A BIODIVERSITY CONSERVATION AND COMMUNITY LIVELIHOOD CO-MANAGEMENT PLAN FOR THE SUOJIA AREA OF QINGHAI, CHINA

Qinghai Environmental Protection Bureau

Upper Yangtze Organisation

Fauna and Flora International

May 2004

Compiled by Jieren Mei and Yingyi Zhang, Ph.D.

Translated by Yingyi Zhang, Lei Lin, Trish Chen, Yang Han, Shelly Shao and Lu Yan

DI 162/10/009

FOREWARD

The Biodiversity Conservation and Community Livelihood Co-management Plan in the Suojia Area was first conceived as a management plan for a wildlife-rich area of the Tibetan Plateau that is also a key part of the headwaters of the Yangtze River. After work began, it became clear that the plan could not be done by one agency alone, even with the support of many others, and the idea emerged of a Collaborative Management Plan, developed and perfected by multiple stakeholders working together for the common goal of ensuring the protection of Suojia's fragile environment, and addressing numerous issues that cut across the agendas of many government departments and affect many people's lives.

With the combined effort of all partners and support from Fauna and Flora International (FFI) and the Darwin Initiative of the UK Department for Environment, Food and Rural Affairs (DEFRA), the *Biodiversity Conservation and Community Livelihood Co-management Plan in the Suojia Area* was finalized in just three years from conception to completion. The plan is a key output of the participatory project for *Research, Survey and Biodiversity Planning on the Qinghai-Tibet Plateau*, funded by the Darwin Initiative and managed by FFI. Through extensive cooperation and participation, the many essential steps were each carried out successfully, from preliminary design, to information collection and field surveys, training, planning Workshops and on through to writing, compilation and revision.

This management plan will be an important reference for the construction and management of a key part of the Sanjiangyuan Nature Reserve. It is essential to regional environment protection, and will expedite biodiversity conservation in Suojia. The goal of this plan is to attract funding for environmental and development programs, promote the co-development of biodiversity conservation and local community livelihoods, strengthen the cooperation between different governmental departments, improve the management of natural resources and the environment and facilitate the sustainable development of the local economy.

The formulation of this plan is based on the relevant laws and regulations. This plan is linked to the relevant socio-economic development and environmental protection plans in Qinghai, and refers to the national and international documents on biodiversity conservation and nature reserve management. This plan also adopts some new approaches widely used around the world.

The special geographic location and topography of the Suojia area has resulted in minimal impact from human activities, higher biodiversity value and better habitats for wildlife compared to adjacent areas. The protection of this nearly intact area should be intensified due to its very important ecological functions. Increasing human disturbance, however, has threatened the wildlife in Suojia in the past decades. Although the government at all levels in Qinghai and the local communities have realized the importance of wildlife conservation and taken some actions, biodiversity conservation remains weak and management is not effective due to constraints such as shortage of funds, inadequate techniques, lack of public and governmental awareness and poor management systems.

The unique value of the Suojia region, the characteristics of key stakeholders and the threats to and constraints on conservation were all analyzed carefully before planning began. Subsequently, each threat was analyzed for its root cause and appropriate countermeasures were put forward. The goal and objectives for the plan were identified, also based on the analysis. Finally, 37 actions were proposed, addressing development of organizational structure, strengthening of management

capacity, construction of management organizations, construction of community service infrastructure, establishment and development of management regulations, formulation of a biodiversity conservation plan, development of eco-tourism, and enhancement of key scientific research.

Authors: Mei JieRen, Traxi DuoJie, Pang WeiDong, Wen Jia, BaSang LaMao, Xin YuQun, Zan MingShou, Ju LiXin

Consultants: Deng WeiJie, Zhang YingYi, Nasan Bayar

Editors: William V. Bleisch, Zhang YingYi, Shelly Shao , Alexander Michelsen, Paul Buzzard, Jacqui Weir

EXECUTIVE SUMMARY

1. INTRODUCTION

This plan will serve as a basis to seek national or international inputs to implement all actions designed to improve the situation for environmental protection, enhance monitoring and management, attract more people to devote themselves to the protection and build public awareness to acheive integrity of ecosystems and sustainable use of resources in the Suojia District.

After reviewing relevant laws and reference documents, general principles for formulation of the plan were set out. New approaches were used to set standards for ecological integrity for the ecosystems, to promote community participation in planning and to provide a foundation for adaptive management of the region.

2. GENERAL INTRODUCTION TO THE SUOJIA AREA

Suojia Township lies in the southwest of Zhiduo County, in Yushu Tibetan Autonomous Prefecture of Qinghai Province. The area covered by this plan comprises 16,218 km2 and is home to over 5,000 people. Historically, as today, the area was a Tibetan nomadic region and had a rich nomadic culture.

