

CHINA
Gansu and Xinjiang Pastoral Development Project

GEF Project Brief

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? No	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	
<input checked="" type="checkbox"/> Loan <input type="checkbox"/> Credit <input type="checkbox"/> Grant <input type="checkbox"/> Guarantee <input type="checkbox"/> Other:	
For Loans/Credits/Others: Amount (US\$m): 10.50 Borrower Rationale for Choice of Loan Terms Available on File: <input type="checkbox"/> 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	32.45 0.00 32.45
IBRD	45.77 20.50 66.27
GLOBAL ENVIRONMENT FACILITY	8.00 2.50 10.50
Total:	86.22 23.00 109.22
Borrower/Recipient: PRC 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 Department, Xinjiang Uygur Autonomous Region Address: 23 Xinhua Nan Lu, Urumqi, China, 830001 Contact Person: Mr. Salajidin Tel: + 86 991 282 5645 Fax: + 86 991 282 5645 Email: wxmb@fm365.com	
P065035 Estimated Disbursements (Bank FY/US\$m):	
FY	2004 2005 2006 2007 2008 2009 2010

Annual								
Cumulative								
P077615 (GEF) Estimated Disbursements (Bank FY/US\$m):								
FY	2004	2005	2006	2007	2008	2009	2010	
Annual								
Cumulative								
Project implementation period: 6 years Expected effectiveness date: Expected closing date:								

OPCS/PAD Form: Rev. March, 2000
GEF Project Brief (PAD)

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 through establishing improved livestock production and marketing systems that would increase the income of herders and farmers in the project areas.

The proposed project would empower farmer and herder households in the project counties to better manage their grassland resources and improve forage and feed production on arable lands, thereby increasing their incomes through more efficient and quality focused livestock production, sufficient to generate marketable surplus to improve living standards. Establishment of improved livestock marketing systems in project counties would also increase the efficiency of the livestock production system and help raise the living standards of farmers and herders.

Global Environmental Objective (see Annex 13). The global environmental objective of the project is 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 plans in selected project areas with high global biodiversity values; providing incremental investments for implementing grassland plans; and monitoring of grasslands habitats in selected pilot sites.

2. Key performance indicators: (see Annex 1)

Achievement of the project objective would be monitored by key performance indicators:

- Increasing trend in average net income of participating project households relative to other households in the same township and county;
- Increasing trend in extent and location of grasslands under sustainable on-the-ground management;
- Participant perception and understanding of biodiversity conservation and catchment management impacts of their grazing management decisions; and
- Increasing trend in fine wool and mutton prices received by farmers/herders' participating in the project compared with other farmers/herders in the same township and county.

Key indicators for monitoring carbon sequestration and biodiversity status include: (i) dry matter production, (ii) percentage of soil covered, (iii) cover of desirable species, (iv) botanical composition, (v) grass cover, and (vi) pasture management.

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: 2002/01/22

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. 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. Major CAS objectives which govern the Bank's

lending program to China's agricultural sector 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 CAS objectives also emphasize the need to increase efficiency in livestock production and marketing through improvements in animal genetic potential, nutrition and production technologies, thereby generating higher-value livestock products. The project is also consistent with the CAS poverty alleviation objectives, supporting selected 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 the rural sector in 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 in depth 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 fully 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 would 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 China CAS, *protecting the environment* is an overarching objective for support by the World Bank Group. The Project is consistent with the national *Biodiversity Conservation Action Plan* (1994) and the *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:

Background. Grasslands cover about 40 percent (400 million hectares) of China's land area, making China second only to Australia in the extent of its grassland resources. About 75 percent of China's grasslands (300 million hectares) are found in the semi-arid pastoral areas in the north and west of the country. The majority of the grasslands are found in a few provinces/autonomous regions in the north and west; the most important of which are Gansu, Inner Mongolia, Qinghai, Tibet, and Xinjiang. Grasslands in the project areas have four global environmental values: (a) biodiversity; (b) forage plant and meat sheep agrobiodiversity; (c) carbon sink and (d) international river catchment.

Global Operational Strategy. The project is consistent with three (biological diversity, climate change, and land degradation) of the six 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, and the Convention to Combat Desertification (CCD) on 18 February 1997. 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 Convention to Combat Desertification (UN-CCD). Furthermore, China has identified the need to reduce greenhouse gas emissions as an environmental priority and has ratified the UN Framework Convention on Climate Change (1992).

Global Program Objective. 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 and Qilian mountains and cover 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 Global Environmental Facility (GEF) Operational Program (OP) 12, Integrated Ecosystem Management in that it addresses cross-sectoral policies and land use practices to ensure better grassland management to enhance protection of environmental services, including biodiversity conservation, carbon sequestration and watershed protection in the headwaters of international waterways. The project is one of the key elements of the country's GEF Partnership on Land Degradation in Dryland Ecosystems under Operational Program (OP) 12 of Integrated Ecosystem Management Operational Policy implemented by the Asian Development Bank (ADB). It will also contribute to the United Nations Development Program (UNDP)-GEF financed regional biodiversity conservation initiatives in the Altai Mountain eco-region in Mongolia, Kazakhstan and Russia.

The project's GEF investments will focus on sites and habitats recognized as threatened and globally significant for biodiversity and protect vulnerable grassland and montane habitats, thus contributing to conservation and sustainable use of Critical Montane Ecosystems (OP 4). 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 OP 1, Arid and Semi-Arid Ecosystems. Several of the pilot grassland areas lie in remote mountain ranges along international boundaries; 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 OP 13 (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 the agricultural sector, China has achieved remarkable agricultural and rural growth, greatly reduced poverty and addressed many environmental and natural resource degradation problems. Replicating these accomplishments and improving sustainability in the future however, will be more difficult as many of the potential gains from the transition reforms have been achieved and weak demand has now slowed growth. Weak aggregate demand is also affecting 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 of 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 more dynamic and effective rural institutions and financial systems, improved land tenure with marketable land-use rights, improved incentives for investing in agricultural development, liberalization of production, pricing and marketing policies, promotion of a market environment, and better targeted investments in rural infrastructure and public services.

Rural Development. In China's northwestern pastoral areas, the challenges for rural development are daunting. Despite the political and strategic importance of the region, rural economic growth has not been very significant. Grassland degradation is a serious problem with almost fifty percent of the proposed project areas classified as moderately to severely degraded, hillsides being often especially badly degraded. Poverty is pervasive. Xinjiang and Gansu together make up almost 15 percent of China's total poor. 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, government development policies, and human population growth hinder sustainable development in the project areas. There is a vicious cycle of increasing human population leading to pressures to convert grasslands to cropland and to increase livestock stocking rates to maintain rural incomes. This leads 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. However, 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 improved grassland management (including pastoral risk management), and more efficient marketing of livestock and livestock products.

Main Sector Issues. The key issues for sustainable development in the pastoral areas to be resolved are: (1) widespread rural poverty; (2) grassland degradation and loss of 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 continues to be a serious problem. China still has 106 million rural absolute poor, and in most cases this remaining poverty is difficult to address. 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 in China 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 and Loss of Biodiversity. Grassland degradation results in a loss of biodiversity and productive capacity to produce forage for wildlife and domestic animals, and also reduces other grassland benefits, including: (a) biodiversity values, which have declined in terms of the number, variety, and range of plants and wildlife; (b) watershed protection; (c) carbon storage; and (d) 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 hectares, with a notable acceleration in the mid-to-late 1990s. Xinjiang and Gansu are experiencing grassland degradation levels well above the average for China's grasslands. The problem appears to be worsening and is contributing to aggravating wind and soil erosion in northwest China. Grassland degradation is triggered by inappropriate policies and human interventions (inappropriate land tenure, agriculture expansion, overgrazing by livestock, collection of shrubs and sod for fuel, and harvesting of medicinal plants), as well as natural factors (such as infestation by rodents and insects and changing climatic factors).

Grassland 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

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 recently gained national attention, the focus of mitigation programs is almost entirely on investment in “technical fixes” with little attention paid to: (1) the underlying social and policy issues that are at the heart of the grassland degradation problem; (2) the inadequacy of forage seed production for grassland rehabilitation and forage improvement; and (3) that 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 problem are required.

(3) Unsustainable Livestock Production Practices. The sub-optimal animal husbandry practices are major factors for the degradation of grasslands in the proposed 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 (1958 to 1984 in Xinjiang), collectives and State Farms were required to breed fine wool sheep and the number of such sheep increased sharply. However, once herders were allowed options 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 in the pastoral areas and a need to evaluate preferred options for fine wool sheep breeding programs. Moreover, with the shift to higher levels of mutton production, there is a need to both 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 fine-wool sheep and processing wool, but has paid little attention to marketing activities and the incentives faced by producers of meat, wool and other animal products. The lack of a functioning 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 percent 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 WTO and the restructuring of the domestic textiles sector, will demand improved competitiveness through improved quality and delivery.

In the Chinese 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 by 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. Currently, there is a lack of integration in addressing the above issues due to: (a) inadequate incentives (herders prefer to produce other livestock products than fine wool), leading to low volumes of fine wool that are not attractive to processors; (b) local authority's tax collection mechanisms favor, to some extent, increased sheep numbers rather than higher valued products. Herders react by increased numbers of meat breed sheep, further burdening the grasslands; (c) exploitation of (sloped) grazing land has been a cheap alternative to developing flat grasslands 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 stakeholders far beyond areas. In addition, 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 livestock related industries, which are based on the grassland resources, are under serious threat. The Government's Western Development Strategy targets investments in the twelve Provinces and Autonomous Regions in the Western Region. The Strategy has two main objectives: (i) to reduce economic disparities between the western and other regions; and (ii) to ensure sustainable natural resource management in the Western Region. In addition, 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 Ninth Five Year Plan and Fifteen Year Perspective Plan, in the 10th Five Year Plan, there has been a noticeable shift in the focus away from increased quantities of agricultural products towards improved quality and more ecologically sound types of production. The project gives China an opportunity to pilot more sustainable grassland-based livestock production practices and marketing/processing systems that could substantially contribute to improving the livelihoods of its rural population in areas that have received little development attention in the past.

In addition, the Government of China has given the conservation of grasslands a high priority in its national development strategy. The project would 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* (1998), 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

West Region of China, and the Western Development Strategy (2000). The strategy emphasizes two main objectives: (a) to reduce economic disparities between the western and other regions; and (b) to ensure sustainable natural resources management. Implicit in the Western Development Strategy is the recognition of the fragility of natural ecosystems in the western region and of the risk of increasing environmental deterioration if appropriate policies and incentives are not put in place. In 1985, the SCNPC passed the Grasslands 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 identified policy actions to restrict the overuse of grasslands, provide measures for rehabilitation of degraded grasslands and conserve existing natural grasslands with high ecological values. Very recently, the Government 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). Also, the grassland law has again been revised to provide more guidance and clarity on government policy.

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 and loss of biodiversity, 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 would be addressed by improving the capacity of herder and livestock farmer households to enhance their incomes through improved livestock production by improved animal husbandry skills and improvements in breeding. These efforts will focus on increased farm-level value-added for livestock products.
- (2) Grassland Degradation and Loss of Biodiversity. Grassland degradation would 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, the strengthening of conservation institutions and working with stakeholders to adjust policies and incentives to support adoption of sustainable grassland management practices.
- (3) Unsustainable Livestock Practices. Important livestock-based industries would 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. The interaction of market forces, income generation and sustainable grassland and feed management will be addressed through market information, targeted marketing activities, and combination of an "early-warning" system and short term credits to traders. The competitiveness and marketability of related livestock products (wool, mutton, beef and milk), would be enhanced by improving the market's ability to deliver price signals to producers.
- (5) Weak Community Participation. Active participation of herders and farmers in the development program would be pursued, and herders associations would be supported.

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

Strategic Choices. The project objectives recognize that there is an urgent need to initiate new interventions that embrace more holistic and integrated approaches to the management of natural resources 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 ecosystems concerns into natural resource management in the broader production grazingland landscape. Conserving biodiversity can no longer be restricted to single habitat types or protected areas but must move out to encompass entire ecosystems. Reversing environmental degradation is also fundamental to poverty reduction in Western China, since the poor herders and farmers, many of whom are ethnic minorities, are the most dependent on natural resources for their livelihoods. They are also the most vulnerable to environmental disasters and whose health is most affected by environmental pollution. In view of the linkages between local rural development and sustainable use of natural resources, the project will actively promote an innovative concept termed community based rangeland resource management planning which applies integrated ecosystem management approaches on a landscape scale to optimize the positive ecological, social, and economic benefits of interventions aimed at maintaining and restoring rangeland ecosystem structure and function.

Sustainable rural development requires an integrated, beneficiary driven development approach which embraces close associations with the private sector, encouraged and assisted by the public sector. The community driven development aspect of the project comes through the involvement of the beneficiary communities in the design and implementation of the project and through supporting the establishment of farmers' and herders' resource associations and informal and/or formal marketing and trading groups. 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 proposed project areas of northwestern China are the poorest in the country, home to several minority populations, which have received little development attention and have largely been bypassed in China's economic boom;
- the two project provinces 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 population is found in Xinjiang and Gansu representing an important cash generating activity for farmers and herders. Increased domestic demand for meat, and growth potential on domestic markets to offer opportunities for agribusiness;
- the project acknowledges and utilizes the role of the market in improving the livestock sector, and the need to establish competitiveness and improved marketability of Chinese livestock products. The project is aimed at working 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 at State Farms and to ensure extension services to herders;

- 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, 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 different provinces, is justified, it does pose risks for implementation arrangements. For example, it will not be possible to pursue all the herder capacity building activities in all project areas at the same time. A participatory process, that actively involves the herders, 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 provides a generally enabling environment for the proposed project. For instance, while market 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 associations, which is still under development, and constraints to the free movement of goods (formal and/or informal transportation restrictions, informal restrictions in inter-county trade), etc. In many cases, adequate policies are in place at least on the national level, and the proposed project would attempt to push the enforcement of such existing rules and regulations.

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 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 and production inputs, and technical assistance. Communities are expected to contribute their labor. This will constitute the Baseline Scenario.

The GEF Alternative will build 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. This will be achieved by preparing and implementing participatory grassland management plans that are more global environment-friendly, including management investments on a demonstration basis; dissemination of good practices on landscape-level grassland eco-systems management; and increasing public awareness about the biodiversity conservation of sustainable grassland ecosystem management. The GEF Alternative will also address issue of environmental capacity building within the local Animal Husbandry Departments and Grassland Monitoring Stations and will provide the means to integrate biodiversity conservation objectives into community resource management plans.

Component 1. Grassland Management and Forage Improvement. The specific objectives of the 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 livelihoods of its rural population. The component will finance works, goods, technical assistance and training for household based operations and participating public breeding farms. Activities to be financed 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, pastoral risk management strategies). The related applied research, training and extension activities are described under Component 4.

GEF Activities. The GEF activities will develop and establish sustainable grassland-based livestock production systems in the project areas that 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 improved livelihoods of the farmers and herders. The activities are also expected to improve the capacity of farmers and herders to better 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.

Activities to be carried out under the GEF Alternative will include financing of incremental costs associated with conservation of global grassland values, including: (i) inventory of grassland ecosystems in selected biodiversity-rich pilot areas, including assessment of their biodiversity and its change as a response to improved management practices. Key activities would include grassland and biodiversity surveys. (ii) preparation and implementation of pilot community and herders' association-based grassland resource management plans in selected project sites, which will be designed to promote biodiversity conservation and carbon storage (technical assistance); (iii) implementation of demonstration global environment-friendly grassland management techniques and investments which are consistent with the existing trans-human pastoral systems (i.e. re-seeding with indigenous grass species, implementation of traditional forage production techniques, etc.); (iv) strengthening existing grassland ecological monitoring systems, including monitoring of biodiversity values; and (v) capacity building, extension, training and technical assistance, including the preparation of training modules and awareness building to support the above global environment-oriented activities. *Detailed implementation plans outlining the specific implementation procedures for these activities will be developed. (see Project Appraisal Document, PAD Section G)*

The specific intervention sites for the GEF Alternative are located in areas which are defined as national priorities in the National Environmental Action Plan (NEAP) (1998) and the Biodiversity Strategy Action Plan and are regionally significant biodiversity corridors in eastern Tien Shen, Altai and Qilian mountains. The priority grassland and mountain ecosystem conservation sites identified in the NEAP and, which are located in the project areas would include: Eastern Qilian Mountain Nature Reserve in Wuwei county and Zhangye City, and Anxi arid desert ecosystem in Anxi county (both of global significance) in Gansu Province. In Xinjiang, the globally significant areas would include: Altai Nature Reserve in Altai and Burin counties and southern and northern slopes of Tien Shen in Yili Prefecture, covering Yili, Xinyuan, Hengcheng and Gangliu counties. Other priority areas of national significance include Eastern Tien Shen 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 Fu Yun county. All of these protected areas are under heavy anthropogenic pressures, including overgrazing.

