out against a Baseline Study (this is the "situation without the project" against which the impacts of the project will be measured). A quantitative/qualitative baseline survey will be prepared for monitoring purposes. Most baseline data will be collected from existing resources such as Grassland Station records, Animal Husbandry Bureau and County records, and national statistics. A quantitative baseline survey was carried out during project preparation and will be used in creating the baseline scenario. In addition, individual household data and stakeholder perceptions before participation in the project will be collected during initial participatory planning processes. This data will be compiled to demonstrate the "without-project" conditions. The baseline study in each project county will identify grassland productivity, species composition, livestock numbers by species and class, livestock production by species and class, and herder livelihoods and income levels. It will also identify the needs for applied research topics, training and extension.

County PMOs will carry out annual quantitative surveys. In addition, independent quantitative and qualitative monitoring will take place three times during the project cycle (beginning, middle and end). Basically two types of monitoring are going to take place:

- **Technical Monitoring Activities** (this is the on-going measurement of indicators and interpretation and reporting of technical results to inform adaptive management and track delivery of key result areas). The indicators used for technical monitoring, how the monitoring is to be carried out, who will be responsible for the monitoring, how reporting will take place and the schedule for measurement is summarized in tables below. Indicators are classified according to the stage and objective of monitoring, namely progress, output, impact, social, environmental, and global (in case of GEF). Measurement is to be done by participants, PMOs, supervision missions, and other independent institutes to be identified at later stages.
- **Monitoring of Project Management** (this is the on-going measurement of indicators and interpretation and reporting of management performance to inform adaptive management to ensure effective and efficient delivery of key results). The indicators used for management monitoring, how the monitoring is to be carried out, who will be responsible for the monitoring, how reporting to the World Bank will take place and the schedule for measurement are included in the tables below.

Outcome and Impact Monitoring and Evaluation

	Indicators	Responsibility	Collection method/ frequency
Sector related CAS Goal	- Average net income of participating project townships compared with non-project townships increased by end of project. - Rate of grasslands de-gradation in project townships halted or reduced.	- PPMO/RPMO - Animal Husbandry Bureaus (AHB) (Grassland Monitoring Stations)	- Periodic annual income statistics and poverty surveys. - Periodic annual grassland surveys
GEF Operational Program - Environmental Impact Monitoring	- Trends in condition of key threatened grassland ecosystems and habitats in project counties. - Trend of carbon sequestration levels in project areas.	- PPMO/RPMO - AHB (Grassland Monitoring Stations) - Applied research activity linked with local research institute to be identified.	- Periodic annual grassland surveys - Regular pasture inspection and monitoring (including aerial photography and satellite imagery). - Periodic physical monitoring of carbon sequestration in selected points
Project Development Objectives Improved feed balance for livestock: nutritional quality, quantity and seasonal distribution of feed supply Increased productivity of livestock and livestock products Improved quality of livestock products Ability and opportunities of farmer/herders to market their livestock and products	- Areas of utilizable grassland. - Grassland species composition. - Forage crops and crop straw output. - Livestock numbers and type. - Lambing rates. - Litter sizes. - Livestock mortality rates. - Animal weight gain rates. - Milk output per animal. - Reproductive rates. - Stocking rates. - Feed conversion rate. - Age of animals at marketing. - Percentage of wool professionally sheared, graded and baled; - Number of farmers/herders using shearing stations. - Price premiums received by farmers/herders (wool). - Percentage of accepted milk. - Farmer/herder ratings of their access to markets and market information. - Inter-spatial price variations for selected livestock products. - Prices received by farmers/herders. - Market volumes. - Percentage of milk collected.	- PPMO/RPMO - AHB - Bank Supervision missions	- Independent project M&E reports (beginning, mid term and final) - Regular PPMO supervision and monitoring - Specific surveys - Annual implementation plans versus progress reports - Bank supervision missions - Reports by Nanjing Wool Market - Market information reports (information bulletins, internet sites, specific surveys analyzing market information at local level)
Social monitoring	- Level of participation in project by minority nationalities. - Impact of project on minority nationalities (income gain etc.) in comparison with non-minority nationalities. - Gender differentiated impacts of project. - Impact of project on poorer households. - Project perceptions from participating and non-participating herder/farmer households	- PPMO/RPMO - AHB - Bank supervision missions - Independent monitoring (to be contracted)	Periodic specific surveys