The project area is on the Yangtze River Headwaters alpine plain and on the north slope of Tanggula Mountain, with an average elevation of plateau areas above 4,500m, and montane areas rising to 5,362 m. The region experiences a cold and dry climate, with extreme moisture and temperature conditions in all seasons.

The project area supports abundant water resources, with numerous rivers, marshes and lakes. All the rivers drain into the upper Yangtze river system.

Suojia Township was established in 1966 from the nomadic encampments of the Yara tribe. At present, four Herder Committees comprise Suojia Township. Eastern Suojia has a large population of livestock and commodious pastures the isolated geographical location and high altitude make it hard to raise livestock, so development of animal husbandry has been slow and unstable.

3. CURRENT SITUATION OF BIODIVERSITY CONSERVATION AND MANAGEMENT

Because of its remoteness and lack of development, the ecosystems of Suojia are still largely intact, and therefore hosts various wildlife species in large populations. The Project Area is dominated by the alpine meadow and alpine steppe ecosystems, and these grassland ecosystems are the most important habitat for the majority of wild animals. There are two substantial areas of wetland in the Project Area, at Tsozhaton and Lirin Tsobja. Wildlife resources are still rich, with large populations of most of the large wildlife species expected for the Qingzang Plateau, including Wild yak, Wild ass, Tibetan antelope, Blue Sheep, Snow Leopard, White-lipped Deer and Black-necked Cranes.484 species, 184 genera and 50 families of seed plants have been recorded in the Project Area. The natural ecosystem of the project area is nearly intact and has a high biodiversity because of its remote location, complex topography and harsh climate.

Six Local Protected Areas have been established by the Suojia community and local government. In additiona, Qinghai Environment Protection Bureau, Qinghai Forestry Bureau, Management Bureau of Sanjiangyuan Nature Reserve, local NGOs such as the Upper Yangtze Organization and International NGOs such as Fauna and Flora International are all actively involved with biodiversity protection in the region. However, local herders must still rely heavily on the natural resources in the nature reserve due to the absence of alternative sources of income. Few ecological/environmental protection projects have been implemented to date.

4. EVALUATION AND COUNTERMEASURES

Stakeholders' analysis provided insight into the interaction between human society and the world of biodiversity, and the impacts of social, economic, and cultural changes in the community upon the environment. The stakeholders in the project area can be classified local residents, local governments, local non-government organizations, local monasteries, higher-level units of administration, and international institutions.

Residents in the project area are the primary stakeholders and all are ethnic Tibetan herders who rely almost exclusively on livestock as their main source of income. The household is the basic unit of production and consumption in Suojia and the main means of production, based on the household, is animal husbandry. Due to the size of the area, there is no shortage of pasture, and herders live in harmony with wildlife and nature. Herders think that the protection of pasture will benefit their livestock, ensuring plenty of grazing land. The traditional method of stock raising relies on natural resources, with herders moving around to graze the animals and living an nearly autarkic lifestyle. Stock products have a low market value.

The Township Government is the only authorized government organization in Suojia, and is responsible for poverty alleviation programs. Government departments at provincial and prefecture levels influence policy-making and have direct or indirect impacts on environmental protection through relevant authorities in the Township and County.

When considering interactions between key stakeholders and with one another and with the environment, the role of local monasteries cannot be ignored. Local NGOs are also an important force because they are a link between various local groups and non-local groups such as international NGOs and Beijing-based Chinese NGOs.

Problem analysis revealed the main problems in the project area include:

- Degradation of some parts of the grassland due to overgrazing
- Loss of habitat
- Desertification of grassland
- Environmental problems resulting from gold mining
- Lack of ecological consideration in planning
- Degradation of fragile areas with high biodiversity
- Low capacity of organizations for biodiversity conservation

The constraints that prevent improved biodiversity conservation include:

- Lack of the awareness of ecological protection and sustainable development.
- Lack of experience in incorporating ecological environmental protection approaches into the implementation and planning of sustainable development programmes.
- Lack of necessary funds and conservation techniques.
- Lack of awareness of participation of communities in protection and management activities.
- Lack of integrated land use planning.
- Deficiency in the human resources necessary for ecological environmental protection and sustainable development.
- Poor condition of primary education in communities.
- Lack of alternative incomes in local communities.
- Incomplete community services and social security systems.

Representatives of all of the stakeholders agreed on priority strategies to counter the root causes of continuing loss of biodiversity in the Suojia Area.