Pasture management plans will be developed for grassland ecosystems throughout a wide elevation range (i.e. summer, spring/fall, and winter pastures) that are only beginning to show signs of degradation and are still relatively biodiversity-rich. Specifically, the GEF Alternative will be implemented within geographically targeted landscape units and natural grasslands of high biodiversity value in Qapqal and Fu Yun Counties of Xinjiang Province (eastern Tien Shen 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 trans-human pastoral systems. It is anticipated that the GEF-supported activities will not work directly inside the existing protected areas. Primary focus is on production landscapes. But since livestock grazing is permitted in some protected areas, grazing management will include those protected areas located on pastoral migration routes.

Component 2. Livestock Production Improvement. The overarching objective of this component is to develop sustainable livestock production systems through improvements in genetics and management using environmentally sound technology. In order for livestock husbandry to remain sustainable in northwest China, new approaches to livestock production enterprises need to be better integrated with improved grassland management and the marketing of livestock products. The specific objectives of the component are to: (i) strengthen livestock breeding, selection and multiplication programs; (ii) improve livestock management and feeding; improve the quality of livestock products (wool, meat, milk); (iii) improve the infrastructure and skills for sheep shearing and wool handling; and (iv) establish commercial input supply systems for the livestock production sector.

The component will finance works, goods, technical assistance and training for household based operations, participating public breeding farms and participating enterprises. Activities to be financed include: (a) fine wool and mutton nuclear breeding stations; (b) fine wool and mutton multiplier stations; (c) fine wool and mutton breeding households; (d) fine wool and mutton fattening (e) beef cattle breeding households; (f) beef cattle fattening households; and (g) household and enterprise dairy production. These activities will also receive support from breeding and veterinary services enhanced through project investments in the establishment and renovation of a network of public Artificial Insemination (AI) Stations to facilitate the transfer of superior genetic traits to household base livestock enterprises and public Veterinary Stations to deliver improve livestock health. The related applied research, training and extension activities are described under Component 4.

GEF Activities. The GEF activities will develop and establish sustainable livestock production systems through improvements in genetics and management using environmentally sound technology. They will strengthen livestock breeding, selection and multiplication programs and improve livestock management. The activities are integrated with the other project components to provide impact across the major fiber, meat and dairy industries in Gansu and Xinjiang with potential flow-on to neighboring provinces with similar livestock production systems. This will be achieved through a balanced program of activities that equally emphasis breeding, husbandry and management.

Activities to be carried out under the GEF Alternative will include financing of incremental costs associated with conservation of native livestock agrobiodiversity, including: (i) technical assistance 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. *Detailed implementation plans outlining the specific implementation procedures for these activities will be developed. (see Project Appraisal Document, PAD Section G*

Component 3. Market Systems Development. The specific objectives of the component is to: (i) improve the competitiveness of Chinese wool and sheep meat; (ii) develop and apply standard product descriptions for wool and meat; (iii) improve the capacity of provincial level public wool testing laboratories; (iv) increase 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 herders' group marketing initiatives.

The component will finance works, goods, technical assistance and training for households, participating public breeding farms, and participating enterprises. Activities to be financed include: (a) physical investments (new and reconstructed livestock markets, new and reconstructed shearing stations, wool testing equipment, and wool storage facilities); (b) trader loans and rural enterprise loans; (c) support (technical assistance and training) to herder's trading organizations (formal and/or informal herders' associations); and (d) development and establishment of mechanisms for public goods provision (market information systems and national quality standards for wool).

The component re-enforces the other project components by magnifying the incentives for participation in the project by herders and other market participants. Benefits of the component include increased herder incomes, improved risk management and a means for orderly development of the livestock sector according to market signals. Primarily, the component benefits will be seen as higher prices for products and reduced risks of sales strategies. 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. *A detailed implementation plan outlining the specific implementation procedures for these activities will be developed. (see Project Appraisal Document, PAD Section G)*

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 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. This represents a significant paradigm 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 equip livestock producers to accept new ideas and adopt new technologies, and extension is needed to transfer research outcomes and 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 (universities and public institutes) and technical assistance and training of trainers (in line bureaus and extension stations), households, participating public breeding farms, and participating enterprises. Activities to be financed include: (i) grants for applied research (identifying, developing and adapting relevant low-cost technologies to solve specific problems that will further facilitate implementation and enhance accrued benefits from the project's livestock, grassland improvement and marketing activities. E.g. optimal seeding rates, irrigation water use efficiency, fertilizer requirements; forage production management; forage harvesting management, rehabilitation of degraded grasslands, seed production of native forage germplasm, herders' indigenous knowledge of grassland resources and livestock, customary grassland management use, livestock grazing behavioral interactions; grassland ecology, economic valuation of grassland resource products and services, appropriate mechanisms to charge consumers for benefits derived from grassland resources, grassland tenure and allocation of grasslands to individuals vs. groups, the effect of settling

herders on the condition of the grasslands, economic valuation of forage and fodder production and services provided by forages, market development and marketing of forage and fodder products and services, etc.; (ii) 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 technical assistance, individual training, workshops, and study tours; and (iii) public extension services (i.e., participatory demonstrations, household visits, group discussions, technical training, company led training and extension).

GEF Activities. The GEF Alternative will finance incremental costs associated with applied research and extension for multiplication of indigenous grassland species for rehabilitation of degraded grasslands, including: (1) applied research in grassland ecology and ecosystem management; (2) training herders and County staff in integrated ecosystem management; (3) ecological surveys and environmental workshops to increase environmental awareness; and (4) applied research into conservation of wildlife habitat of global significance. *An applied research, training and extension strategy is included in the PIP. Their detailed implementation plans, including annual plans for overseas training and study tours will require the Bank's prior approval (see PAD Section G E.5.)*

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, technical assistance 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: (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 (technical assistance and training).

GEF Activities. The GEF Alternative will finance incremental costs associated with establishment of integrated grassland management monitoring processes at Provincial, County and Townships scales including: (1) development and implementation of monitoring processes for adaptive management of integrated ecosystem management at Provincial, County and Township scales and (2) development and implementation of monitoring tools to measure changed carbon sequestration and biodiversity status in managed grasslands. *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 Plan (EMP) and terms of reference acceptable to the Bank. No disbursements will take place before the finalization of the MIS. (see PAD Section G)*

Key Features in Project Design. 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; and (d) the active participation of herders and farmers in the planning and implementation of activities to enhance their capacity to better manage natural resources.

The project components are linked closely together in order to: (i) ensure optimum use of the investments in grassland management and improvement, forage development, livestock breeding and production, and the market systems development components; (ii) promote more effective participation of the herders and farmers; and (iii) address inappropriate policies towards pastoral areas and policy-induced market distortions.

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, 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 enterprises are further supported through the Market Systems Component that empowers household producers to utilize market information to make informed decisions on enterprise selection and production focus.

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	16.73	15.3	7.01	10.6	6.42	61.1
Livestock Production Improvement	66.66	61.0	41.87	63.2	0.64	6.1
Market Systems Development	11.11	10.2	8.98	13.6	0.00	0.0
Applied Research, Training and Extension	8.88	8.1	5.66	8.5	2.44	23.2
Project Management, Monitoring and Evaluation	5.18	4.7	2.09	3.2	1.00	9.5
Total Project Costs	108.56	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	109.22	100.0	66.27	100.0	10.50	100.0

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

The project will contribute to the continuation of China's reform process towards a liberalized rural economy with strong supportive market institutions. It complements China's efforts to further integrate with international markets and join the World Trade Organization (WTO) by developing an integrated livestock production system which efficiently produces and markets high value products that are competitive internationally.

The project will also contribute to policy and institutional reforms towards sustainable natural resource management in China through research and policy studies that will analyze the incentives and disincentives that influence how herders make management decisions regarding grassland use, and will pilot new, participatory approaches that seek to maintain mobility of livestock in order to conserve biodiversity in the production landscape. 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 reforms at county and township levels to enable biodiversity conservation in productive landscapes by encouraging collaborative approaches between bureaux and development of a portfolio approach to grassland management by local institutions. Furthermore, the project would support reforms towards more effective land use and more sustainable use of grassland resources based on the active participation of herders and farmers.

The project seeks to demonstrate the benefits for communities of improved management of grassland resources and livestock production systems and the marketing of livestock products. Currently one of the main obstacles for implementation of group-based management of grasslands is the lack of formal recognition by the Government for such arrangements. Instead, the Government puts an emphasis on the individual household as the basic unit for contracting the grasslands. The project will pilot the establishment of group-based participatory grassland management schemes.

3. Benefits and target population:

Benefits. It is expected that herders, farmers, small entrepreneurs and leading enterprises (so called "dragon heads") will directly benefit from the project. Detailed environmental, 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 income and decreased vulnerability of livestock farmer and herder households as a result of: (i) improved access to markets; and (ii) creation of risk management systems that encourages early off-take of animals from the production system.
- environmental protection: the project is expected to have a positive effect on the grassland environment. The grassland management activities and improved access to extension services and training related to grassland management and livestock production would support grassland rehabilitation and balancing livestock numbers with available forage;
- the establishment of a livestock production and marketing strategy that takes into account the products produced, their quality, the range of existing and potential outlets, and the prices at which these products change hands;
- 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;
- improved status of wool (fine wool, as well as strong and speciality wools), i.e. making the wool more attractive, in the Chinese textile industry; and
- enhanced beneficiary and community participation in the development process. The project would adopt a participatory approach whereby herders and farmers actively assist in the design and implementation of project interventions to address their expressed needs regarding grassland management and livestock production; and

Target population. The main targeted beneficiaries are located in 19 counties/cities in ten prefectures (Jingtai, Jiuquan, Zhangye, Sunan, Yongchang, Liangzhou, Jingyuan, Huining, Lintao, Dingxi, Zhangjiashuan, Qingshui, Linxia, Kangle, Linxia, Lintai, Pinglian, Huating and Ningxian), one corporation (Hovill Group) and two farms (Huangcheng and Minshen) that are managed by the Gansu Provincial Agriculture and Animal Husbandry Bureau. 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 5,854 in 1999). The average (net) per capita income of rural households in Xinjiang is RMB 1,473 per year (1999) and in Gansu RMB 1,357. This figure is well below the average income and also below the average rural income in China (RMB 2,210 per year). Benefits would also accrue to entrepreneurs associated with livestock product processing industries in county, prefecture, and provincial centers (wool, mutton, beef, dairy). A large portion of the herder and farmer households are ethnic minorities (Dongxiang, Hui, Kazakh, Mongol, Sala, Uygyur, and Yugu). The number of households which will benefit from the project are currently estimated to be about 35,000 households (140,000 people), whereof about 24,500 households in Gansu and 10,500 households in Xinjiang. The

selection criteria for beneficiary households is described in the Project Implementation Plan. 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 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, Jingyuan, Zhangye, Yongchang, and Huining., Beef fattening will be the principal activity in Zhangjiachuan, Qingshui, Liangzhou, Lintai, Pingliang, Ningxian, Kangle, and Huating. Linxia, Lintao, Linxia, Huating 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).

The GEF activities will be implemented within geographically-targeted landscape units and natural grasslands of high biodiversity value and with significant carbon sequestration potential, initially in Tekesi and Fuyun Counties of Xinjiang Province (eastern Tien Shan and Altai mountains eco-regions) and Sunan County in Gansu (Qilian mountains eco-region).

Women Beneficiaries. In the livestock sector, women play a significant role in production activities. Women, therefore, are considered as important beneficiaries of the project; and women's participation in the design and implementation of activities will be closely tracked through measurable monitoring indicators. The social assessment has 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. The role of women in the farming systems is described in detail in the social assessments.

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. FECC will assist the Provincial/Regional Project Management Offices (PPMOs) in coordination, logistics and technical assistance when necessary. The FECC has successfully managed a number of Bank projects before.

Project Management Structure. The integrated approach of the proposed project is reflected in the project management structure, in which the various stakeholders, including the beneficiaries, various government line agencies, private sector and civil society, participate. Project Leading Groups (PLG), Project Management Offices (PMOs) and technical advisory groups (TAG) have been established. In Xinjiang PMOs have been established at regional level, prefecture level (with more than 2 counties), county and township levels. In Gansu, township level PMOs will be established only if scope of project in that particular county is so dispersed that it is deemed necessary. *The townships that will not have PMOs will be agreed upon during negotiations. Detailed terms of reference for each of these entities have been prepared (see PAD Section G)*

Project Leading Groups (PLGs). In Gansu, the Foreign Cooperation Committee of the Provincial Standing Committee, headed by the Executive Vice Governor (for Finance) will function as the Project Leading Group. In Xinjiang, a Project Leading Group has been formed, headed by the Vice Governor of Agriculture. To ensure broad ownership for implementing the integrated approach of the project, all relevant departments and agencies are represented: Water Resources, Foreign Trade; The Committees of Agriculture, Economic and Trade, and Environmental Protection; Agricultural Bank of China (ABC) and People's Bank of China; Poverty Reduction Office, and Women's Federation are represented in the PLGs both in Gansu and Xinjiang. *Establishment and maintenance of the PLGs are covenanted in the legal agreements (see PAD Section G)*

The PLGs will provide overall guidance to the project. Specific responsibilities include to: (i) mobilize institutional, technical and financial resources and support for project implementation; (ii) review the annual implementation plans; (iii) monitor the implementation works of line agencies; (iv) define and supervise the work of the PMOs; and (iv) discuss, define, and bring to the attention of the Government, policy support measures which, by complementing project investments, could enhance the achievement of the development objective.

Project Management Offices (PMOs). Provincial PMOs (PPMOs), located in the Provincial/Regional Animal Husbandry Departments, have been formed and undertaken principal responsibility for the preparation of the project. Project institutions similar to those on the provincial level have been established at prefecture/municipal, county and selected township levels and will be funded by the project.

The PMOs, under the guidance of PLGs, are responsible for: (i) coordinating the day-to-day implementation of the project, (ii) drafting of annual implementation plans and any readjustment plans; (iii) in cooperation with the line agencies, implementing overall project management rules, financial management methods, procurement management methods, engineering management and training methods; (iv) supervising and monitoring the project implementation plan, engineering quality, financial management and procurement, and training implementation; (v) the coordination of line agencies and project areas/counties; (vi) reporting to PLGs and the Bank; and (vii) communication and public relation.

PMOs exist on provincial, city and county level and are extended to most of the townships. Staff will consists of personnel responsible for the different components and their integration, for communications and coordination of training and extension, and for 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 are covenanted in the legal agreements (see PAD Section G)*

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 Plans (PIP), including detailed implementation arrangements, have been prepared and reviewed by the Bank's Project Team. The PIPs will be used as key implementation guides for the project (*see PAD Section G).* 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 Plans (MEGDP). It is the project's intent to create a planning process, as opposed to a "blue-print." All implementation arrangements including for financial management (provision of counterpart funds, on-lending, disbursement, auditing), procurement, supervision (including reporting), monitoring and evaluation, and the BPMs are included in the PIP (*see PAD Section G).* *In addition, annual workplans will be prepared in a participatory manner per the BPM and MEGDP, and submitted to the Bank per requirements in the legal agreements (see PAD Section G)*

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. Its major responsibilities are to: (i) provide advice in technical issues relevant to the project design, institutional, technical and financial feasibility and environmental impact; (ii) review technical specifications and project standards; (iii) 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 (iv) 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 and engineers from technical bureaus, cooperating 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. The TAG would be represented by smaller groups at county levels to enable timely participation by beneficiaries. *(See PAD Section G)*

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 livestock development in the medium and long-run.

Timing, Sequencing and Combining Project Activities. The integrated implementation approach requires that the timing, sequencing, and combining of the various component activities be carefully planned to achieve the desired combined benefit. "Timing" is the time allocation to a sub-project or 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 detail in the PIP along with the definition of standards and criteria and description of procedures for the selection and inclusion of project activities for implementation.