Grassland Management and Forage Development. The objective of this component is to introduce sustainable grassland based livestock production systems that will reverse the current trend of grassland degradation, and substantially contribute to improving the livelihood of its rural population. Activities to be financed under this component include forage and fodder production, and grassland management and improvement. Most of the indicators presented under the GEF Monitoring Plan below, will be used to monitor some of the activities under this component.

Grassland Management and Forage Development - Project Output Monitoring

Indicators	**Responsibility**	**Collection method/ frequency**
- Number of participatory grassland management plans developed and under implementation. - Area in ha implemented under participatory grassland management. - Area in ha of grassland improved (seeded, fenced, etc.). - Area in ha of artificial pasture & forage crops established. - Number of Grassland Monitoring Stations equipped, trained, and in operation.	- Project PMOs all levels	- Field inspection: surveys, maps -Progress reports (2 times/year) - Grassland surveys

Livestock Production Improvement. The objective of this component is to develop sustainable livestock production systems through improvement in genetics and management using environmentally sound technology. Specific objectives include: (i) strengthening livestock breeding, selection, and multiplication programs, improving livestock management & feeding; improving the quality of livestock products (wool, meat, milk), (iii) improving the infrastructure and skills for sheep shearing and wool handling, (iv) establishing commercial input supply systems for the livestock production sector.

Livestock Production Improvement - Project Output Monitoring

Indicators	**Responsibility**	**Collection method/frequency**
- Number of shearing stations, dipping stations built. - Number of improved nucleus breeding animals. - Number of improved breeding animals . - Number of livestock sheds & silage pits built. - Number of AI, nucleus breeding and veterinary stations established. - Number of native species support breeding programs established (Han Tan Sheep, White Yak).	- Project PMOs all levels	- AHB, PPMO records. - Project surveys - Milking stations and milk collection points' records - Field inspection (sheep tallies, sales data.) - Progress reports (2 times/ year)

Market Systems Development. The specific objectives of this component is to: (i) improve the competitiveness of Chinese wool and sheep meat; (ii) Develop and apply standard product description for wool and meat ; (iii) improve the capacity of provincial level public wool testing laboratories; (iv) increased awareness in the Chinese wool textile industry of the potential for using more Chinese fine wool; (v) ensure that herders and other wool producers receive the full market price for their wool and other livestock products; (vi) assist with developments in the market system so as to reduce seasonal fluctuations in price and delivery; (vii) introduce market related mechanisms to help herders to reduce and manage risk and (viii) support the development of herder groups marketing initiatives.

Market Systems Development - Project Output Monitoring

Indicators	**Responsibility**	**Collection method/frequency**
- Number of shearing stations livestock markets, and milking stations. - Numbers of livestock markets converting to auction sale - Number of appraised rural enterprise activities. - Number of financed rural enterprise activities. - Market information system in place (including published set of product description and quality standards). - Proportion of sheep shorn by certified shearers	- Project PMOs all levels	- Field inspection - Market Information reports - Information bulletins, sheets. - Progress reports (2 times/ year)

Applied Research, Extension and Training. The objective of the component is to develop an improved integrated management systems that enable household livestock producers to simultaneously raise the quality of fiber, meat and milk products, derived from grazing livestock and decrease the number of grazing livestock resulting in improved grassland condition without economic loss.