5. MANAGEMENT OBJECTIVES

The goals for this management plan are to facilitate natural processes; to set up a management system consisting of management organizations and communities; to encourage local people to participate in management actively; to control and alleviate the deterioration of the ecological environment and degradation of natural resources in this area; to recover damaged ecosystems; to realize the sustainable use of natural resources; to develop Suojia into a pilot area for biodiversity and ecological environment conservation in Qinghai Province, and to extend its experience to other districts in the headwaters region of the three great rivers.

The objectives for the four years from 2004 to 2006 are:

- To develop the organizational structure and management system so as to enhance the participation of communities in the management of their natural resources and environmental protection.
- To improve the capacity of UYO and the communities for livelihood development, biodiversity protection and natural resources management, and facilitate the sustainable

development of the socio-economy.

- To coordinate the relationships between the nature reserve, the local community, government at all levels and national and international NGOs, and to strive for more financial and technical support.
- To conduct infrastructure construction to improve conditions for management and protection.
- To formulate a plan for wildlife protection, and to strengthen patrolling, monitoring and enforcement activities, for ecosystem protection and sustainable development.
- To formulate an eco-tourism plan, and to increase alternative income opportunities for local communities.
- To increase investment in scientific research, and to guide protection through the research.
- To strengthen education and publicity; to improve public awareness of environmental protection and sustainable development; to promote traditional ethnic culture.
- To effectively control illegal activities that destroy the ecological environment.

6. ACTION PLAN

Priority actions include:

- Set up a Suojia Biodiversity Protection Program Office
- Construct the Suojia Branch of the Tongtian River Core Protection Station for the Sanjiangyuan Nature Reserve
- Build capacity of local community committees to serve and monitor community and protection activities.
- Build capacity of the locla NGOs Upper Yangtze Organization and Qinghai Environment Protection Promotion Council of Great Rivers Headwater Areas
- Improve education and publicity for biodiversity conservation in local communities
- Improve the livelihood of local communities
- Restore and manage breeding corridors for important wild animals, mitigating the impacts of fencing and roads
- Open a Wild Animal Rescue Clinic
- Conduct research on natural disasters
- Conduct research and protect the local culture of Suojia
- Control diseases in wild animals and livestock
- Research on pikas and biological countermeasures for control of pika infestations
- Conduct research on migration of wild animals
- Study the impact of settlement and changes in nomadic lifestyle on grassland ecosystems
- Conduct research on key species and ecosystems
- Construct community schools
- Construct heat preservation barns for livestock
- Prevent grassland fires
- Set up a market for trading livestock
- Improve public health in communities
- Establish a community management system for natural disasters

The Action Plan also includes a mechanism for monitoring, evaluation and adjustment of the plan, a timetable and a summary budget.

PREFACE

Suojia District is within the Sanjiangyuan National Nature Reserve and partly within the Tongtianhe Core Zone of the reserve. The objective of this reserve is to protect rare wild animals such as Tibetan Antelope, Tibetan Wild Ass, Snow Leopard, and Black-necked Crane, and wild habitats such as Alpine Steppe, as well as the ecosystems of the headwaters of the Yangtze River. In May 2001, the project *Research, Survey and Biodiversity Plan on the Qinghai-Tibet Plateau* was launched, co-coordinated by Fauna & Flora International (FFI), together with the Environmental Protection Bureau (EPB) of Qinghai Province. Two local non-governmental organizations, the Environment Protection Promotion Council of Great Rivers Headwaters Areas (EPPCGRHA) and the Upper Yangtze Organization (UYO) also took part in the implementation of this project.

Qinghai EPB organized a workshop, *Qingzang plateau Suojia District wildlife protection and community livelihood co-management plan,* in Xining on 15 Jan 2003. Over 60 Participants came from the Qinghai Finance Bureau, Qinghai Environmental Protection Bureau, Qinghai Forestry Bureau, Qinghai Animal Husbandry Bureau, Qinghai Water Conservancy Bureau, Qinghai Weather Bureau，Qinghai Science and Technology Bureau, North-west Plateau Biology Society CAS, Agriculture Department and Stock Raising Department of Qinghai University, Qinghai Normal University, Xining Wildlife Rescue Station, Qinghai reporting station of China Environmental Daily, Qinghai TV and Qinghai Daily, as well as government officers of the project area and local herders. After workshop training on Logical Framework analysis, problem analysis and a lively discussion, countermeasures and suggestions for biodiversity protection and sustainable development of the socio-economy in Suojia area were developed. This management plan is a direct result of the workshop.

Since protection of the Headwaters Region in Qinghai Province began, the *Biodiversity Conservation and Community Livelihood Co-management Plan* is the first management plan organized and developed with participation of an International NGO, adopting international approaches. The plan proposes pertinent countermeasures to the problems of ecological and environmental protection in this district and establishes a reasonable, scientific and effective management mechanism in order to maintain and restore the integrity of the ecosystem. This project is a good attempt to protect biodiversity on the Tibetan Plateau with the participation and collaboration of communities. The completed management plan will be a good base and reference for the management of Protected Area for Ecological Functions (PAEF) in the Yangtze River Headwaters Region and Sanjiangyuan National Nature Reserve.