Line Agencies. The main day-to-day implementation of the project would be in the hands of 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: (i) to provide assistance in the areas of law and regulation, policy, technical specifications and standards; (ii) to review and comment on the overall design, engineering, technical, financial and economic feasibility studies, and environmental impact of detailed project activities; (iii) to support and give guidance to the work of the PMOs, and supervise and monitor project implementation; and (iv) to provide technical support and information and give necessary training to the relevant staffs in the project areas. In addition, 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 agreements between the PMO and the line agencies will be concluded (see PAD Section G)*

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 production only. Therefore the alternative project approach considered during the early stages of project preparation was mainly a narrow focus on traditional fine wool sheep productivity improvements with a little attention on improving the feed base and marketing of the agricultural products. This alternative was rejected on the ground that a narrow approach may 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 of China 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.

Grasslands cover about 40 percent of China's land area, making China second only to Australia in the extent of its grassland resources. About 75 percent of China's grasslands are found in the semi-arid pastoral areas in the north and west of the country, mainly in Gansu, Inner Mongolia, Qinghai, Tibet, and Xinjiang. The economic development in the rural areas of Gansu and Xinjiang relies heavily on grassland dependent animal husbandry. While the grasslands in the project areas have important global environmental values: (a) biodiversity; (b) forage plant and meat sheep agro-biodiversity; (c) carbon sink and (d) international river catchment, they are also threatened by degradation.

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. In addition, consequences of not doing the project would be: misallocation of investment in livestock systems due to distorted market signals; degradation of the genetic base of fine wool breeds; continued decline in competitiveness of Chinese fine wool *vis a vis* imported fine wool; and declines in incomes, accompanied by reduced tax revenues and a decreased capacity of local governments to provide basic infrastructure and services.

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. Livestock production by low incomes households. Development of smallholder cattle production within existing crop farming areas; improved feed production; marketing of livestock products. Improved sheep productivity; better management of pastures and grasslands; marketing of sheep products. Community based pasture management; livestock and fodder production; risk management. Establishment of community based resource users associations; improved access to markets. Improving pastoral risk management and livestock production.	China: Gansu and Inner Mongolia Poverty Reduction Project	U	S
	China: Shaanxi Agricultural Development Project	S	S
	China: Smallholder Cattle Development Project	S	S
	Kyrgyz Republic: Sheep Development Project	S	S
	Mongolia: Sustainable Livelihoods Project		
	China: Jiangxi Integrated Agricultural Modernization Project - under preparation China: Inner Mongolia and Xinjiang Snowstorm Emergency Recovery Operations	S	S
Other development agencies Canadian International Development Agency (CIDA) Australian Agency for International Development (AusAID) Asian Development Bank	China: Dairy cattle and forage production project, and grassland management project.		
	China: Small ruminant grazing and rangeland management project.		
	Optimization of Initiatives to Combat Desertification in Gansu Province.		

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

GEF-Supported Projects

The proposed project is one of the key elements of China's GEF Partnership on Land Degradation in Dryland Ecosystems under Operational Program (OP) 12 of Integrated Ecosystem Management Operational Policy implemented by the Asian Development Bank (ADB). The GEF component will also complement the UNDP-GEF regional biodiversity conservation initiatives in the Altai Mountain eco-region in Mongolia, Kazakhstan and Russia. The main focus of the UNDP-GEF projects will be on biodiversity conservation in the selected protected areas and buffer zones, as well as on biodiversity overlays at the landscape level. The proposed WB-GEF will work in the Chinese side of the Altai Mountains eco-region, but the project will not work directly inside the protected areas. However, the linkages between these projects arise through promoting sustainable landscape resources management activities outside protected areas in production landscapes. The proposed WB-GEF project would thus allow transfer of lessons learned from implementation of community based grassland management plans to 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, Western 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. 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 that:

- **Institutional Capacity Building.** (a) establishment of Grassland management Associations and Herders Associations should be bottom-up; (b) lending programs need: (i) to capitalize on what has already been achieved in institutional development; and (ii) further strengthen and delegate responsibilities to farmer based grassroots institutions, enabling them to become self-reliant institutions; and (d) participation of beneficiaries in project preparation helps meet their needs more closely than if investments are decided centrally. Once the beneficiaries develop a sense of ownership in a project, they are willing to co-invest in it and take over the responsibility for maintenance.
- **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. The incentives faced by herders has been made the central focus of fine wool activities.

- **Market Access.** Past experience in China suggests that setting up and providing the essential elements for productive livestock production activities has a quick impact on household incomes. 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 the socioeconomic and political. “Political” means the 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. root causes of biodiversity loss; 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 of the project 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 those 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 policies 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 and political 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, strategic tactic to conserving and sustainable using 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. Also, there is growing awareness that livestock related activities, which are based on grassland resources, are under serious threat. The project gives China an opportunity to pilot more sustainable grassland-based livestock production practices and marketing/processing systems that could substantially contribute to improving the livelihoods of its rural population in areas that have received little development attention in the past.

The Government of China 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 (WDS).

The WDS attempts to: (a) reduce economic disparities between the western and other regions; and (b) ensure sustainable natural resources management. Implicit in the WDS is the recognition of the fragility of natural ecosystems in the western region and of the risk of increasing environmental deterioration if appropriate policies and incentives are not put in place. In 1985, the SCNPC passed the Grasslands 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 identified policy actions to restrict the overuse of grasslands, provide measures for rehabilitation of degraded grasslands and conserve existing natural grasslands with high ecological values. Recently, the Government has restructured land tenure arrangements for grassland and in late 2002, the grassland law was revised to provide more guidance and clarity.

Under the direction provided by the WDS, the Government of China has requested the Asian Development Bank to take a lead role in facilitating the preparation of a PRC-GEF Partnership on Land Degradation and in Dry-land Ecosystems under Operational Policy (OP) 12 on Integrated Ecosystem Management.

At the project level, the Ministry of Agriculture and the State Planning and Development Commission have been very active in including the project in the World Bank project pipeline. The local governments in Gansu and Xinjiang have issued formal expressions of commitment in regard to it. The provincial and county Governments have paid considerable attention not only to securing the necessary counterpart funds, but also to establishing a transparent system that ensures their timely and sufficient availability. Other demonstrations of government commitment include that: (i) the project concept has been developed within the policy and institutional framework of the central and provincial governments, and has been prepared through stakeholder consultations; (ii) preventing further degradation of grassland resources is a priority to the government; and (iii) the integrated approach of the project is an indicator of government's commitment on improving the livelihoods of rural population in sustainable manner. Finally, the Borrower has taken a lead role in project preparation. It has set up a project preparation units at Central and Provincial levels that commissioned several studies carried out by local and foreign consultants, with own funding and funding provided by a Japanese PHRD grant and donor agencies.

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 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 Ministry of Agriculture 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 extensive 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.

In addition, Bank involvement can be 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 other donors regarding opportunities for grant financing, especially for some of the technical assistance activities.

Global support is justified in that four of the five project components can be enhanced to provide global environmental benefits in: (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 global support 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.

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. 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.

The economic analysis of the project focuses on the three major areas of quantifiable benefits; (i) increased turnover 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 total economic rate of return (ERR) of the project is 17.1%. The ERR for Xinjiang province is 19.4%. The ERR for Gansu province is 15%.

Capitalized value of total project net benefits is RMB 146 million RMB (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 mill 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)

FRR. Financial analysis was carried out on a representative farm/herder households models for eight pilot counties (Jingyuan, Sunan, Yongchang, Pinglian and Lintao Counties in Gansu Province and Bole City, Tekes 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 household based sheep and cattle production models varies between RMB 7,600 - 30,000 per household. The FRR of is in the range of 17-28%.
- Average investment into household based sheep and beef fattening operations varies between RMB 19,834-97,419 per household. The FRR is in the range of 20-29%.
- Investments into 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 shows 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 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. However, the 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 managements skills; and (c) phasing of investments and monitoring their physical and financial impacts.

Fiscal Impact:

Distribution effects, such as the net impact of the proposed project on beneficiaries and on the provincial and county budgets has been reviewed. The loan itself is anticipated to have little net impact on the central budget since it would be on-lent through the province to the beneficiaries; and emphasis is put on the financial management of the project in order to promote timely repayment of the 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 sources of 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 the components, but as a general principle, technical requirements used under the project will conform with or complement Chinese standards. The project would ensure the full implementation of these generally high standards through its design and institutional set-up, various 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 would attempt to improve techniques and technical standards through experiences gained during implementation, specific TA and empirical research activities.

In general, the technical aspects of the project would focus on long term productivity improvements and implementation of risk reduction and risk avoidance measures from environmental, economic/market and social factors. The key measures comprise: (i) establishment of farmer's/herders' associations and pasture users' associations based on existing and new forms of collective action (e.g. in livestock product marketing); (ii) promotion of improved pasture management techniques based on grassland management plans; (iii) development of reliable feed and forage supply systems; and (iv) promotion of improved access to markets to reduce market risk and maximize cash returns.

Technically, the main challenge of the project is to retain its flexible approach that enables quick adjustments in the detailed design to adjust to changing markets. The flexibility has been integrated into the project design and its implementation guidelines. In addition, 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. *Adequate phasing and sequencing of activities is described in the PIP (see PAD Section G.....)*

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 to work to balance livestock numbers with available forage.

Institutional Capacity. The guiding premise of the project is that there is considerable 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 provide focused training for herders' organizations and pasture users' associations.

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 and well tried out to most Chinese projects. 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 proposed 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 proposed project would 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 province's 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 departments in Gansu has not been involved in implementation of Bank-supported projects in the provinces before and the technical strength of the department is relatively weak. Xinjiang animal husbandry department has implemented its first project, the Xinjiang Snow Emergency Project and has been quite successful its management and executing. In anycase, strengthening of and coordination among the involved agencies is essential. The Project Leading Group has to play an important role in this coordination. *Cooperation agreements will be completed between the PMOs and the line bureaus and adequate management funding will be provided to the line bureaus (see PAD Section G)*

4.2 Project management:

Keys 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 (inance, forestry, planning and development, and water conservancy departments). Based on experience from other rural development projects, the full attention of PLGs is key for smooth project implementation. County PMO's role in coordination is crucial.

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.

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. *(See PAD Section G)*

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 has been 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 approved Chinese Model Bidding Documents for procurement of goods and works under International Competitive Bidding (ICB) and National Competitive Bidding (NCB) procedures 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 contracts. While the national procurement laws and provincial regulations do not apply to the World Bank financed projects in China as specified in the Chinese Bidding Law, they may impact Bank projects. Main issues to pay attention to are: (i) cost estimates are prepared based on mandatory but out-of-date norms and guidelines; (ii) shorter bid preparation (20 days); (iii) bracketing is used for evaluation; (iv) a merit point system (scoring system) is used for bid evaluation; (v) bidding with less than three bidders can be cancelled. *These issues will all be addressed through issuance of a side letter at the time of negotiations* or 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 Foreign Trade and Economic Cooperation (MOFTEC) in the review process has been resulting in delays in the procurement process. MEIRO's function is to review bidding documents and bid evaluation reports for mechanical and electric equipment procurement. The World Bank Office in Beijing has been closely working with MEIRO and MOFTEC to improve their efficiency of the review process and help them better understand the Bank's procurement procedures. However, the central and provincial review processes have been incorporated into the preparation of the procurement plan of the proposed project.

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 of China. These include weaknesses in procurement planning, use of unrealistic cost estimates, poor technical specifications, incomplete design studies, inadequate 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 the project during implementation.

Procurement Under the Project. Procurement under the Project would 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 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 International Competitive Bidding, National Competitive Bidding, 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 technical assistance.

A procurement management manual (PMM) has been prepared by each PPMO. The PMM defines: (a) procedures applicable to the project as agreed at appraisal and negotiation; (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. *A Procurement Management Manual, and a procurement plan have been drafted with the objective to provide detailed procedures for PMO staff to follow, minimize procurement delays and cost overruns. TA under the project will require various levels of consulting services and will follow the Bank's procurement guidelines for consulting services. The Bank's standard procurement covenants are included in the legal agreements. (See PAD Section G)*

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 in accordance with Bank's requirements. 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. Potential weaknesses in procurement management identified during this assessment, and recommended actions include:

- 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.
- 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.
- Procurement Agents. NCB procurement agents (PAs) should be hired by PPMOs to ensure efficient procurement. As Gansu and Xinjiang will procure different types of equipment, the two PPMOs may select different PAs. PPMOs are required to select PAs prior to negotiations, which should be experienced in Bank financed procurement and subject to Bank assessment.
- Procurement Planning. PPMOs should immediately start preparation of procurement arrangement table (packaging and methods) and the procurement scheduling of the first year of the project implementation. Consultant contracts, if any for the first year must be included in the scheduling. Systematic numbering of contracts should also be provided in the planning. The procurement planning should be provided in Excel or Microsoft Project.
- Procurement Manual (see also below). Each PPMOs has prepared a procurement management manual for Bank review, outlining the procurement cycle management, administrative procedures and filing of procurement records, etc. The procurement provisions as set in the final Loan Agreement of the project should be fully incorporated into this manual. It will be issued by PPMOs

to counties to be followed when the project is started to be implemented. PPMOs should arrange workshops to explain in detail the provisions of the manual to the related staff of the county PMOs when it is issued.

- 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.

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 exist in the areas of internal financial control procedures, the reporting system, and staffing. A formal country financial accountability assessment (CFAA) has never been carried in China. However, the Chinese government 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 the World Bank Financed Project", which specifies the procedures for financial management for all project implementation entities. The establishment of a financial management system under all Bank financed projects is now standard practice. Simplified financial reports have been agreed upon and have been used for all Bank financed projects in China appraised after July 1, 1998. In addition, MOF issued "The Regulation on Accounting and Reporting for the World Bank Financed Project 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 misused 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 proposed project. Gansu and Xinjiang Provincial Audit Bureaus have been identified as the auditor for the project. *This provincial level agency will carry out the audit fieldwork.* The audit reports will be issued by the provincial audit bureau under the guidance and supervision of the China National Audit Office. (*See PAD Section G*). In addition, the internal audit department already established in the provincial audit bureau will provide internal audit function for the project. The provincial audit bureau has 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 System Manual to be finalized and included in the PIP (*see PAD Section G.....*).

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. The Ministry of Finance (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. *The establishment of a MIS will be a condition for disbursement (see PAD Section*).

An assessment of the financial management system and its capacity was carried out in July 2002 per requirements of the Bank's OP 10.02. 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's projects and have accumulated extensive experiences and are familiar with Bank requirements. The financial management assessment revealed no major weaknesses and concludes 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. *Standard financial control covenants are included in the legal agreements (record and accounts keeping, audits and utilization of statement of expenditures.) (see PAD Section G)*

- **Inexperienced PPMOs.** Gansu Agriculture and Animal Husbandry Bureau, the key project management and implementation body in Gansu province, has not been involved in Bank-supported projects, and technical capacity of the Bureau is relatively weak. Therefore, capacity building and strengthening of the Bureau should be a top priority and adequately addressed prior to Board presentation. In addition, the project leading group 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 though 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. A comprehensive training on project financial management has to be provided prior to effectiveness by the project 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. MOF would on-lend IBRD funds to Gansu and Xinjiang according to standard practice. Gansu and Xinjiang, together with MOF has chosen as IBRD loan instrument. The reasons.....

On-Lending Arrangements, Flow of Funds (including Counterpart Funds) and Loan Repayment.

On-lending agreements would be signed between the various Government levels of the Province/Region, i.e. Provincial/Regional Finance Bureau, Prefecture Finance Bureaus, and County Finance Bureaus. Either the county finance bureaus or rural finance institutes, e.g. RCCs would act as financial agents. 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 financial responsibility for project activities which are of private nature, would be passed on to individual beneficiaries (enterprises and households) under varying on-lending terms for different project activities. The following general guidelines have been agreed upon: (1) loans will be denominated in local currency and no foreign exchange risk would be handed down to the final beneficiaries. *The foreign exchange risk would be born by the Province (see PAD Section G B.3.);* (2) the interest rate of the loans would be fixed at the time of contract signing and cannot be changed over the course of the repayment period; (3) the cost of a loan 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; (4) the maturity of sub loans will depend on the repayment capacity of the borrower and the returns from the investments. *The detailed onlending terms and conditions are summarized in Table 1 below and have been specified in the PIP and component implementation manuals and will be covenanted in the legal agreements (see PAD Section G).*

Commonly, Bank financed rural development projects in China experience serious delays in the provision of counterpart funding hindering timely project implementation. The participating counties' financial situation and ability to provide counterpart funds has been assessed and will be closely monitored by the Provincial Finance Bureau. The overall counterpart fund requirement for the project is about 1/3 of the total project funding. *Details for sources of funds for the various activities have been agreed upon and are included in the PIP. Repaid loans that have not yet fallen for repayment by the counties to the province would be used for similar activities to the project (see PAD Section G).*

To facilitate the monitoring of counterpart fund provision, a computerized financial monitoring system will be active before the project will start disbursing (see PAD Section G A.1.). In particular, this system will provide accurate information regarding the timing of the need for counterpart funds. As the implementation of the project will involve very large numbers of loan agreements between County Financial Bureaus and beneficiaries, the MIS will also include a loan tracking module. This would allow for sound control of the recovery of the loans.