Applied Research, Extension and Training - Project Output Monitoring

Indicators	**Responsibility**	**Collection method/frequency**
- Number of proposals submitted, reviewed, and awarded. - Number of on farm case studies for applied research implemented. - Number of demonstrations for integrated grassland eco-system management and biodiversity conservation. - Number of logged technician visits to villages and households. - Household satisfaction with technician visits (w/extension services). - Number of Extension bulletins . - Number of technicians trained, (AI, shearing, etc.) and their degree of satisfaction with the training. -Number of public information campaigns to educate farmers/herders (including in marketing) developed and implemented. - Number of farmers/herders trained and their degree of satisfaction with the training. - Number of people with grassland survey & inventory competencies trained. - Number and location of people with grassland monitoring competencies.	- Project PMOs all levels	- Specific bi-annual research progress reports - Field inspection - Progress reports (2 times/ year)

Project Management, Monitoring and Evaluation. The objective of this component is to develop and strengthen the overall project implementation capacity of project management offices and promote effective community participation in project activities. The component will finance operational costs, goods, TA and training for the various levels of project management offices. Activities to be financed include: (a) operational costs; (b) strengthening of the provincial, city, county and township level PMOs (goods and training); (c) establishment of a monitoring and evaluation system that includes: project progress monitoring, environmental monitoring, social monitoring, and impact monitoring (technical assistance and training), and establishment of community advisory/participation groups (technical assistance and training).

Project Management, Monitoring and Evaluation: Summary Monitoring Plan

Management Indicators	**Responsibility**	**Collection method/frequency**
- Number of meetings of the PLG. - Number of meetings of the TAG . - Number of PMO staff trained. (project management, procurement, financial management, etc.). - Progress reports/annual implementation plans prepared on schedule. -Statistical and financial analysis carried out of the results and impact. - Budget versus Actual delivery of project inputs and outputs. - Number of M&E outputs and their use in adaptive management. - Number of environmental indicator monitoring reports. - Number of technical/ economic indicators, reports of their measurement & their use - Number and coverage of surveys and inventories carried out by scale. - MIS system used as a management tool. - Management changes resulting from monitoring information.	- Various levels of PMOs. - Bank supervision missions.	- Progress reports (2 times/ year)

GEF Monitoring Plan. GEF activities emphasize participation by herders and other relevant stakeholders. This is reflected in the roles and responsibilities for monitoring and evaluation of GEF specific activities. There are a number of simple tools that will be used to enable herders to measure change in grassland condition as well as their own perceptions of the environment and other influences on their livelihoods. In particular, grassland condition (species composition, ground cover and productivity) will be monitored by using participatory tools such as:

- **Photo-points** - photo-point monitoring uses photographs taken from the same place each year to provide an accurate record of change over the long-term. Very useful information can be extracted from this record, especially if it is backed up with some brief notes recorded when the photograph is taken. An annual photograph, taken from the same place at the same time each year, is sufficient. A monitoring site will consist of two 1.6m metal posts, 10 meters apart, driven into the ground 0.5m (50cm). Each of these will be a photo-point used for monitoring range or pasture condition. Each metal post is permanently labelled with a unique site identification number.

- **Step test** - a step test is a simple and rapid tool that can be used to monitor pasture and range biodiversity. Herders as well as technicians can easily use the tool so it is ideal for use by project participants. It should be used every spring and autumn as an ongoing monitoring effort in pasture and range management activities. To implement a step test, walk along a chosen transect line with wide steps (or paces). At each step participants record what touches their boot first. The answer is recorded on a prepared record sheet. Participants then make another step and record on the sheet what the point touches with this next step. Participants keep doing this until they have between 200 and 300 points recorded. This method is useful for species composition and ground cover estimates.
- **Goal attainment scaling** – a simple tool adapted from medical science and now widely used in participatory natural resource management. It is especially useful for qualitative monitoring of participant perceptions, grassland quality and intangible environmental services.

Given the lack of reliable and consistent grassland condition and herder socio-economic data, the monitoring approach relies on time series data collected during project preparation, through project implementation and for a period of 2-3 years after project completion. An independent monitoring team will be contracted for the duration of the project to support participatory data collection and conduct annual monitoring activities to assess project impact and participant perceptions.