This project was funded by the Darwin Initiative, under the management of FFI. The editing process referred to the *Development Guide for Nature Reserve Management Planning,* and other technical documents. This management plan is compatible with and has effective linkage with the following plans: the *Ecological Environment Constructive Plan of Qinghai Province*, the *Master Plan for Sanjiangyuan Nature Reserve*, the *Plan of Protected Areas for Ecological Functions in the Yangtze River Headwaters Region* and the *Integrated Administration and Plan of the Ecological Environment of the Yangtze River Headwaters Region*. Qinghai Environmental Protection Bureau, Qinghai Forestry Bureau, Qinghai Animal Husbandry Bureau, Qinghai Land Resources Bureau, Zhiduo County, Suojia Township and two local NGOs also participated in the

compilation and revision of this plan. Experts from Inner Mongolia University, Sichuan Forestry University and Qinghai University provided technical support.

ACKNOWLEDGEMENTS

The authors and compilers would like to thank the many, many people who gave their time and efforts to making this plan a reality. Key among these are SEPA Vice-director, Qinghai EPB Director Zhang Lanqing, who provide essential backing and support despite the sometimes difficult planning process. Mention must be made of those who managed the project for FFI and made sure that it ran smoothly, particularly Mike Harding, Yingyi Zhang, Shelly Shao, and Bill Bleisch. The help of Drashi Dorje, Marc Foggin and Mei Jieren was vital to getting the project started. Deng Weijie played a key role, both as trainer and facilitator. Many people shared their time and valuable experience during workshops, including the experts Li Diqiang, Xie Yan, Wang Sung, David Mallon, Nassan Bayur, and Su Jianping. There were many others who contributed key ideas, information and expert review, too numerous to be named. If they read this report, each one should know how important their contribution was and how grateful we are to them. There can be little doubt that errors and omissions have unavoidably occurred in the course of planning and compilation. If the reader detects these, we would appreciate if they could be brought to our attention.

1. INTRODUCTION

1.1 THE GOAL AND NECESSITY

Formulating the *Biodiversity Conservation and Community Livelihood Co-management Plan for the Suojia District* is a fundamental project for regional environmental protection. Formulation of this plan promotes the management of an ecological environment. It will ensure biodiversity conservation and the development of communities through scientific planning and effective management of natural resources. It will enhance cooperation and coordination between different departments, which is essential to environmental protection in this region. This project encourages the participation of communities in collaborative management (co-management), which will promote the local herdsmen's contribution to environmental protection and improve public awareness. Finally, the project will facilitate sustainable development of the communities and their socio-economy.

Currently, global biodiversity conservation is grounded in the international "Convention on Biodiversity Conservation". This convention encapsulates key principles for any work related to biodiversity conservation. In response, China published a National "Biodiversity Action Plan" (BAP) in addition to many provincial and county-level BAPs. This attempt to develop a collaborative plan for wildlife conservation and community development was the first attempt in China to set up a BAP at township level, resulting in many new ideas and methods for establishment and development of the Sanjiangyuan National Nature Reserve.

1.2 OBJECTIVES OF THE MANAGEMENT PLAN

This plan will serve as a basis to seek national or international inputs to implement all proposed actions, which will therefore improve the situation for protection, enhance monitoring and management, attract more people to devote themselves to the protection and build public awareness. Through the implementation of this management plan, the integrity of ecosystems and sustainable use of resources in the Suojia District will finally be realized.

Through implementation of the management plan, we expect to achieve the following results:

(1). Enhanced cooperation between governmental and non-governmental sectors in jointly organising international projects, expanded range of cooperation, and in-depth study and research to addressing conservation concerns.

(2). More prominent involovment of the government in ecological conservation and facilitated cooperation between different government sectors. Wildlife conservation of the Suojia area brought more prominently into national and local government financial budgets.

(3). Improved condition of wildlife conservation in the Suojia area, gradually restoring wildlife populations.