Table 1. Onlending Terms and Conditions

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) of the proposed project has been carried out, in parallel with project preparation, by an independent institute (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 highly participatory preparation approach of the proposed project and was implemented in parallel with project preparation. The EIA has: (a) screened the project to the most appropriate review and approval option; (b) established a reliable environmental baseline against which to measure future change; (c) established environmental objectives, standards and performance indicators; (d) identified additional environmental project sub-components; (e) identified benefits and residual impacts or risks (i.e. those that cannot be avoided or mitigated); (f) designed 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 of the People's Republic of China, Governments of Gansu and Xinjiang, and the World Bank. This 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 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 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. In addition, marketing related activities such as auction markets, slaughterhouses, and milk processing facilities were also reviewed and potential environmental impacts and respective mitigation measures were identified.

Anticipated Environmental Impacts. The major environmental issues that were identified are the present status of natural grasslands, adequacy of feed stuff for livestock, and adequacy of natural resources (water and soils) for the production of artificial pastures and improved natural grasslands to ensure an environmentally and socially sustainable development project. During implementation and operation phase, 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) should reduce the pressure on natural grasslands, allowing for the rehabilitation of the presently degraded and/or overgrazed grasslands. Use of seeds of indigenous grass species for the improvement of natural grasslands through supplementary sowing would provide for improvement of natural grassland ecology. It is anticipated that the proposed GEF activities would generate positive global environmental impacts.

Possible negative environmental impact could come from any limitations in availability of irrigation water for the development of artificial pastures within project counties, and soil quality (soil salinity, sodicity, water holding capacity, nutrient availability, etc.) for development of irrigated forage/fodder crops. Since the exact location for development of artificial grassland is not identified, it is difficult at this point 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

sustainable implementation. In addition, the project will encourage alternative, less water demanding forage crops and water saving irrigation methods. The dairy sub-component in Gansu has its own specific environmental issues and potential impacts. Three different dairy production models are proposed: (i) small-scale household dairy farmers; (ii) medium-size dairy farms with up to 100 heads; and (iii) larger-scale (200 dairy cattle) run by Hovill Dairy Company. The small-scale household enterprises with 1 - 5 heads cattle/household are not anticipated to cause any significant impacts. However, medium and large scale dairy farms and beef cattle feedlots could have pollution impacts and health related issues (possible coliform increase), odor and manure, and liquid waste from washing of the equipments. Appropriate waste/wash water and manure treatment plans will be incorporated in the design of these activities to reduce potential negative impacts. The potential negative environment impacts identified in the EIA 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 as identified in the EIA report, an *Environmental Management Plan (EMP)* has been developed to provide a plan to implement the identified monitoring and mitigation measures. The EMP also provides a budget estimate, manpower needs and training/capacity building requirements in order to ensure efficient implementation of the EMP. For artificial grassland locations not yet identified, and activities under the Market Systems Development Component not yet designed in detail, the EIA and EMP spells out detailed environmental assessment procedures to be followed prior to clearance of such activities (see PAD Section G)

The Environmental Management Plan (EMP), developed as part of the EIA, is based on the highest standards of the Government of China. The content is consistent with the corresponding Bank policies and includes: (i) recommendation of feasible and cost-effective measures to prevent or reduce significant negative environmental impacts to acceptable levels, including proposed work programs, budget estimates, schedules, staffing and training requirements, and other necessary support services to implement the mitigating measures; (ii) 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 (iii) preparation of detailed arrangements for the monitoring of implementing mitigating measures and the impacts of the project during construction and operation. A detailed 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 EMP.

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

Date of receipt of final draft: July, 2002

The project has been categorized as and Environmental Risk Category B and Safeguards Risk Category S2. The ratings were given on the basis of the general restorative and conservation nature of project activities and: (a) the presence of ethnic minorities in the project areas; (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 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 EMP.

The EIA has been carried out by an independent institute (Chinese Research Academy of Environmental Sciences (CRAES)) who is certified to undertake environmental impact assessments according to Chinese regulations. A Bank contracted consultant worked closely with the EIA team to advise them in their work. The EIA work is fully in line with the highly participatory preparation approach of the proposed project.

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. 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. A second draft was reviewed by the the Regional Safeguards Team. The EIA report was finalized in March 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 and the proposed project, participation of beneficiaries and other stakeholders was of great importance in the environmental assessment process.

In order to keep all beneficiaries informed, the EIA Terms of Reference (TOR) were sent to the libraries within the affected communities for review and comment by the interested parties. Notices were issued and were 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 (see 6.2 below) have been prepared in close cooperation with the EIA and established the means and mechanisms by which project beneficiaries would participate in a meaningful way in project implementation. All consultations have been appropriately recorded. Training and capacity building are proposed as part of the project to enhance the Borrower's ability to implement the project in a participatory manner

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. Detailed arrangements (including costing) has been prepared for monitoring the impacts of the project during construction operation and implementation of any mitigating measures as part of the EMP in the EIA report. Training and institutional strengthening will ensure that environmental monitoring will be carried out with participation of all stakeholders in the project. Environmental monitoring indicators are included in the regular monitoring reporting such that they fully reflect and follow the objectives of the EMP. All environmental inspectors and county level environmental staff will be trained as part of the training programs within project management component as identified in the EMP on identification of project environmental monitoring indicators and triggering points. The EMP 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 natural resources development projects.

6. Social:

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

General. The main 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, Sala, 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 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 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 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 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.

During the summer of 2001 extensive social assessments were carried out in both Gansu and Xinjiang by Chinese social scientists. 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 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 Ethnic Minorities Development Plans for both Gansu and Xinjiang in accordance with OD 4.20 as the best mechanisms to address minority nationality concerns and issues. *The project will be implemented in accordance with these plans (see PAD Section.....)*

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

General. The nature of the project requires that it is community driven in design and implementation. 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. The nature of the project requires close involvement of the beneficiaries in the detailed design of the various project activities. In order to "streamline" beneficiary participation in implementation, a Beneficiary Participation Manual (BPM) has been prepared (*see PAD Section G*). The purpose of the BPM is to describe in detail and formalize the consultation and participation process with affected and beneficiary groups. As such, it is a strategy for allowing stakeholders to influence and share control over the decisions and resources that affect them. The BPM is viewed as a working document that is modified to reflect any changes in the project and/or in the economic, political, and social conditions.

The BPM: (1) identifies the project's *main stakeholder groups* (beneficiaries in general, women in particular, government leaders, academicians, and any other groups that would be affected by the project); (ii) summarizes the *types of activities* project households and affected groups are involved in at different points in the project life cycle for each of the components; and (3) describes the *extent of participation* by households and affected groups, and (4) the *forum for participation*. The BPM also contain: (a) strategy for involving farmer households in the selection of actual project villages; (b) needs assessments of the farmer households with respect to production, training, and financing in each of the project counties; and (c) set of criteria for targeting, selecting, supervising, monitoring and evaluation.

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

The project is actively promoting the formation of farmers'/herders' organizations which through their active involvement in project implementation would increase project impact and sustainability. This would be grassland management groups and farmer production and marketing groups.

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 BPM and MEGDP.

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 social assessment process throughout project implementation. Detailed arrangements for monitoring the social impacts of the project has been included in the Multi Ethnic Groups Development Plans and in the regular monitoring reports.

A quantitative/qualitative baseline survey has been prepared for monitoring purposes. Continuous follow-up monitoring of the baseline survey households will be carried out by an independent local institute in cooperation with project beneficiaries. Both quantitative and qualitative baseline surveys will be carried out for monitoring purposes. *The monitoring will be carried out by an independent local institute in cooperation with project beneficiaries. (see PAD Section.....).* In addition, the BPM establishes a feedback mechanism that allows 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 BPM has also established information dissemination mechanisms (in the context of a Project Communication Strategy) through which stakeholders can receive continuous information on the projects social impact.

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)	<input checked="" type="radio"/> Yes <input type="radio"/> No
Natural Habitats (OP 4.04, BP 4.04, GP 4.04)	<input checked="" type="radio"/> Yes <input type="radio"/> No
Forestry (OP 4.36, GP 4.36)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Pest Management (OP 4.09)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Cultural Property (OPN 11.03)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Indigenous Peoples (OD 4.20)	<input checked="" type="radio"/> Yes <input type="radio"/> No
Involuntary Resettlement (OP/BP 4.12)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Safety of Dams (OP 4.37, BP 4.37)	<input checked="" type="radio"/> Yes <input type="radio"/> No
Projects in International Waters (OP 7.50, BP 7.50, GP 7.50)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Projects in Disputed Areas (OP 7.60, BP 7.60, GP 7.60)*	<input type="radio"/> Yes <input checked="" type="radio"/> 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. Final sub-project designs will be such that no impact will take place on natural reserves, and will be reviewed by the Bank prior to implementation. No project activities will take place in natural reserves or within buffering zones of natural reserves. *Procedures for environmental reviews for final plans have been developed in the EMP (see PAD Section G)*

Indigenous People. The majority of project beneficiaries are minority nationalities. The social assessment recommended to the Borrower and the Bank that a minorities-targeting development plan 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. Multi Ethnic Group Development Plans (MEGDP) have been prepared for both provinces *The MEDPs, which: (i) identify and describe the minority population in the project areas; (ii) specify the development requirements for minorities in project implementation, have been prepared and are part of the overall implementation plans of the project (see PAD Section G)*

Safety of Dams. It is likely that the project will utilize irrigation water downstream from two dams in Xinjiang exceeding 15 meters in height or 10 meters in height and 2.5 million cubic meters in storage capacity thus being subject to safety review in accordance with procedures acceptable to the Bank in accordance with OP 4.37. *A Dam Safety Review Management Plan for the project will be prepared and will become part of the overall implementation plan of the project (see PAD Section G).*

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 depend upon the functioning of the relevant resource users associations, being able to generate revenues for operation and maintenance and organize members to contribute labor. Implementation of project investments and activities will thus go in parallel with capacity building at the local level through a participatory approach. Particular attention would be paid to supporting the beneficiaries in building capacity to take on this responsibility for sustainable management of 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 to 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; conservation and sustainable use on privately owned lands; (b) 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 newly established resource user associations.
- **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 sub-loan program which if successful, would be expected to be adopted by banks within and beyond the project areas. Another example is the reorganization of fine wool marketing at herder level. Its 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 generating also significant global benefits.

1a. Replicability:

The ADB's PRC-GEF partnership has identified the project, along with six other projects, as demonstration projects to generate knowledge and experience in integrated approaches to land management. These projects would provide an array of lessons and replicable models on integrated land management for the priority eco-regions in the western region, and more widely across the country and the region.

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 applicability of what they have seen. 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. Herders who have survived on marginal resources are careful and risk averse people and will thus take their time to adopt new avenues and techniques, which will ensure sustainable utilization of their resource base. The GEF pilots and demonstration activities will provide incentives and confidence for herders to overcome barriers that currently limit their adoption of integrated and sustainable pastoral production systems. Finally, there also seem to be 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 with the availability of natural resources for the implementation of the project. Availability of adequate feed quality (nutritional value) and quantity for sustainable development of the project 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 PAD 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 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. Certainly, 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 (including fodder crops); (c) increased investment costs; (d) inability to achieve the projected livestock productivity targets; (e) lower

than expected fodder crop yields which would increase the total cost of feed and fodder (farmers need to purchase more feed from markets); (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) to (c) are modest. Livestock products have shown generally an upward trend in China and prices of major inputs have been stable. Risks (d) and (e) are 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. Risks (g) and (h) 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.

Regarding risk (f) above, international wool prices are, for all quality categories, volatile and subject to periodic collapses. A long period of low wool prices poses a risk to the financial viability of the project. However, the current wool prices received by herders are so far below international levels (adjusted for transport and quality considerations) due to the shearing, grading and baling practices, that this risk is rather distant. Some causes of price volatility and collapse are domestic (e.g. local transport and storage restrictions, lack of transparent pricing and quality standards descriptions). This risk is mitigated through implementation of the project marketing activities.

Delivery of Project Benefits. 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, with the result that some existing enterprises continue to dominate markets, while not delivering new market functions nor channeling benefits to herders. 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. Lack of community commitment to enforce natural resource use and provisions of the Grassland Law. Grassland stations continue having difficulties to enforce the implementation of the Grassland Law. Difficulties to trade wool across provincial borders freely remain. Low adoption rates of new technical innovations and packages by farmer/herders.	S S S S M	The project will support training, awareness building, knowledge and information man. for relevant institutions and entities. The project will strengthen community and public institutions to enforce appropriate regulations and maintain natural resources sustainability, and develop proper incentives. The project would support linkages with and service provisions by public agencies, by establishing links with various centers of technical expertise at all levels. The project would work to obtain full Regional government support to monitor and enforce free trade. The project activities would be sequenced. Technologies and technical innovations which are profitable and consistent with farmers/herders skills and needs would be developed. Technologies which have significant positive impact of farmers/herders incomes while minimizing the risk would be selected. Training and extension will build confidence in production techniques and activities.
From Components to Outputs Provincial, prefecture and county governments approve and release project counterpart funds on time. Unsuitable staff would be appointed to implement project activities.	S M	- 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. The project would 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. 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.

3. Possible Controversial Aspects:

General. More generically, any internationally financed project in Xinjiang Uygur Autonomous Region could possibly provoke international political controversy. This is an issue however, that must be addressed at a country portfolio level during country assistance strategy discussions, rather than through individual projects. In addition, any project in Xinjiang potentially involves sensitive ethnic questions. Due attention to the needs of the ethnic minorities, careful application of OD 4.20, and the preparation of the MEGP should help alleviate such concerns. Other potential area of controversy in pastoral development projects would be whether or not the project was contributing to the involuntary settlement of pastoral nomads or increasing animal/human pressure on already degraded grasslands. The project design has been careful to avoid either path. In this context, it should be noted that the pastoral peoples in the project areas have already been settled in permanent or semi-permanent fixed residences for the better part of a decade or more.

Specific. Potential project specific aspects of controversy include:

- Loans to wool traders could promote non-competitive practices. The project will provide loans to wool, livestock and mutton traders. The purpose is to alter and improve their function in the markets, with the overall goals of raising prices received by herders and offsetting their risks. Secondary benefits include the use of contracts and the shifting of seasonal supply patterns. Traders are blamed by some market participants for applying downward pressure on prices by way of non-competitive practices. These arguments have little economic justification, and such problems are in any case best approached by increasing, rather than reducing the number of active traders in a market.
- 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 possibilities exist based on local knowledge of products and production systems, as well as substantial volumes of product. 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 organizations could potentially be controversial 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.

1. Effectiveness Condition

4. Cooperation contracts shall be concluded between the various levels of PMOs and the various levels of environmental monitoring stations/environmental protection bureaus (PAD..., PA....).

A. Condition for Disbursement

B. Procurement and Financial Covenants

B.5. <u>Water</u>	Charges
..... Section.....).	(PA

B.6. Procurement. Goods and works shall be procured in accordance with the provisions of Section I of the "Guidelines for Procurement under IBRD Loans and IDA Credits." Consultants' services shall be procured in accordance with the provisions of the "Guidelines: Selection and Employment of Consultants by World Bank Borrowers." (PA, Schedule 1).

C. Reporting and Monitoring Covenants

C.1. Management Information System. Project will implement and maintain a management information system acceptable to the Bank (PA Section.....).

C.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,).

C.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 Schedule 2,).

D. Project Management and Coordination

D.1. 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).

D.2. 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).

D.3. 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).

D.4. Investment Committee. Project will establish and maintain throughout project implementation, an Investment Committee under terms of reference acceptable to the Bank and comprising members with qualifications acceptable to the Bank. (PA Schedule 2).

D.5. Cooperation Agreements. Enter into and maintain cooperation agreements acceptable to the Bank between the PMOs and the Water Resources Bureau, Agricultural Bureau and Environmental Protection Office at the provincial and county levels (PA Schedule 2).