GEF Activities: Summary Monitoring Plan (includes GEF specific indicators only)

Purpose	Monitoring Indicators	Means of verification	Responsibility	Reporting tool
Project output indicators	- Number, area&location of participatory grassland management plans prepared. - Number of completed grassland resource maps. - Number of completed biodiversity inventories. - Number of completed indigenous seed harvesting, storage and re-seeding manuals. -Number of detailed pilot demonstration plans. - Number, area, and location of participatory grassland management plans under implementation (reseeding, fencing, rotation, etc.) - Area in ha of grassland improved (seeded, fenced, etc.). - Number of Grassland Monitoring Stations equipped, trained, and in operation. - Number, location, and area of actively managed grassland monitoring sites. - Number and location of operational grassland user groups. - Number and location of participants attending training programs.	- County AHB & PPMO records, verified by M&E team. - Compile from PMO records. - Photo points recorded using pro forma method. - Project biomass photo-standards and photo points recorded with pro forma method.	- Grassland Stations and AHBs. - Project M&E staff (PMOs) (verified by periodic Bank supervision missions).	- Progress reports (2 times/year).
Project impact monitoring	- Trends in grassland EMU diversity (% ground cover by genus using step test). - Number and location of breaches of exclusion and protection regulations. -Trends in adoption of improved grazing practices. - Numbers of indigenous wildlife species. - Dry matter production, % of soil covered, cover of desirable species. - Increased carbon sequestration in selected points in project areas. -Changes in albedo level (soil surface reflectance). - Biomass and surface water behavior (linking measured vegetation cover with existing experimental data on infiltration, runoff, sediment loads under different pasture conditions.)	- County AHB records - Participatory transect step test, plot harvesting and photopoints. - Step test recorded for each EMU using pro forma method. - Photo points recorded using pro forma method. -Goal Attainment Scaling using pro forma method. - Biodiversity inventories and grassland resource surveys.	- Contracted M&E team with Grassland Stations, AHBs and herders.	- Progress reports (2 times/year) - Specific grassland monitoring reports - Specific biodiversity monitoring reports - Other specific monitoring and inventory reports
Social monitoring	- Stakeholder perceptions of level of participation in planning and implementation of the participatory grassland management plans. - Stakeholder perceptions of grassland resource condition	- Goal attainment scaling conducted with participants. -Interviews and surveys. - Participatory Rural Appraisals.	- PMOs - Bank supervision missions - Independent monitoring (to be contracted)	- Annual surveys reported with Progress Reports. - Independent monitoring report (Year 1, 3, 6)

ADDENDUM TO THE AGREED MINUTES OF NEGOTIATIONS
BETWEEN
THE PEOPLE'S REPUBLIC OF CHINA
AND
THE INTERNATIONAL BANK FOR RECONSTRUCTION
AND DEVELOPMENT
REGARDING THE
GANSU AND XINJIANG PASTORAL DEVELOPMENT PROJECT

JULY 21, 2003

Negotiations for the proposed International Bank for Reconstruction and Development Loan of US$66.27 million and Global Environment Fund Trust Fund Grant of US$10.5 million for the Gansu and Xinjiang Pastoral Development Project were held between representatives from the People's Republic of China, including representatives of Ministry of Finance (MOF) and Ministry of Agriculture (MOA), representatives from Gansu Province and Xinjiang-Uyghur Autonomous Region, and representatives of the Bank at the Bank's headquarters in Washington, DC, USA from July 14 to July 17, 2003. Minutes of these negotiations were agreed upon. This document is an addendum to the agreed minutes.

The Bank Team and the Borrower confirmed the financing package of the project as follows:

IBRD	$ 66.27 million
Various levels of Government	$ 34.82 million
GEF	$ 10.5 million
Total Project Cost:	$111.59 million

Washington, D.C. July 21, 2003

ON BEHALF OF THE PEOPLE'S REPUBLIC OF CHINA:

Yang Jinlin
Director
International Department
Ministry of Finance
People's Republic of China

ON BEHALF OF THE INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT:

Sari Söderström
Task Team Leader
Rural Development and Natural Resources Sector Unit
East Asia and Pacific Region