(4). Ecological harmony achieved between humans and nature through community participation, co-management and co-development

1.3 RELEVANT LAWS AND REGULATIONS

This management plan was formulated in accordance with the following laws and regulations:

Convention on Biodiversity Conservation

21st Century Agenda

The Protection Guidelines of Important Protected Areas for Ecological Functions in the Headwaters District of the Yellow River and the Yangtze River in Qinghai Province

Nature Reserve Regulations of the People's Republic of China

Forestry Law of People's Republic of China
The Master Plan of Sanjiangyuan Nature Reserve in Qinghai Province
Environmental Protection Law of People's Republic of China
The Formulation Guide of Ecological Integrity of National Park
Wild Animal Protection Law of People's Republic of China
Wild Animal Protection By-law of People's Republic of China

1.4 GENERAL PRINCIPLES

The formulation of this management plan adheres to the following principles:

(1) Protection is the priority. Suojia District is located in the heartland of the Yangtze River Headwaters Region. The ecosystem remains intact to a large extent, with little influence from people, so biodiversity is abundant and of high conservation value. Consequently, the human impact on this ecosystem must remain low to ensure its continued survival.

(2) Integrated planning and moderate exploitation. The Plan should focus on protecting endangered wild animals and their habitats; it should emphasize the establishment of an effective step-by-step management system. At the same time, considering the interests of local herdsmen, animal husbandry and other enterprises, the Plan should be have a large enough scope to take into account the sustainable use of natural resources.

(3) To be scientific, insightful and practical. The Plan will protect the environment based on scientific research. Furthermore, the Plan will be able to not only meet the needs of current environment protection, but also to adapt to future dynamics.

(4) Linkage of ecological environment protection with local economic development: biodiversity protection in the Suojia District will be combined with social and economic development in the community. The implementation of projects will strive to alleviate poverty and improve the living conditions of herdsmen, making the herdsmen not only participants of this project but also its beneficiaries.

(5) Sustainable development. The Plan addresses the conflict between environmental protection and economic development. It also strives to improve degraded environments, increase grazing productivity, adjust economic structure, enhance ecological function and realize the co-development of economy and environmental protection with external inputs.

1.5 NEW APPROACHES

1.5.1 Ecological Integrity

Ecological Integrity means that all of the existing characteristics of a natural region, such as inorganic components and local species, and the processes and interaction between them are expected to persist in roughly their current abundances and magnitudes. This will help us to identify a basis for adaptive management of the nature reserve and the local area's conditions, and also provide a basis for determining the ecological integrity state of the nature reserve by describing key parts of its ecological systems in the Ecological Impact Survey (EIS). This approach should be kept central in the formulation of the Plan.

1.5.2 Participation of Communities

The participation of communities in natural resource management and conservation is a new approach in the Project Area. This plan will encourage people to commit themselves to biodiversity conservation and will build public awareness.

1.5.3 Adaptive Management

A scientific management system is the key to environmental protection. The system should be

adaptable to the difficult realities of the Project Area: diverse ecosystems, a harsh climate, inconvenient transport and an under-developed economy.

2. GENERAL INTRODUCTION TO THE SUOJIA AREA

2.1 GEOGRAPHICAL LOCATION, ADMINISTRATIVE DEMARCATION AND FUNCTIONAL ZONING

2.1.1 Geographical Location and Administrative Demarcation

Suojia Township (N 33º35'—36º18'; E 89º20'—94º40') lies in the southwest of Zhiduo County, Yushu Tibetan Autonomous Prefecture, Qinghai. It borders both Zhahe and Duocai Townships of Zhiduo County to the east; Moyun Township of Zaduo County and Tanggula Township of Golmud Municipality to the south; Anduo County within the Tibetan Autonomous Region to the west; and Ruoqiang County of Xinjiang, Golmud Municipality and Qumalai County to the north. It covers an overall area more than 60,000 km^2 including the 45,000 km^2 inside the Kekexili National Nature Reserve in the west. The land on the north bank of Tongtian River, while still in Suojia Township, is under the control of herders from Qumalai County.

The project area comprises the 16,218 km^2 that is under the administration of the four Herder Committees of Suojia Township. It shares the same western border with the Suojia area, but borders Tongtian River on the north and the Qinghai-Tibet highway on the west. The Qinghai-Tibet railroad and Qinghai-Tibet highway pass through the western part of this area. There are simple roads connecting the project area with the seat of Zhiduo County and the Qinghai-Tibet highway. The distance between the Township Government and the seat of Zhiduo County is about 260 km, while the distance between the Township Government and Xining City is about 1,150 km.

Table 1: Human population and land area in project area

	Population and %	Land Area (km^2)	Details
Qinghai Province	5,181,560	721,200	The fourth biggest Province in China, after Xinjiang, Tibet and Inner Mongolia
% (of China)	0.4%	7.5%	
Yushu State	268,000	197.791	The second biggest district in Qinghai, after Haixi District
% (of Qinghai)	5%	27.33%	
Zhiduo County	24,647	77,600	The biggest county in Yushu District
% (of Yushu State)	9%	39%	
Suojia Township	5,315	19,854	The biggest township in Zhiduo County
% (Zhiduo County)	21%	83.4%	

Sanjiangyuan (Source of the Three Great Rivers) Nature Reserve was established in 2000, and approved by the State Council in 2003 as a National Nature Reserve. The reserve was set up primarily to protect the plateau wetland ecosystem. It has 18 core zones, covering an overall area of 152,300 km^2. The Tong Tian River Source Core Zone of the Nature Reserve is partly located in the Project area, with the core zone of 3,256 km^2, the buffer zone of 4,776 km^2 and the experimental zone of 2,822 km^2.