E. Project Implementation

E.1. Project Implementation Plan and Manuals. The project would be implemented in accordance with the Project Implementation Plan, including Procurement Management Manual, Financial Management Manual, Beneficiaries Participation Manual (PA Schedule 2).

E.2. Annual Work Plans. PPMO shall facilitate participatory preparation of annual work plans for the Bank's prior review. (PA Schedule 2).

E.3. Beneficiary Participation. Project shall be implemented according to the Beneficiaries Participation Manual agreed upon with the Bank. (PA Schedule 2).

E.4. Phasing and Sequencing of the Project. xxxxxxxxxxxxxxxxxxxxxxxx. (PA Schedule 2).

E.5. Irrigation Designs. All irrigation works would be established in accordance with technical design criteria acceptable to the Bank. (PA Schedule 2).

E.6. Grassland Management Plans. Grassland management plans forcounties in Gansu and xxxxxxxx counties in Xinjiang shall be prepared and implemented in accordance with guidelines acceptable to the Bank (PA Schedule 2).

E.7. Water Resources 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 (date...), water tests and studies will become a pre-requisite for implementation of artificial grassland sub-components. In addition, water withdrawal permits, required according to the EPB regulations, should be obtained from the respective water resources administration bureaus at county/prefecture level before release of funds for the development of irrigated artificial pastures (irrigated alfalfa crops) (PA Schedule 2).

E.8. 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).

E.9. Market Systems Development. Project will prepare a detailed implementation plan for the market systems development activities acceptable to the Bank and approved by the Provincial PLG by_____ (PA Schedule 2).

E.10. Applied Research, Training and Extension. Project will prepare a detailed implementation plan for the applied research, training and extension activities, acceptable to the Bank and approved by the Provincial PLG by_____. For overseas training and study tours, the Project will submit an annual plan for the Bank's prior review no later than November 1 of each year for prior approval. (PA Schedule 2).

E.11. Farmers'/Herders' Associations. Project will prepare a detailed implementation plan for the farmers'/herders' groups support, acceptable to the Bank and approved by the Provincial PLG by_____. (PA Schedule 2).

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

F.1. Environmental Management 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 3,).

F.2. Indigenous People. Project will implement the Multi Ethnic Groups Development Plan (MEGDP), 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,).

F.5. 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,).

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
Team Leader

Mark D. Wilson
Sector Manager/Director

Yukon Huang
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: Sustain rural income growth, while maintaining the natural resources base.	Sector Indicators: <ul style="list-style-type: none"> - Average net income of participating project counties increased by end of project (EOP). - Rate of grasslands degradation in project counties halted or reduced. 	Sector/ country reports: <ul style="list-style-type: none"> - Periodic income statistics and poverty surveys. - Periodic grassland monitoring 	(from Goal to Bank Mission) <ul style="list-style-type: none"> - Government will continue to focus on rural development. - Government committed to sustainable resource management.
GEF Operational Program: 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.	Outcome / Impact Indicators: <ul style="list-style-type: none"> - Implementation of landscape level grassland management plans linking critical eco-systems. - Stabilization of key threatened grassland eco-systems and habitats in the project areas. - Increased trend in dry matter production, percentage of soil coverage, cover of desirable species, botanical composition, and grass cover in project areas. 	<ul style="list-style-type: none"> - Independent monitoring of project implementation progress. - Periodic grassland monitoring 	<ul style="list-style-type: none"> - Local communities honor their commitment to implement grassland management. - Commitment of local stakeholders to global biodiversity conservation objectives.
Global Objective: Project Objective: To promote sustainable natural resource management through establishing improved livestock production and marketing systems that would increase the income of herders and farmers in the project areas.	Outcome / Impact Indicators: <ul style="list-style-type: none"> - Increasing trend in average net income of project households relative to other households in the same township. - Trend in extent and location of grasslands under sustainable on-the-ground management. - Participants perception and understanding of biodiversity conservation and impacts of their grazing management decisions. - Increasing trend in fine wool and mutton prices received by farmers/herders participating in the project compared with other farmers/herders in the same township. 	Project reports: <ul style="list-style-type: none"> - Project monitoring (comparison with baseline) - Regular pasture inspection and monitoring (including aerial photography and satellite imagery) on basis of grazing plans agreed with beneficiaries. - Project Implementation Completion Reports. 	(from Objective to Goal) <ul style="list-style-type: none"> - Prices of livestock products provide adequate incentives to farmers and herders. - All levels of government committed to monitor and enforce the National Grassland Law. - All levels of government are committed to maintain agricultural research and extension programs. - All levels of government enforce laws allowing free movement of livestock products within and between counties, Provinces and the international markets.

Hierarchy of Objectives	Key Performance Indicators	Data Collection Strategy	Critical Assumptions
<p>Output from each Component:</p> <p>1. GRASSLAND MANAGEMENT AND FORAGE DEVELOPMENT- introduced 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.</p> <p>Forage and Fodder Production: (a) developed new systems for annual and perennial forage/fodder development for increased livestock production and improved animal nutrition; and (b) developed skills in mon. impact of forage production practices on the env.</p> <p>Grassland Management and Improvement: (a) identified appropriate pastoral risk man. system; (b) dev. grassland survey, assessment and mon. methodologies, and skills; (c) developed community based grassland man. plans; (d) developed and introduced sustainable grassland-based livestock prod. systems that will reverse the current trend of grassland degradation and contribute to improving the livelihoods of its rural population; (e) developed new systems for annual perennial forage/fodder dev. for increased livestock prod. and improved animal nutrition; (f) developed skills in mon. env. impact of forage prod. practices; and (g) dev. sustainable technical and non-technical mechanisms for grassland man.</p> <p>2. LIVESTOCK PRODUCTION IMPROVEMENT - dev. sustainable animal prod. systems through improvements in animal genetics, including native species and monitoring.</p> <p>Fine Wool & Mutton Nuclear Breeding Stations - increased the economic viability of fine wool</p>	<p>Output Indicators:</p> <ul style="list-style-type: none"> - 75% of project grasslands under effective management by EOP - Number of community-based grassland management plans developed for project production units. - Change of area under fodder crop compared to the baseline conditions. - Number of community based technical resource management teams established in each project county EOP. Increase of annual animal off-take <ul style="list-style-type: none"> - Average net income per ewe, will increase - Average lambing rate, average lamb mortality, average adult mortality will increase - Average wool yield will increase, clean fleece yield and fiber fineness in the wool clip will increase; - Increase in number and variety 	<p>Project reports:</p> <ul style="list-style-type: none"> - Project progress reports. - Bank supervision mission reports. - Monitoring and evaluation reports. <ul style="list-style-type: none"> - Project survey results (based on baseline study). - Sheep tallies. - Sales data. - Annual audited project accounts; - Project progress report - Bank supervision mission reports - Herder surveys 	<p>(from Outputs to Objective)</p> <ul style="list-style-type: none"> - Adequate community commitment to enforce natural resource use and provisions of the Grassland Law - Adequate government commitment and support for decentralized and herder managed natural resources control - Grassland technicians have institutional means to enforce provisions of the Grassland Law <ul style="list-style-type: none"> - New technical innovations and packages are adopted by farmers/herders. - Herders recognize the economic benefits of AI - Breeding farms recognize and develop beneficial strains of local breeds - Price changes achieved through market development are

<p>and mutton sheep production through genetic improvement in economically important traits.</p> <p>Fine Wool and Mutton Sheep Multiplication Farms - increased the numbers of genetically improved fine wool and mutton sheep.</p> <p>Fine Wool and Mutton Breeding Households - increased herders income through improved breeds, training in techniques of efficient animal production, and through better equipment and facilities.</p> <p>Fattening Farms (mutton and beef) - provided opportunities for smaller scale fattening operations.</p> <p>Dairy Sub-Component - developed efficient household and small-scale dairy production entities.</p> <p>3. MARKET SYSTEMS DEVELOPMENT - improve the competitiveness of the Chinese wool and mutton sector, develop a market based system for the sale of these products, and increase the capacity of wool testing laboratories.</p> <p>Physical investments - established new and reconstructed livestock markets, new and reconstructed shearing stations, with appropriate equipment and storage facilities.</p> <p>Targeted loans - provided loans to market participants to (a) re-orient seasonal livestock sales in pastoral areas with persistent late-Summer feed shortages (b) promote the use of contracts specifying animal liveweight and standard wool quality descriptions (c) improve competitiveness amongst livestock and wool buyers. Provided loans to selected rural enterprises to promote marketing of farmers/herder activities.</p> <p>Public goods and services- dev. market info. provision, training, applied research, and est. of marketing organizational systems.</p>	<p>of meat, fine wool and dual purpose sires available to project herders.</p> <ul style="list-style-type: none"> - Increase in number of herders using advice on breeding/production and marketing system and good herders' satisfaction with the programs and services. - Yield increase of lamb slaughter weight at 9 -12 months of age <p>Increased herders' profits per animal.</p> <p>- Numbers of sheep shorn by certified shearers.</p> <ul style="list-style-type: none"> - Price received by project herders for fine wool (that has been mechanically shorn, classed and baled) is higher than for other herders by an average of 22% after 5 years; 50% after 10 years and 61% after 15 years. - Share of wool clip in project areas that is classed and presented for sale in like-quality lines according to the schedule is increased. - Wool quality description system developed, introduced and accepted as industry standard, including the use of quality certificates at sale-by-separation auctions 	<p>- Project survey results (based on baseline study).</p> <ul style="list-style-type: none"> - Project progress report - Bank supervision mission reports - Reports by Nanjing Wool Market 	<p>transmitted to the production level, so as to reflect improved quality of meat and wool</p> <p>- 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.</p> <ul style="list-style-type: none"> - Chinese wool processors recognize Chinese fine wool products as a viable alternative to imported wool, top, yarn and fabric.
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<p>4. APPLIED RESEARCH, TRAINING AND EXTENSION</p> <ul style="list-style-type: none"> - developed and transferred relevant low cost technology to herders and farmers - developed a sustainable training program with trainers of trainers. - established an effective extension system that provides needed services to herders and farmers. <p>5. PROJECT MANAGEMENT, MONITORING AND EVALUATION provincial, county and township-level PMOs and relevant line bureaus established and operational.</p>	<ul style="list-style-type: none"> - Number of trainers trained. - Number of AI station staff trained. - Number of shearing trainers trained. - Herders/farmers satisfied with the training and extension <ul style="list-style-type: none"> - PMOs established and staffed - Progress reports/annual imp. plans on schedule - Publish detail of wool price/quality/ vol. available to herders/ relevant languages/ freq. intervals - Posters/diagrams in shearing stations to assist w/ recognition of quality criteria and wool handling,; - Published detail of sales volumes/prices, and offer prices at local meat processing facilities - Herder-project manager technical service group established and functional to allow for herder driven development 	<ul style="list-style-type: none"> - Project progress report - Bank supervision mission reports - Herder/farmer surveys <ul style="list-style-type: none"> - Annual audited project accounts - Project progress report - Bank supervision mission reports 	<p>Extension stations participate effectively in project.</p> <p>Operational support from key government agencies provided to PMOs</p>
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Hierarchy of Objectives	Key Performance Indicators	Data Collection Strategy	Critical Assumptions
Project Components / Sub-components: Grassland Management and Forage Development Livestock Production Improvement Market Systems Development Applied Research, Extension and Training Project Management, Monitoring and Evaluation	Inputs: (budget for each component) \$ 11.14 million \$ 66.02 million \$ 11.11 million \$ 6.44 million \$ 4.46 million	Project reports: - Project progress reports - Project Financial Management Reports - Bank supervision mission reports - Project ICR	(from Components to Outputs) - Provincial, prefecture and county governments approve and release project counterpart funds on time - Highly qualified counterpart staff can be assigned to work (and maintained) on a full-term basis

Annex 2: Detailed Project Description

CHINA: Gansu and Xinjiang Pastoral Development Project

By Component:

Project Component 1 - US\$16.73 million

Grassland Management and Forage Improvement (US\$16.73 million of which GEF US\$6.42 million)

Component Output: This Component will introduce sustainable grassland-based livestock production systems that will reverse the current trend of grassland degradation and substantially contribute to improving the livelihoods of its rural population. The GEF incremental 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: (i) 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 improved livelihoods of the farmers and herders; (ii) improve the capacity of farmers and herders to better manage their grasslands, artificial pastures and livestock and promote more sustainable use of grassland resources and on-farm forage and feed supplies; and (iii) 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: (1) lead to increased understanding of grassland ecosystem dynamics; (2) improve the information base on grassland and biodiversity resources; (3) improve the ability of herders and government technicians to plan participatory grassland development in an integrated ecosystem approach; (4) result in the development of village-based participatory grassland resource management plans; (5) lead to improved management of the grasslands for both livestock and wildlife; (6) conserve globally important grass and legume germplasm; (7) increase supplies of forage from reseeding degraded grasslands; and (8) improve wildlife habitat.

Description of Sub-Components: The sub-components will comprise: (1) forage and fodder production; and (2) grassland management and improvement. The applied research, training and extension activities related to grassland and forage management are described under Component 4.

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 productivity. Annual forage/fodder development would focus on the raising of corn for silage and feed-grain. In addition, attention would be directed towards other annual forage/fodder crops such as oats, peas and vetches which 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; (ii) development, testing and extension of new systems for growing corn for livestock feed-grain; (iii) development, testing and extension of new systems for growing other annual forage/fodder crops (oats, peas, vetches); and (iv) limited irrigation development and deep wells to provide water for forage and fodder development. Forage and fodder development will take place on both irrigated and non-irrigated land and there will be different seeding rates and fertilizer applications depending on whether or not the land is irrigated or not.

(b) *Perennial forage development*: (i) development, testing and extension of new systems for growing alfalfa; and (ii) development, testing and extension of new systems for growing perennial grasses.

(c) *Monitoring and evaluation* comprising the following activities: (i) project monitoring with key implementation and output indicators; (ii) environmental monitoring to assess the environmental risks not fully mitigated by the environmental assessment process; and project impact monitoring to document the impact of improved forage/fodder production on individual households and communities.

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 to improve livestock distribution on the grasslands, especially when considered as part of an overall herder or 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. The sub-component would develop practical grassland management and improvement models. Funding would be provided to support the following key activities:

(a) *Participatory grassland resource planning*. Participatory grassland management plans are a valuable tool to assist herders in developing more sustainable use of grassland resources while improving livestock production and livelihoods of the pastoral communities. The key to improving livestock productivity is ensuring 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 on which livestock depend, 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 participatory grassland management plans is based on the following reasoning:

- ecological condition of the plant community in terms of structure and composition influences the allowable level of grazing intensity and determines the ecologically sustainable stocking rate;
- the stocking rate in turn correlates directly with the livestock off-take available to be sold to provide income and profits to the production enterprise;
- a stocking rate balanced with annual availability of forage and fodder resources allows the grassland manager to project, over a specified planning horizon, the changes in stocking rate that might occur if improvements (i.e., improved yield of natural pasture, construction of improved artificial pasture, higher producing hay-land, water development, improved livestock nutrition, reseeded of degraded grassland, etc., were implemented; and
- the increase in income obtainable from selling more 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 outweigh costs of improvement.

In the GEF areas, participatory grassland management plans will be developed which will consist of the following specific tasks: (i) preparation of participatory village based grassland management plans based on: development of a planning process including participation of all stakeholders; development of detailed grazing management plans based on detailed field surveys and participatory discussion with herders; and development and pilot field testing of grassland management plans; (ii) formalization of the grassland management planning process; and (iii) implementation of grassland management plans.

(b) *Grassland management*: (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 through provision of grassland survey, assessment and monitoring equipment.

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 to facilitate improved grassland management and pastoral development. The current state of the grasslands also needs to be determined in order to be able to monitor changes in grassland condition over the life of the project. County Grassland Stations, tasked with assessing and monitoring grasslands, currently lack adequate equipment, resources and skills to properly undertake their assigned tasks. Support to the County Grassland Stations will improve their capacity to undertake comprehensive grassland surveys, assessment and monitoring of grasslands. This will enable the Stations to: (i) interpret 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 examples; (iii) collect grassland biophysical and socioeconomic information; (iv) develop a grassland resource management data base; and (v) 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. In the GEF project areas, GEF grant funds will be used to support the Grassland Stations.