Table 2: The Zoning of the Nature Reserve（Unit: million ha)

Name	Total Area	Core Zone	Buffer Zone	Experimental Zone
Sanjiangyuan NR	15.23	3.1218	3.9242	8.1882
Suojia Township	1.0854	0.3256	0.4776	0.2822

2.2 BACKGROUND OF NATURE, HISTORY AND CULTURE

Relics of "Yushu People" and human activities appeared in the Project Area about 20,000 years ago and people began to herd livestock there about 10,000 years ago. Around 3,000 to 4,000 years ago, people began to live in settlements, and by approximately 1,000 years ago hunting tribes and herdsmen were scattered across the river valley.

Historically, the area was a Tibetan nomadic region and had a rich nomadic culture. In the 7th century, when Tufan conquered all tribes on the Qinghai-Tibet plateau, this area belonged to the prefecture of Tuguhun. The dominant religion at that time was Bon, and the worldview of Bon was pantheistic, the landscape itself being considered a supernatural deity. The Bon religion held wildlife in high regard as part of nature worship. In the 17th century, people converted to one of the four sects of Tibetan Buddhism, the Gelugpa.

Among the sagas, stories, eulogies and adages of nomadic culture, the saga of "King Gesar" is the most mystical and highly regarded. The story of "King Gesar" is the product, the pith, and the treasure of nomadic culture. It encapsulates both pantheistic nature worship and the Buddhist concept of Samsara. The Suojia area figures prominently in the "King Gesar" saga.

The project area was historically the large summer pasture of the Yushu tribe, and was the habitat of wildlife during most times of the year.

At the beginning of the 19th century, because of fighting with Guoluoashijunqianhu, the Yara tribe migrated westward to Xiqia Mountain. There were 2,500 people in more than 500 households at that time. In 1953, when Zhiduo County was established, western households from the Yara tribe and parts of the Zongju tribe were assembled at the centre of the County and set up several state-run pastures (e.g. Daka and Jiangyangtan).

In April 1996, two groups of herders were transferred from Dangjiang and Xiarinake (Zhichu) to form the Suojia community. In 1970, four additional groups of herders were transferred in from Dangjiang and Jiumo (Hongqi) community. At present, there are 16 subgroups of herders, totaling 5,201 people in 1,027 households.

Bayar (2002, appended) provides more details on the people of the area.[1]

2.3 PHYSICAL CONDITION

2.3.1 Geology and Geomorphology

The project area is on the Yangtze River Headwaters alpine plain and on the north slope of Tanggula Mountain. The geology is characterized by alluvial rock, lacustrine rock, pluvial rock, fluvial-glacial accumulation and eluvial rock. The elevation of the project area is high, with the average elevation of plateau areas above 4,500m, and montane areas above 5,000m. The main Peak of Xiqia Mountain reaches 5,362m and has permanent snow and glaciers. Most mountains differ in height by only 500m. The terrain is wide and little undulating, revealing a mosaic

[1] Bayar, N (2002) *Stakeholders and Socioeconomic Analysis*, below.

landform of foothills, valleys and basins. The geological formation is a Tertiary system, consisting of Amaranth pebbly sandstone, Sandy mudstone and limestone, basic and intermediate volcanic rock, and bottom gravel.

2.3.2 Type and Distribution of Soil

The principal soil types are:

Alpine meadow soil: This is the prevailing soil type, widely distributed on slopes with better drainage and in river valleys. The parent material horizon is composed of weathering eluvia, slope wash, fluvial-glacial accumulation and alluvium.

Bog soil: This is widely distributed but in limited areas, second only to Alpine meadow soil. This soil occurs around riverbanks, basins and low wetlands of impeded drainage in the valley. It is an intra-zonal soil, developed by wetland processes. There are water-worn holes on the surface.

Alpine steppe soil: This covers only a few areas, distributed merely on the south slope or semi-south slope in the valley of the Tongtian River. The parent material horizon is composed of various sediments and eluvia. The growth of steppe vegetation is slow, and often without a sod layer. The degree of mineralization is high.

Alpine Desert Land: This is distributed only along watershed ridges and the paleo-moraine plateau above the Alpine meadow soil, split by alpine bare rocks and clast.

The principal soil erosion process is freeze-thaw erosion, along with weathering erosion. The type and distribution of the erosion are indicated in Table 2:

Table 2: The Type and Distribution of Soil Erosion In Suojia District. Unit: Km^2

Erosion type	Slight	Weak	Medium	Strong
Area	12892.9	1499.0	897.4	858.5

2.3.3 Climate

The project area has a Plateau Climate, with frequent winds and low rainfall. The region is cold and dry with only two meteorological seasons including a prolonged cold season. Sunlight and radiation are both intense. The cold season lasts 8 to 9 months, while the warm season lasts merely 3 or 4 months. The average temperature is low and the area does not have a fully frost-free period. Aggregate sunlight totals 2600-2800 hours per annum and the growing period of natural pasture lasts about 105 days. In the cold season, the area is cold and dry because of the west wind drift. On the other hand, in the warm season, the climate is warm and wet because of the warm-wet air drift. The project area has extreme moisture and temperature conditions. Average annual temperature is –4℃ to –6℃, with average July temperature 5℃ to 8℃, mean January temperature –18℃ to –19℃, average highest temperature 12℃ to 15℃, and mean lowest temperature –23℃ to –29℃. Cumulative temperature above 0℃ is 400℃ to 800℃. Annual precipitation is 200-300mm, and annual humidity is 0.3-0.5. The area receives a large amount of sunlight and the annual aggregate radiation is 669.9 KJ/cm^2.

The project area is subject to many natural disasters including snowstorms, drought, flooding, hail, thunderstorms, pests, strong winds, and high densities of rodents. Droughts are rare in the district while snowstorms are the most powerful and intense disasters that cover a wide area. From Oct 17 to 19 in 1985, an exceptionally severe snowstorm lasted 50-60 hours and dropped 110cm of snow

causing heavy mortality of wildlife and livestock in the project area. Strong winds occur in January-April, bringing lower temperatures, higher livestock mortality, and intensified desertification. Severe hailstorms and thunderstorms occur often in the rainy season and may result in mud slides threatening wildlife, livestock, growing pasture, and people. Pests and high densities of rodents mainly occur during the growing period of pasture, and are severe in July and August.

2.3.4 Grass Land

The area of high grassland cover is about 119.7 km^2, covering 1.37% of the whole area, while medium cover is 1,966.2 km^2 covering 22.55%, and low cover 4,675.2 km^2 covering 53.62%. The following are main vegetation types distributed in the project area (See also Mallon 2002[2]):

Alpine meadow: This is the most widely distributed vegetation type in the project area. The plant species include Alpine *Kobresia spp* meadow, *K. capillifolia, Carex spp. & Kobresia tibetica* meadow, Alpine *Kobresia spp. & Stipa purpurea* Steppe-Meadow, and *Kobresia tibetica* mash-meadow. Perennial herbaceous plants dominated by *Kobresia spp.* are the main elements of the vegetation. Alpine meadow is characterized by a tall sward, orderly shape, and uniform structure and is the most valuable pasture in the project area.

Alpine steppe: It is distributed mainly in the pluvial-alluvial fan on the south slope and the semi-south slope of the valley of the Tongtian River. It includes *Stipa grandis* Steppe, *Stipa grandis & Kobresia tibetica* Steppe, and *Kobresia tibetica* Steppe. Vegetation is sparsely distributed and simply classified, mainly consisting of perennial graminoids and weeds. *Stipa purpurea* and *Stipas* are frequent elements of the flora and are dominant over large tracts.

Montane Meadow: It is less common in the area. *Arenaria* and *Androsace tapete* are dominant elements of the flora.

Alpine Stone-slope Meadow: It is less common in the area. *Arenaria*, snow lotus (*Saussurea involucrata*) and *Rhodiola* are dominant elements of the flora.

The area of pasture is 916,000 hm^2, about 84.82% of the total area. Available pasture covers 688,700 hm^2, occuping 63.77%. The area of the cold season pasture is 138,100hm^2, with a real capacity of 469,900 Sheep Units. The warm season pasture is 550,600hm^2, with a real capacity of 1,150,000 Sheep Units. Alpine meadow pasture covers an area of 576,600 hm^2, 62.95% of total area; Alpine wetland pasture covers an area of 246,300hm^2, 26.89% of the total area; Alpine steppe pasture occupies an area of 92,000 hm^2, 10.05% of the total area; Montane scrub pasture is 1,200 hm^2, 0.10% of the total area.