(c) *Pastoral risk management strategies*. Herders in the pastoral areas of Gansu and Xinjiang are confronted with many risks in raising livestock. In recent years, livestock losses due to severe snowstorms and drought have been especially serious. Instead of a singular focus on improving livestock production, more attention to facilitating the management of risks 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 herders in Gansu and Xinjiang risk management would entail: (i) raising diverse livestock species (fine-wool sheep, meat sheep, cattle/yaks and horses) in order to diversify their assets of production; (ii) 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; (iii) obtaining up-to-date information on livestock production technologies, including pasture management and fodder production, market prices for livestock and livestock products; and (iv) improved access to external resources such as credit to build 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 plans to be made for in order 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 and 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 events such as snowstorms or droughts. A pastoral risk management strategy can also build on the traditional knowledge herders possess of the environment in which they make a living and the livestock they herd. Finally, herders' associations and informal herder groups can play an important function in forging better linkages between herders for exchange of knowledge and information and for group action to better manage risks. 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. This would be funded through the project.

The GEF incremental activities give considerable emphasis to developing participatory approaches to addressing land degradation, plant ecosystem conservation, and integrated ecosystem management. To this end, concerned planners would employ a participatory planning process that includes structured consultations with, and active participation of, local people and other key stakeholders during the grassland resource planning process in addition to the more traditional grassland vegetation inventory and survey assessments. Funding would be provided for the following key activities:

Description of Sub-Components: The sub-components will comprise (1) participatory grassland resource planning; and (2) community-based Integrated Grassland Management and Pastoral Development.

1. Participatory Grassland Resource Planning. Funding would be provided to support the following key activities:

(a) *Grassland surveys* comprising collection of grassland ecological and socioeconomic information in the Qilian Shan, Tian Shan and Altai Shan regions of Gansu Province and Xinjiang Uygyur Autonomous Region. The information obtained would be used to determine grassland types, forage productivity, carrying capacities and stocking rates and to identify areas for reseeded, 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.

(b). *Biodiversity surveys* comprising collection of biophysical information in the Qilian Shan, Tian Shan and Altai Shan regions of Gansu Province and Xinjiang Uygyur Autonomous Region. The biophysical information obtained would be used by the province and region as they develop activities for establishing nature reserves and watershed protection areas and for managing existing reserves. It could also be used by the Environmental Protection Bureau in its efforts to ensure that proposed development activities for the areas do not compromise the biodiversity and globally significant ecosystems which support it. 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 the distribution and conservation status of the fauna and flora is poorly understood. The Black River (Hei He) also originates in the Qilian Shan and this river system is 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 and the flora and fauna is also poorly understood in these areas. The Ili River, in the Tian Shan, and the Ertix River in the Altai Shan are also important international river systems requiring improved watershed management.

(c) *Grassland resource maps* comprising preparation of grassland resource maps for (i) the Qilian Shan, (ii) Tian Shan and (iii) Altai Shan ecosystems. These maps would include information on the distribution and diversity of ecosystems within the project sites, along with other information such as management zones, seasonal pastures, key biodiversity habitats, and villages and herders' settlements. The maps would be developed using existing baseline data and information collected from participatory

planning processes and the project's grassland resource planning and development activities. The maps would make use of remote sensing, complimented with on-the-ground fieldwork, and would be entered into a geographic information system (GIS).

(d) *Village-based participatory grassland resource management plan development* comprising further development of feasibility studies and initial plans for all the project areas by herder participants with support from County Animal Husbandry Bureau staff.. As part of the Project's preparation process, feasibility studies and initial plans were developed for three townships in Sunan County, Gansu Province and one township in Fuyun County, Xinjiang Autonomous Region. These models 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.

2. *Community-based Integrated Grassland Management and Pastoral Development.* This subcomponent will introduce sustainable grassland-based grazing and livestock management systems to reduce land degradation and reverse biodiversity loss. Based upon lessons learned from past experience of integrated grassland ecosystem management and pastoral development activities in China and elsewhere, the subcomponent will deepen the interactions between bureau cadres and pastoralists and pastoral communities for participating in integrated grassland resource management with the objective of enhancing local levels of sustainable and economically viable pastoral development. Financing would be provided to support the following key activities:

(a) *Developing improved grazing and livestock management systems.* Building on technical expertise in Grassland Institutes and Provincial and County Grassland Monitoring Stations and practical experience of herder participants, develop management systems that maintain productivity of grassland ecosystems and reduce threatening processes. This is likely to include changing the commencement time and duration of grazing in different ecosystems of summer transhumant ranges, intensively managing areas of increased pressure such as valley bottoms and spring/autumn range that require rehabilitation, and setting aside areas of high biodiversity.

(b) *Forage seed production* including germplasm collection of native grasses, forbs and shrubs and development of forage seed production. Local stocks of indigenous grass and legume species are needed for sustainable rehabilitation of grassland systems and is critical to conservation of genetic diversity in globally important forage species. Without production of local provenances 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 degraded 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 edges.

(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 tradeoffs 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 tradeoffs, 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 effectively achieve a balance between these tradeoffs.

Project Component 2 - US\$66.66 million

Livestock Production Improvement (US\$66.66 million of which GEF US\$0.64 million)

Component Output: The component will develop and establish sustainable livestock production systems through improvements in the project areas in genetics and management using environmentally sound technology. In order for livestock husbandry to remain sustainable in northwest China, new approaches to livestock production enterprises need to be better integrated with improved grassland management and the marketing of livestock products. The GEF incremental activities will strengthen the capacity of the Animal Husbandry Bureaus and universities to conserve indigenous breeds of livestock in Western China. 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 native livestock germplasm is essential to conserve agrobiodiversity and to promote 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, 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, and the provision of high quality forages and improve rangeland 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 component that empowers household producers to utilize market information to make informed decisions on enterprise selection and production focus.

The GEF incremental benefits are expected to: (1) conserve indigenous livestock agrobiodiversity; and (2) improve the capacity of herders and technicians to evaluate indigenous livestock breeds and assess their potential for inclusion in livestock development programs.

Description of Sub-Components: The Livestock Production Improvement Component will comprise activities that are integrated with the other project components to provide impact across the major fiber, meat and dairy industries in Gansu and Xinjiang with potential flow-on to neighboring provinces with similar livestock production systems. This will be achieved through a balanced program of sub-component activities that equally emphasis breeding, husbandry and management. These activities are: (1) fine wool and mutton nuclear 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 large 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 Artificial Insemination (AI) Stations to facilitate the transfer of superior genetic traits to household base livestock enterprises and Veterinary Stations to deliver improve livestock health. The applied research, training and extension activities related to livestock production are described under the integrated program outlined in Project Component 4.

1. Fine Wool and Mutton Sheep Nuclear Breeding Stations. The nuclear 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 nuclear breeding stations at Gongnaisi (Xinjiang), Bazhou (Xinjiang) and Huangcheng (Gansu). Total nuclear flock numbers is above 30,000 ewes. In order to make maximum progress in genetic improvement and to meet the market demands, fine wool nuclear breeding flocks will be divided into breeding lines emphasizing economically important traits within each line. These breeding stations have a significant public goods dimension in protecting the genetic progress made to fine wool blood line to date 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 native 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* breed 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 marketing of wool and mutton.

2. Fine Wool and Mutton Multiplication Farms. The number of genetically improved fine wool and mutton sheep consistent with demands of herders. 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 is 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 Artificial Insemination Stations. Some herder flocks associated with nuclear breeding stations may also be used as multiplier flocks to provide rams to household breeding activities.

3. Fine Wool and Mutton Breeding Household Production. Households will receive improved genetic lines and better equipment and facilities for raising breeding sheep and 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 greenhouse sheds.

4. Fine Wool and Mutton Fattening Household Production. Households and medium sized farms will specialize to undertake the fattening of wool and mutton sheep to meet market demands rather than to support on-farm activities. 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 Breeding Household Production (Gansu only).** The increasing concentration of beef cattle production in several 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 in these counties has the potential to attract joint-venture opportunities in beef slaughtering and processing to the region. 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 specialized fattening households.

6. **Beef Fattening Household Production (Gansu only).** Specialized cattle fattening households have emerged in China as a relatively commercialized form of household production because they buy cattle and feed from outside the household system. Specialized fattening households will be supported to establish 30 head beef feedlots to finish yearlings to trade specifications in three cycles each year using on-farm grain and forage resources supplemented with concentrate and hay purchases. These households will receive technical and market training to equip them to face considerable market-orientated budget constraints of feedlot production.

7. **Dairy Component (Gansu only).** The total cost of the dairy production sub-component 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 dairy farms.* The project will provide funding for the construction of five 100 dairy cow farms. The investment for one dairy cow farm will be undertaken by Hovill Company who will construct and manage the dairy farm for the demonstration purposes to other future dairy production operations in the project area. In addition, one 100 head farm household based dairy operation will be established in each of four dairy project counties for demonstration purposes. The dairy farms will be owned and managed by local leading farmers selected by counties. The farmers 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 (eleven milking centers).* Investment of ten milking centers will be undertaken by Hovill Company and the remaining one will be constructed and operated by Dingxi County. 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 allow farmers also 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 AI stations.* 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.* 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 (DHI) program (financed by Canadian International Development Agency, CIDA). The investment will be undertaken by Hovill Company. 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.* The project will support local small-scale dairy farmers to expand their production scale and improve the efficiency of production practices. The average investment per household is 30,000 RMB. Farmers are expected to use this money to purchase two dairy cows, improve their sheds and finance improved feed production (i.e. working capital). It is expected that the loans for some 900 farmerhouseholds will be administered by Hovill Company, who will purchase the raw milk based on contractual arrangements. The loans for the remaining 990 dairy farmer households will be channeled through project county finance bureaus.

8. *Native Livestock Breed Conservation (GEF).* This activity will strengthen the capacity of the Animal Husbandry Bureaus and research institutes to conserve native breeds of livestock in Western China. 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 agrobiodiversity and to promote sustainable pastoral development. Funding will be provided for selection, improved breeding and management of local breeds of sheep and yak (Tibetan sheep, Altai fat-tailed sheep, Bayinbulak fat-tailed sheep, and yak). Research on indigenous livestock breeds will also be supported.

Project Component 3 - US\$ 11.11 million

Market Systems Development Component (no GEF funding)

Component Output: This component will: (i) improve the competitiveness of Chinese wool and sheep meat; (ii) develop and apply standard product descriptions for wool and meat; (iii) improve the capacity of wool testing laboratories; (iv) increase 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 herders' group marketing initiatives.

Expected Benefits: The component re-enforces the other project components by magnifying the incentives for participation in the project by herders and other market participants. Benefits of the component include increased herder incomes, improved risk management and a means for orderly development of the livestock sector according to market signals. Primarily, the component benefits will be seen as higher prices for products and reduced risks of sales strategies. 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.

Herder incomes will be raised by higher prices due to improved payment mechanisms and improved product quality. The component contributions include the establishment of quality standards and instigating the various marketing activities necessary to achieve and utilize those higher prices.

Management of risks will address problems of seasonal physical factors, excessive market influence by a few buyers, and the lack of a long term marketing strategy in the project areas. Benefits throughout the marketing chain will include reduced selling costs, reduced price fluctuations, and clear and consistent application of market signals to investment programs in the public and private sectors.

Description of Sub-Components: The component's activities are targeted at the improvement of marketing systems in terms of transparency in price formation, competitive actions, and the provision of essential services to the maximum number of market participants. The component will comprise: (1) physical investments; (2) targeted loans; (3) support to herder's trading organizations) and (4) establishment of mechanisms for public goods provision.

I. *Physical investments* will entail: (i) new and reconstructed livestock markets; (ii) new and reconstructed shearing stations; (iii) wool testing equipment; and (iv) wool storage facilities.

(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 for herders, and improved the transparency of price formation are the targeted outcomes. The borrower, particularly at local level, recognizes fully the importance of improving selling mechanisms for livestock. A short term outcome of investment in markets will be to lower the costs of conducting transactions, and improve the aesthetics, logistics and environmental aspects of livestock marketing. This has been shown locally to attract both buyers and sellers to a market. In all cases, investments address existing markets, with the aim of improving their performance and throughput.

The identity of the borrower for investment in livestock markets (5 in Gansu and 12 in Xinjiang) varies according to locality and the specific needs of both the livestock sector and the local community. In general, Gansu's investments for this activity will be made by local governments, but the markets will be leased to private operators. Xinjiang has favored ownership by local government. In all cases, delivery and display of market information, using standardized product descriptions, will be required from market operators.

(b) *Shearing stations.* Upgrading and construction of shearing stations (10 in Gansu and about 100 in Xinjiang) is a pre-requisite for improved wool quality and enhanced practices in packaging and presentation of wool for sale. Ownership is generally to be private, with local governments playing an interim role in some cases. Feasibility of shearing stations requires a threshold level of utilization, which will be closely monitored. Training and extension activities, along with enhanced market information, will be delivered at the same times and locations as the investments in 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. Increasing the number of buyers visiting the stations is acknowledged as a progress indicator by the borrower.

(c) *Wooltesting equipment.* The function that wool testing plays in wool marketing is the provision of certified quality assessment based on a standard sample and standard quality criteria. This activity runs parallel to the provision of market information, which informs buyers and sellers of prevailing prices of wool categorized in precisely this way. The rationale for the activity is then to strengthen the marketing position of wool sellers, while maximizing the information delivered to buyers about the volumes and quality of available supplies.

Fiber testing is a well-established function of a designated government bureau. Project activities would upgrade the testing services offered for wool and streamline their procedures. Ownership would remain with the local state service providers. Cost recovery is well-established for such services, and the logistics of charging by volume tested will encourage bulking of "like" lines of wool by sellers, which is a positive development that supports all project components.

(d) *Wool storage facilities.* Provision of “wool storage” actually addresses other marketing functions than storage. This includes bulking of sales lines, improved transport logistics, access for 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, and this (advanced) market function is being addressed by the Sapale wool brokerage at its Kuitan facility in Xinjiang. Elsewhere in Gansu and Xinjiang, small investments in storage would focus on specific identified needs. In all cases, the activities will target a future provision of services to the wool industry as a whole and not proprietary use by the owner of the storage facility. Private ownership and borrowing is proposed, with adequate cost recovery plans.

2. *Targeted loans* are, in general, not for herders but for other market participants. Their focus is on overcoming marketing problems associated with risk and seasonality. For fine wool, their main impact is to help promote the incentives for using the shearing stations and presenting wool for sale according to textile industry requirements. In addition, the added liquidity will increase the number of buyers encountered by each herder. These impacts are likely to be most keenly felt in remoter regions, where the small number of buyers has penalized herders in terms of prices paid, and the timing and circumstances of sales and payment.

Project design has acknowledged the scope for improved livestock sales strategies in addressing seasonal feed shortages and overgrazing, and the associated risks. Training, upgraded livestock markets and market information services will all contribute to an improvement, alongside better genetic improvement and improved pasture management. Targeted loans would provide the impetus for livestock buyers to approach herders with a variety of purchase offers, possibly accompanied by advance payment.

In the case of wool, quality, presentation and delivery arrangements would be specified in advance of the sheep being shorn, thereby transferring some labor-intensive functions to herders in exchange for some added value. The pre-specification of pricing and payment arrangements transfers risks from the herder to the trader. The same comments apply to livestock sales, with rather more emphasis on risk management options: herders would have a larger number of options for early sales.

(a) *Trader loans.* Targeted loans, as proposed, are primarily a mechanism for increasing flexibility and security for herders through increased market access and the ability to shift risk by making decisions early in the season. This program is highly complementary to other project components, as well as to other activities under this component. In design of these activities, care has been taken to avoid borrowing by herders, while utilizing the vibrant trading environment that exists in livestock trading. Criteria and guidelines for the loans have been formulated to ensure that project objectives are supported (e.g. use of standards) and other project activities run in parallel (e.g. training). In the specific case of fine wool, herders’ profitability and risk management options are broadened by raising the number of market participants. In the case of sales of lambs, additional demand is generated at a time not previously favored for sale by herders. In all cases, the loans are designed so as to increase the number of buyers and the number of options open to each buyer.

Loans are to be made available to buyers of herders’ produce, where such transactions occur under a number of pre determined conditions supporting project activities. These conditions include that the transaction is subject to a legally binding contract providing detail of standardized product descriptions, pricing arrangements, and facility for pre-payment. The sales volumes will be subject to a minimum to encourage grouping and pooling amongst herders and bulking of product for marketing activities. The enforced use of a contract is a major risk management advance, and the use of pre-payment can offset seasonal income problems. In the case of wool traders, loans will be available only to participants in training in wool preparation, with its essential elements of quality management and the use of standard product descriptions.

(a) *Rural enterprise loans.* 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. Similarly, loans would be made available for the construction and rehabilitation of livestock markets. The loan funds would be channeled to enterprises and farm 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 an Investment Committee representing principal stakeholders.

3. *Support to herders marketing organizations* to promote formal and/or informal herders associations in coordinating their trading activities. Support is going to be provided in the form of technical assistance, training and limited credits under targeted loans.

4. *Investment in capacity for delivery of public goods* addresses the need for training and extension to herders and other market participants, the establishment of a market information service for livestock products, market research activities, and initiatives in quality promotion and quality management. These activities are focused on building the capacity (technical and human resources) 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 systems.* Both provinces have developed plans for collection, processing and delivery of market information on livestock products. The marketing training activities have, as a major rationale, equipping the herders to use that information alongside enhanced capacity for breeding, feeding and pasture management.

(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.

Project Component 4 - US\$8.88 million

Applied Research, Training and Extension (US\$8.88 million of which GEF US\$2.44 million)

Component Output: This Component will develop and promote 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. This represents a significant paradigm shift from focusing exclusively on livestock to a systems and resource management approach. Research is needed to provide the necessary know-how, training is needed to equip livestock producers to accept new ideas and adopt new technologies, and extension is needed to transfer research outcomes and producers. The GEF incremental activities will develop and support research, extension, and training in ecosystem management approaches to address land degradation and biodiversity loss in globally important grassland ecosystems. This represents an important paradigm shift from focusing almost exclusively on livestock production to a more holistic and integrated approach to the management of natural resources.

Expected Benefits: 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 Sub-Components: The component will comprise: (1) applied research; (2) training; and (3) extension.

1. *Applied Research.* The applied research activities are to develop and transfer relevant low cost technology to household farmers and to provide technical support during project implementation. The strategic framework to achieve these objectives will encourage local research institutes and universities to submit proposals to:

- identify, develop and adapt relevant low-cost technologies to solve specific problems that will further facilitate implementation and enhance accrued benefits from the project's livestock, grassland improvement and marketing activities;
- incorporate project household investors into these on-farm case studies to ensure that farmers' interests are the prime focus of the applied research;
- utilize simple contrast designs and employ standardized scientific methods to establish the merits of best management relative to traditional practice within a low cost framework of RMB 50,000 per research proposal;
- No funding will be provided to support the use of embryo transfer in livestock breeding research.

Specific activities anticipated to be carried out for the Grassland Management and Forage Improvement Component would comprise development and implementation of research activities that address either long-term or short-term information requirements for more effective grassland management and improvement. The emphasis would be on applied research to solve practical grassland management problems related to these broad themes: (i) seeding rates; (ii) irrigation water use efficiency; (iii) fertilizer requirements; (iv) forage production management; (v) forage harvesting management (including silage making); (vi) rehabilitation of degraded grasslands; (vii) seed production of native forage germplasm; (viii) herders' indigenous knowledge of grassland resources and livestock; (ix) customary grassland management use; (x) livestock grazing behavioral interactions; and (xi) grassland ecology, especially vegetation succession dynamics.

Fostering improved policies for the grasslands and herders requires studies which will identify reform steps needed to effectively implement the Great Western Development Strategy and to address inefficiencies in grassland resource use. These policy studies would comprise of: (i) economic valuation of grassland resource products and services; (ii) appropriate mechanisms to charge consumers for benefits derived from grassland resources; (iii) grassland tenure and allocation of grasslands to individuals vs. groups; (iv) the effect of settling herders on the condition of the grasslands; (v) economic valuation of forage and fodder production and services provided by forages; and (vi) market development and marketing of forage and fodder products and services, as well as market intelligence systems would be carried out.

GEF specific activities would strengthen the capacity of research agencies to develop and implement research and inventory activities which addresses either long-term or short-term 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. Based on the research needs identified in the project sites, a research proposal for each site would be developed and implemented under the component. These proposals would follow a standard format and would be developed by the local personnel themselves or by working in collaboration with a provincial research institution. The emphasis would be on applied research to solve practical management problems.

2. Training Activities. The training component is 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 provincial and county PMO staff to ensure smooth project implementation.

- Project management training will include workshops and individual tutoring delivered as part of the project supervision mission;
- Since the technical expertise of potential trainers at the prefecture, county and township county levels in grassland and livestock management is poor, priority will be given to training specifically needed to implement livestock, grassland and marketing activities. These activities include: (i) grassland management, (ii) forage production, (iii) feeding livestock for production and product quality, (iv) livestock husbandry and management, (v) livestock breeding, and (vi) using market information for decision making. Manuals for these training programs will be developed at the provincial level and approved by the Technical Advisory Group (TAG) prior to delivery of training programs;
- Overseas training and/or study tours will be used opportunistically for training trainers from each province and its officers of PMO both in provincial level and county level. Overseas management study tours for PMO personnel will have a strategy and policy orientation, while the activities for study tours for technical training will be based on detailed discussions between the PPMOs and overseas institutes subject to approval by the TAG;
- Training staff outside project provinces will only be considered if no suitable trainer is available from in the project provinces as internal training is considered to be more effective and economic. Therefore, identification of appropriate domestic institutes and experts for specific training program is essential. However, the two provinces are encouraged to identify activities or opportunities for joint activities for training and workshops when appropriate;
- Active participation in discussion will be encouraged in trainer training to ensure that workshops and classes take into account differences in issues that relate to regional differences in physical or social conditions. Trainers and trainees will share equal status in exchanging their views and sharing experiences. The PPMO in collaboration with counties and beneficiaries will identify topics for workshop and training programs, and will be responsible for the development of each technical training module. The TAG will review every workshop and training program for the eligibility; and
- At the conclusion of each training course, an evaluation form will be completed by trainees to identify shortcomings in either content or delivery style and to provide audit trail to verify completion of training courses.

Activities anticipated to be carried out for the Grassland Management and Forage Development Component would be directed at provincial and county Animal Husbandry Bureau staff, and particularly Grassland Station personnel, involved in the planning, organization, supervision and monitoring of grassland management and forage/fodder improvement related activities. An important task will be the production of training modules, and the World Bank Institute (WBI) is expected to assist in this activity. Key staff will undergo training in activities related to sustainable grassland management by participating in study tours and training other provinces of China and abroad in countries with proven experience in grassland management and forage/fodder improvement and pastoral development.

For the Market Systems Development Component, training activities are to be targeted at herders and are to include an overall focus on developing profitable management strategies, backed up by and risk management tools and improved sales skills. This would particularly target the use of information as provided under the Market Information System activity. Training to other market participants would focus variously on specific skills (e.g. shearing and wool handling).

The GEF specific training program is designed to improve the capacity of Animal Husbandry Bureau 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 would also participate in an integrated program of in-service training courses designed to cover different aspects of integrated rangeland resource management. Funding would support the following key activities:

(a) *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.

(b) *Building local capacity for training delivery* comprising support to local institutions/universities to provide in-service training to herders, farmers and technicians.

(c) *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).

3. Extension Activities. Effective extension is crucial to successful of the project 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. However, producers will not follow extension recommendations unless they are convinced that it is in their interests to do so. That means the 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 activity to empower herders to realize the opportunity to achieve sustainable livestock production and grassland protection. This poses a major challenge for the provincial extension services to change from the top-down approach used prior to recent rural reforms in which household producers were not involved in extension planning and evaluation 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:

- *Participatory Demonstrations:* The community will be the basic unit for implementing participatory extension and a community learning approach will be adopted to involve household farmers 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 successful of the project by focusing on improved quality of produce. 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;

- *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;
- *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. The PMO and other line departments;
- *Technical training:* Strong measures are needed to reinforce these technical innovations through effective training and to improve the delivery capacity of the technical extension services at the prefecture, county and township levels. Training of extension staff is needed to better equip them to assist producers with decision making required for all the processes of pre, mid and post production brought about by the move to a market economy (see point 2 above). Training to equip beneficiary households to implement project activities will be delivered by trainers at the township level using materials and manuals approved by the TAG. Evaluation of training programs by household participants is required; and
- *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 the “dragon head” reduces the marketing risks for small household producers.

Activities anticipated to be carried out for the Grassland Management and Forage Improvement Component 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 (at the provincial, county and township levels) and to herders and farmers, the main project beneficiaries, mainly using existing extension networks at the county and township levels. For the Market Systems Development Component, the extension services need to emphasize quality management and the potential financial reward of fine wool.

GEF specific activities would strengthen technical programs for grassland management, participatory grassland management planning and conservation of grassland and wild ungulate biodiversity. It would also include support for the development and transmission of improved technologies and extension material on integrated grassland resource management to herders and farmers.

Implementation Arrangements: There will be an implementation unit at each of the state-owned breeding farms that will liaise on all activities with the PPMO. 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. They 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. They will be responsible for identifying and collecting information and detailed reports on progress of activities to the PLGs and the TAG.

Project Component 5 - US\$5.18 million

Project Management, Monitoring and Evaluation (US\$5.18 million of which GEF US\$1 million)

Component Output: This Component will develop and strengthen the overall project implementation capacity of project management offices 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.

For the GEF Alternative, the component will develop and strengthen overall GEF project implementation capacity if project management offices.

Expected Benefits: The proposed activities are expected to lead to: (1) improved capacity of project staff to implement GEF activities; (2) improved capacity to undertake important policy studies related to grassland degradation, ecosystem management, and biodiversity and to be able to formulate improved policies; 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; and (v) valuation of environmental services provided by integrated grassland ecosystem management. These studies will be coordinated by the Provincial Bureaus of Animal Husbandry, the agency responsible for grassland management policies.

3. *Monitoring and evaluation* comprising development and implementation of a simple, inexpensive and sustainable plan for monitoring and evaluating project impacts on (i) biodiversity; (ii) grassland health; and (iii) the socio-economic state of pastoral communities than have an impact on grassland resources. The measurement of these indicators would rely principally on direct survey methods compiled during periodic surveys for biodiversity and grassland indicators, and annual PRAs in selected communities for socio-economic indicators.

Additional GEF Annex 3: Social Issues

CHINA: Gansu and Xinjiang Pastoral Development Project

Background. The Gansu and Xinjiang Pastoral Development Project (GXPDP) focuses on sustainable development of the animal husbandry and natural resources including fine wool and mutton sheep, beef and dairy cattle, and grassland resource management in the project areas.

The total proposed project investment is about US \$99.83 million, of which about US \$66.27 million would be financed through a World Bank loan. The GXPDP aims at improving the livelihood of the herders and livestock farmers in the project areas in Gansu Province (Gansu) and Xinjiang-Uyghur Autonomous Region (Xinjiang) through establishment of integrated, demand driven, and sustainable livestock production systems (including market systems). The project also hopes to be viewed by non-project counties as a demonstration project and other interested parties could use project's findings with regard to sustainable development of livestock and grassland resources in their own development systems. The project objectives would be achieved through improving natural grasslands, developing artificial grasslands, upgrading the quality of fine wool and mutton sheep, development of household based and medium scale beef fattening and dairy cattle activities and establishing production and marketing and technological extension systems suitable to the development of the livestock sector.

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, Pingliang, Huating and Ningxian), one corporation (Hovill Group) and two farms (Huangcheng and Minshen) that are managed by the Gansu Provincial Agriculture and Animal Husbandry Bureau. 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 Sheep Stock Farm will focus on the development of fine wool sheep. Development of mutton sheep will be the main project activity in Jingtai, Jingyuan, Zhangye, Yongchang, and Huining., Beef fattening will be the principal activity in Zhangjiachuan, Qingshui, Liangzhou, Lintai, Pingliang, Ningxian, Kangle, and Huating. Linxia, Lintao, Linxia, Huating 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).

Target Beneficiaries. The main targeted beneficiaries in both Gansu and Xinjiang 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, Uyghur, 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 for both Gansu and Xinjiang.

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, 45% of whom were males (although for the more intensive interviews 81% of respondents were male). In Xinjiang, 28 families were interviewed and twenty-four questionnaires filled in. Over one hundred farmers and herdsman 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 beneficiaries in the four counties being investigated. The villages investigated were 23 % Han and 23% Hui, Tibetans were a third (33 %), Yugu 16 %, and Dongxiang 5%. The villages were largely multiethnic. In Xinjiang, of the four project counties, the population of Uyghur in Baicheng County is the largest proportionally, making up 87% of the whole 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 Uyghur 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.

It is anticipated that the SA process will encompass a broad set of activities to be conducted during three distinct phases of the proposed project (identification/preparation, implementation, and evaluation.) These activities 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 will be addressed in one or more components of the proposed project. Included as SA activities are also the consultations with project beneficiaries and affected groups and populations specifically outlined in the Beneficiary Participation Manuals prepared by the Provincial PMOs and data collection efforts for

the purposes of monitoring and evaluation. 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 proposed project. The range of issues that were addressed by the SA included: (a) *affordability concerns*: Can the proposed project households afford the anticipated financing terms and other expenses, such as user fees; (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 proposed project activities? How does the proposed 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 proposed 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 both Gansu and Xinjiang by Chinese social scientists. 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 Ethnic Minorities Development Plans for both Gansu and Xinjiang in accordance with OD 4.20 as the best mechanisms to address minority nationality concerns and issues. Multi-Ethnic Groups Development Plans have been prepared and reviewed by the Bank.

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

Table 1: Xinjiang SA sites

County	Prefecture	Pra Xiang	Ethnic Composition	Forms of Animal Husbandry Production
Maigeti	Kashgar	Anghe Terek Kezileawat	Uygur	Farming area folding sheep and herding in arid pasture
Baicheng	Akesu	Mijik & Kangqi	Uygur, Kirkiz Han	Farming area folding sheep and herding
Changji	Changji Autonomous Prefecture	Yushugou Town Two Villages	Kazak, Hui, Han	Farming area folding sheep and migration herding
Huocheng	Yili Autonomous Prefecture	Guozigou Farm/ Qingshuihe Town (Village)	Kazak, Uygur, Han, Hui And Sala	Migrating herding and farming area folding sheep
Tacheng	Tacheng	Bozdakfarm / Arxir	Kazak, Uygur, Hui, Han And Daur	Migrating herding and farming folding sheep
Fuhai	Altai	Jietharele / Kuohe	Kazak	Migrating herding and settled herding

In Gansu, the SA covered 8 villages, including 4 purely 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, Humagou and Qiabu are poor villages. These 8 villages vary greatly in natural conditions and resources. See Table 2 and 3.

Table 2: Gansu SA sites (a)

Village	Population	Cultivated area (mu)	Grassland (mu)	Per capita tilled land (mu)
Kangfeng	217	— —	124,000 (fenced)	— —
Saiding	318	— —	121,500 (fenced)	— —
Beidi	2,615	4,880	— —	1.87
Xigou	2,500	10,000	50,000	4
Tanyaogou	1,489	1,581	137,000	1.06
Honggeda	766	571	128,000	0.75
Waxia	2,040	2,030	— —	1
Humagou	1,431	2,885	— —	2.02

Data source: Villagers' committees of 8 villages.

Table 3: Gansu SA Sites (b)

Village	Nationality	Religion	Per capita net income (RMB)	Type of industry
Kangfeng	Yugur, Han, Tibetan	Buddhism	3,794	Pure Pastoral
Saiding	Yugur, Tibetan, Han	Buddhism	3,912	Pure Pastoral
Beidi	Han	None	1,700	Agriculture, cultivation
Xigou	Han	None	2,800	Agriculture, cultivation
Tanyaogou	Tibetan, Han, Tu	Buddhism	800	Pastoral, agriculture
Honggeda	Tibetan	Buddhism	1,050	Pure Pastoral
Humagou	Hui, Dongxiang, Han	Islam, others	285	Agriculture, cultivation
Waxia	Hui	Islam	600	Cultivation, transport for sale, agriculture, working out of home

Data source: village-level forums.

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 (Table 4).

Table 4: The Ethnic Population of the Project Counties in XAR (data from year 200)

		Popula- tion	Han	Minority Ethnic Groups								Average Farmland Per. P*
				Total	Uyгур	Kazakh	Hui	Kirkiz	Mongol ian	Sibo	Others	
Yili	Zhaosu	149982	43690	106292	14661	69677	4299	4152	12462	73	968	26.22
	Tekes	148337	36009	112328	14913	58995	20570	8705	5604	855	2686	12.07
	Xinyuan	284881	113604	171277	27181	123124	17727	443	107	579	2116	13.43
	Gongliu	154371	48923	105448	35053	45692	18556	440	506	1487	3714	16.21
	Chabchar	158547	54753	103794	41711	32625	6583	284	316	20533	1742	20.86
	Huohe	341302	156474	184828	69762	26385	69453	360	508	3005	15355	10.33
Tacheng	Tacheng	148949	94821	54128	4935	22316	10284	1651	1598	1406	11938	56.48
	Wusu	197548	123914	73634	18176	21509	24732	15	8248	155	799	23.40
	Shawan	196820	137741	59079	8342	32057	17008	17	385	27	1243	30.72
	Erming	182426	98690	83736	7521	61790	5941	292	5480	108	2604	33.44
	Yumin	51124	30761	20363	193	16059	2871	12	146	55	1027	60.32
Bole	Borle	220507	148294	72213	35017	16317	7828	33	11509	305	1204	12.65
	Wenquan	72301	43961	28340	2965	12207	2177	51	10252	55	633	28.38
Altai	Altai	217535	134030	83505	5270	67472	6471	26	2417	42	1807	8.60
	Fuhai	64882	36271	28611	658	25290	2006		197	8	452	37.70
	Fuyun	81982	21207	60775	2139	56119	1823	10	208	15	461	17.65

Changji	Changji	352357	271270	81087	9912	17258	48621	48	1184	293	3771	13.25
	Manas	161387	132014	29373	4865	17021	6543	24	97	30	793	28.17
	Hutubi	205229	160703	44526	5293	22813	14614	9	221	34	1542	19.35
	Fukang	153260	112909	40351	8754	12077	17795	13	316	60	1336	13.16
	Jimsar	131967	94889	37078	6324	9909	17894	19	1898	18	1016	24.55
	Qitai	229102	176440	52662	15778	20912	12027	4	1244	61	2636	32.97
Kashgar	Maigeti	195710	34343	161367	160972	9	237		15	2	132	18.06
	Shache	622305	17122	605183	599803	4	747	941	33	8	3647	13.13
Aksu	Wensu	208891	46264	162627	157893		813	3561	13	1	346	22.30
	Baicheng	196015	25309	170706	168943	6	735	953	8	4	57	24.83
	Kucha	380887	38524	342363	340007	34	1937	111	37	10	227	15.03
Bayingg uoleng	Kurle	357682	239866	117816	102183	58	8823	5	4181	126	2440	8.54
	Yanji	120468	55681	64787	34037	29	27270	79	2855		517	13.97
	Hejing	170498	94510	75988	39296	891	6234	83	28410	6	1068	9.35
Turfan	Turfan	243811	50567	193244	173382 9	27	18728		52	12	596	5.28
Hami	Hami	375368	261494	113874	86652	10025	13789	16	796	139	2457	4.12

Sources: *Xinjiang Statistics Yearbook 2001* and * is the area of *mu*, about 667 square meters.

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, Tianzhu 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 people in Gansu mainly inhabit Zhangjiachuan Hui Autonomous County and Linxia Hui Autonomous Prefecture, accounting for 66.18% of the total Hui population in Gansu. The Tibetans largely inhabit Gannan Tibetan Autonomous Prefecture and Tianzhu Tibetan Autonomous County. The Salar, Baoan and Dongxiang people mainly inhabit Linxia Hui Autonomous Prefecture. The Yugu people, 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, Kirkiz, 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 seems to be 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 fully nomadic families have settled down to a semi pastoral production pattern where they continue to send their animals on the seasonal round, either taken their 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, Kirgiz, 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 and religious practices. Muslim community leaders, the imams or *ahong* of the villages, are also 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. Among all the minorities in Gansu Province, except for the Hui and Manchus who speak *Mandarin*, all the others have their ethnic languages but are to some degree also bilingual in Mandarin. The Mongols, Kazakhs, Kirgiz, 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.

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.

Additional GEF Annex 4: Environmental Issues

CHINA: Gansu and Xinjiang Pastoral Development Project

Background. The Gansu and Xinjiang Pastoral Development Project (GXPD) focuses on sustainable development of the animal husbandry and natural resources including fine wool and mutton sheep, beef and dairy cattle, and grassland resource management in the project areas.

The total proposed project investment is about US\$99.17 million, of which about US \$66.27 million would be financed through a World Bank loan. The GXPD aims at improving the livelihood of the herders and livestock farmers in the project areas in Gansu Province (Gansu) and Xinjiang-Uyghur Autonomous Region (Xinjiang) through establishment of integrated, demand driven, and sustainable livestock production systems (including market systems). The project also hopes to be viewed by non-project counties as a demonstration project and other interested parties could use project's findings with regard to sustainable development of livestock and grassland resources in their own development systems. The project objectives would be achieved through improving natural grasslands, developing artificial grasslands, upgrading the quality of fine wool and mutton sheep, development of household based and medium scale beef fattening and dairy cattle activities and establishing production and marketing and technological extension systems suitable to the development of the livestock sector.

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, Pingliang, Huating and Ningxian), one corporation (Hovill Group) and two farms (Huangcheng and Minshen) that are managed by the Gansu Provincial Agriculture and Animal Husbandry Bureau. 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 Sheep Stock Farm will focus on the development of fine wool sheep. Development of mutton sheep will be the main project activity in Jingtai, Jingyuan, Zhangye, Yongchang, and Huining., Beef fattening will be the principal activity in Zhangjiachuan, Qingshui, Liangzhou, Lintai, Pingliang, Ningxian, Kangle, and Huating. Linxia, Lintao, Linxia, Huating 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).

Natural Conditions. The annual average temperature in Gansu varies between 0.2oC to 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, being far from open waters, has a typical continental climate with cold winters and warm and sunny summers. 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.

Grassland Conditions. Except for Sunan County, 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 grasslands within the project areas. The grassland degradation is as low as 10 to 20% in Sunan County with an average degradation rate of 30%, of which 50 to 60% are slightly degraded.

Due to the large size of Xinjiang (1.65 million square kilometers), a variety of different grassland types exist in the region. 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% to more than 50%, compared to yields in the 1960's.

Water Resources. Both Gansu and Xinjiang suffer from shortage and/or poor distribution of water resources. In Gansu, the areas to the north of an imaginary line between Liupan Mountain-Qingliang Mountain- and Qilian Mountain suffer from shortage of water resources, while most of the areas to the south of the line enjoy abundance of water resources. Areas to the north of the line with inadequate water resources include eastern Gansu, the massive loess plateau and areas to the north of Lanzhou, where annual runoff depth is only 5 to 50 mm, while the areas to the south have an annual runoff depth in the 100 to 300 mm range that increases 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 to 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 resources availability in dryer central and southern counties are poor. In total, 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 the entire Xinjiang is 88.4 billion m³. The available groundwater resources are believed to be 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 seek local support, to increase transparency and accountability to the public, to reach consensus with various stakeholders, and to enhance the feeling of ownership of the proposed project and involvement in the proposed environmental management plan, participation of beneficiaries and other stakeholders was of great importance in the environmental assessment process.

In order to keep all beneficiaries informed, 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 stuff for the 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 proposed 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 in both Gansu and XAR 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 (Jiuquan City, Yongchang County, and Zhangye City), 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 and large 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 plan (EMP) has been developed including institutional strengthening, environmental training requirements (as a part of the project management component) and environmental monitoring plan. The EMP 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.

A number of sheep and cattle slaughterhouses are proposed in Gansu and Xinjiang. Effluents from such activities, if not adequately treated, could cause health and odor problems within the surrounding communities. Same requirements for detailed assessment once location is determined are included in the EIA.

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 GXPD 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 Ratio (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 songaricum*, *Calligonum yingisericum*, *Amondendron bifolium*, *Tamarix sachuensis*, *Cistanche salsa*, *Astragalus mongolicus*, *Fritillaria walijewii*, *Ferula sinkiangensis*, *Saussurea involucreata*, 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 increase 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, may 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 grazingland 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 (Olsson et al. 2001).

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 biomes 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 (Olsen et al. 2001). 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 - MISSING), Tian Shen Montane Steppe and Meadow (Box 4), and Alashen Plateau Semi-Desert (Box 5).

The ecoregion mapping exercise complements 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 - Qilian Mountains Sub-alpine Meadows - MISSING

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 Tian 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 solifluction support a restricted assemblage of plants adapted to sliding on scree 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 (*Ursus 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 saxaul (*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 biologically 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 levels 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 capercaillie, hazel grouse and Altai snowcock. Xinjiang goitered gazelle and *kulan*, or wild ass, can 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 hectares – one third of China’s total areas – is prone to desertification. Of this total, desertification is actually occurring on about 262 million hectares. 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 provinces.

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 an excessive buildup in livestock numbers. Both were driven by the Government’s drive for food self-sufficiency. Partly as a result, land degradation is widespread and increasing, especially in Western China. China is now considered one of the most seriously eroded countries in the world, with nearly 40 percent 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 to 30 percent. 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 hectares, including about 8 million hectares in areas of cultivated land. Most of the salinized land is located in three geographical regions: the North (30 percent of the total), the Loess Plateau (26 percent), and the Northeast (16 percent).

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 hectares, 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 Not 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 to biodiversity. 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. However, 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 millions of people in western China.

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 saltaffected 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 agroecosystems. However, when you examine the full range of goods and services produced by agroecosystems, 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 as 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 in 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
<i>Objectives</i>	<ul style="list-style-type: none"> • Maximizes livestock production • Aims to increase livestock offtake • Maximizes net present value 	<ul style="list-style-type: none"> • Maintains grassland ecosystems as an interconnected whole, while allowing for sustainable grassland <i>and</i> livestock commodity production • Aims to sustain grassland productivity over time while simultaneously considering tradeoffs with other grassland goods and services • Maintains future options
<i>Scale</i>	<ul style="list-style-type: none"> • Works within political, administrative or ownership boundaries 	<ul style="list-style-type: none"> • Works at the ecosystem and landscape level
<i>Role of Science</i>	<ul style="list-style-type: none"> • Views grassland management as an applied science focused on grassland resources 	<ul style="list-style-type: none"> • Views grassland management holistically, combining science and social factors
<i>Role of Management</i>	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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. Managing ecosystems in western China holistically and sustainably requires a thorough understanding of their function and condition. Without strong scientific knowledge and indicators, assessing grassland ecosystems' productive capacity is difficult. Better scientific understanding of grassland ecosystems' carrying capacity and thresholds for change will also benefit 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. A first step toward setting these values is calculating the cost of economic policies that subsidize the use of natural resources. 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 fully in the development process. When all interest groups are part of the solution, the results are usually more sustainable than those achieved without broad 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. Some of the key challenges include: (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 complex, dynamic and fragile 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 patterns, 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 the following: (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 (ix) time frames for grassland resilience to changes from grazing pressure, especially for high elevation, degraded *Kobresia* sedge meadow communities.

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.

The expanded appreciation for the complexity and ecological and economic efficacy of traditional pastoral systems is encouraging. It provides hope that the vast indigenous knowledge herders possess will be better understood and used in designing new interventions. Greater awareness of the need to understand existing pastoral systems should also 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. Pastoral development programs must involve herders themselves in the initial design of interventions. Herders' needs and desires must be heard and the vast body of indigenous knowledge they possess about rangeland resources must be put to use when designing new range-livestock development projects. An important message for pastoral policy-makers and planners is the need for active participation by the herders in all aspects of the development process and for empowered herders to manage their own development.

Addressing Reduced Carbon Sequestration Capacity

Basic Strategies for Carbon Sequestration. The basic strategies of soil organic carbon sequestration are to decrease losses of carbon from the soil and to increase net primary productivity of the soil. (Lal 2001). Reducing soil carbon losses can be achieved in many ways. Soil carbon sequestration can be achieved through restoration of degraded soils and adoption of recommended agricultural practices. Desertification control may also lead to carbon sequestration through increases in biomass produced and by means of soil inorganic compounds returned to the soil through formation of secondary carbonates. Erosion management can reduce loss of carbon from the soil. Strategies of fire management can also enhance soil carbon sequestration as fire can increase runoff and soil erosion and also emits gases into the air. Rehabilitation of degraded grasslands is another option of increasing soil organic carbon content. The objective is to improve vegetative cover and enhance net primary productivity through reseedling 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 drivers 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 belowground.

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 or 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	Hejin, Tekes, Xinyuan, Gongliu, Bole, Qitai
Size	5,032 km ² useable pastoral area	3,710 km ² useable pastoral area	3,132 km ² 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 <i>Biodiversity Review of China</i> . 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 <i>Biodiversity Review of China</i> . 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 <i>Biodiversity Review of China</i> . 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)	<p>(1) <u>Rangeland Planning</u>: rangeland and biodiversity surveys, preparation of ecological land unit maps, village-based rangeland resource management plan development, provision of equipment, and rangeland-related research.</p> <p>(2) <u>Community-based Integrated Rangeland Management</u>: development of grazing and livestock management systems, reseeding degraded rangelands with native forage species.</p> <p>(3) <u>Native Forage Seed Production</u>: germplasm collection of native grasses, forbs and shrubs and development of seed production.</p> <p>(4) <u>Native Livestock Breed Conservation</u>: selection, improved breeding and management of local breeds of sheep and yak to maintain indigenous livestock germplasm.</p> <p>(5) <u>Training and Capacity Building</u>: 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.</p> <p>(6) <u>Management, Monitoring and Evaluation</u>: project management training, monitoring, periodic sampling as well as policy studies.</p>		
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 songaricum*, *Calligonum yingisaricum*, *Amondendron bifolium*, *Tamarix sachuensis*, *Cistanche salsa*, *Astragalus 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 trans-human 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 trans-human 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 GXPD 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, 330,000 *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

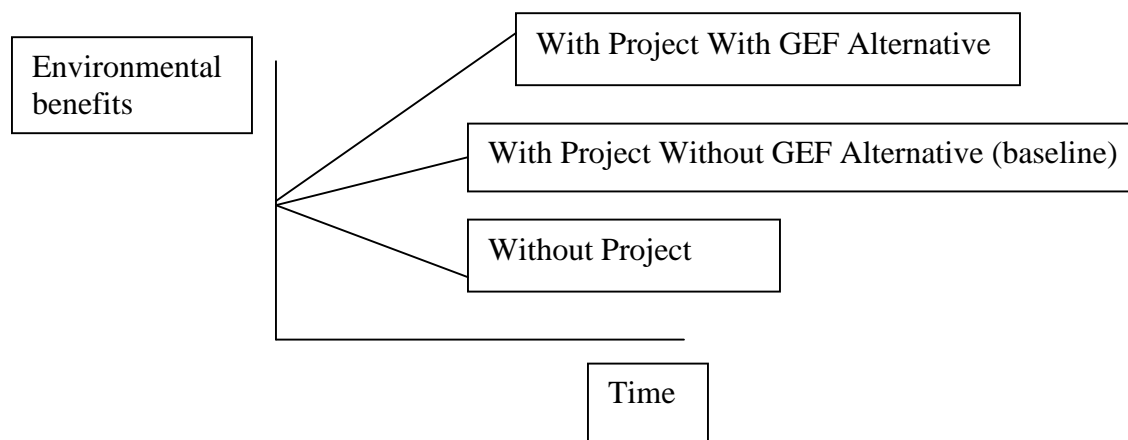
The global environment objectives of the GEF Alternative are to more effectively mitigate land degradation, conserve globally important biodiversity and enhance carbon sequestration through promotion of integrated ecosystem management in the grassland, desert, and forest ecosystems of the Qilian Shan, 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 trans-human 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 sibirica*); 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		

Financing for the different project components in US \$ million.

Component	IBRD	Counterpart	GEF	Total
1. Grassland management and Forage component	7.01	3.02	6.45	16.73
2. Livestock Production Improvement	41.87	24.15	0.64	66.66
3. Market System Development	8.98	2.13	0	11.11
4. Applied Research Training and Extension	5.66	0.78	2.44	8.88
5. Project Management and Monitoring	2.09	2.37	1.00	5.18
TOTAL	65.61	32.45	10.50	108.56

Technical Review of World Bank Gansu and Xinjiang Pastoral Development Project

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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. Muslim 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: loan 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 Council 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 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 sand 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 and would incorporate monitoring air quality within the suggested ecological monitoring system. Furthermore, strengthening existing local capacity in air quality control will contribute to the same objective. GEF activities under the Grassland Management Component of the project include: (i) strengthening existing grassland ecological monitoring systems; (ii) capacity building, extension, training and technical assistance.

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 trans-human 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 Task Team agrees. These additional programs will be noted in the relevant sections on institutional coordination and linkages.

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.