2.3.5 Wild Animals

The project area is the core and buffer area for wild animals within the Sanjiangyuan Nature Reserve. As most habitats are intact, the project area has large populations of various wildlife species. Based on the survey (see annex), the total number of land vertebrates comprises 95 species (29 mammals, 65 birds, 1 reptile). Key rare and protected species are Black-necked Crane (*Grus nigricollis*), Tibetan wild ass (*Equus kiang*), Snow Leopard (*Uncia uncial),* White-lipped Deer (*Cervus albirostris*), Wild Yak (*Bos grunniens*), Tibetan Antelope (*Chiru*), Otter (*Lutra lutra*), Himalayan Marmot (*Marmota himalayana*), Red Fox (*Vulpes vulpes*), Blue Sheep (*Pseudois nayaur*), Tibetan Argali (*Ovis ammon hodgsor*), Tibetan Snowcock (*Tetraogallus tibetanus*) and Golden Eagle (*Aquila chrysaetos*).

[2] Mallon, D (2002) *Habitats, Biodiversity and Capacity Building,* below.

2.3.6 Landscape Resources

There are many amazing and sacred landscapes all over the project area such as expansive wetlands and pasture, scattered lakes, snow-mountains, Saint Geladandong, commodius Aqingwutang, the great Yangze River, the Xiqia Mountain (guardian mountain of the hunting tribes), Yanzhangua ("Lushan" in the river headwaters), Qieguoama (Mother Spring) which nourishes thousands of wild ass, Bazaitan and Dilaatan (original habitats of Tibetan Antelope), Duojiewangzha Sacred Mountain (the guardian of the Yara tribe), Gawalaze Mountain and Qiecunnala Mountain.

There is also a modified landscape stemming from nomadic culture in the project area, like the encampment at Dalai Qieguozhaxiqingwa (Lucky Spring) in the north of Gawalaze Mountain, the monument at Kunlun Mountain Pass to Jiesang-Suonandajie, the environmental martyr of China in the 20th century, Jiesang—Suonandajie Protection Station 10km away from Unfrozen Spring, four community nature reserves in Suojia, Gongsa Monastery in Yachu where wildlife protection is incorporated into religious activities, poetic Rai, vivid sagas and stories, and wonderful marriages. People around the monastery live simply and with close ties to nature.

2.3.7 Water Resources

The project area supports abundant water resources because of many rivers, marshes and lakes. All the rivers flow into the Yangtze water system, and Dang Chu River is the south headwaters of the Yangtze River. Other primary rivers include Ya Chu River, Mo Chu River, and Jiong Chu River, which are all large tributaries of Tongtian River with ample flow and good water quality. The main characteristics of these rivers are shown in Table 3 below.

The aquifer types providing groundwater are pore water, fault water, alluvium water, and talus-pluvium water, and some areas are supplied with water from fluvial-glacial deposits and moraines. Groundwater is formed by either infiltration or coagulation. Furthermore, the temperature, quality, and level of groundwater are sensitive to meteorological change. Exit points of phreatic water are found along river valleys.

Table 3: Main Characteristics of Rivers in the Suojia District

Water System	Distance (Km)	Catchment (Km^2)	Elevation (m)		Difference of elevation (m)	Slope (%)	Average annual volume (m^3/s)	Aggregate annual volume (×10^9 m^3)
			Head waters	Exit				
Mo Qu	137.8	7096.10	4782	4390	392	0.0028	27.6	8.7
Kouqian Qu	153.1	3546.21	5152	4279	873	0.0057	10.0	3.15
Ya Qu	110.9	3055.3	4963	4344	619	0.0056	8.6	2.71
Tongtian River	613.3		4550	3944	602	0.0098	292	85.85

2.3.8 Mineral Resources

Geological survey work in the Suojia District was started late and is still in its infancy. Geological and hydrological field surveys were only carried out in the region to the scale of 1: 1,000,000. Currently, only three Gypsum mines have been discovered: Zazhizhajia, Aogoubengen and

Eguoduoma. These small mines cannot be accessed easily, and thus cannot be efficiently exploited at present. Based on "The general planning of mineral resources in Yushu Tibetan Prefecture in Qinghai Province" (2000-2010), mining is banned in the core zone of "Sanjiangyuan Nature Reserve" and "Kekexili Nature Reserve". Mining is also limited in the 14 buffer zones of "Sanjiangyuan Nature Reserve" and must go through strict censorship. Therefore, large-scale mining exploitation is not viable.

2.4 GENERAL SITUATION OF THE SOCIO-ECONOMY

2.4.1 Population

In 1966, the Suojia Township was established. The project area was the nomadic encampments of the Yara tribe and some people of the Zongchu tribe. At present, there are 4 Herder Committees and 16 sub-groups of herders in the Suojia Township. There are 5135 people, 3564 labor forces in 1019 Tibetan households. The Herder Committees are named Moqu, Dangqu, Yaqu and Junqu. Dangqu is the largest Herder Committee in area; Moqu is the Herder Committee with the largest population, and Yaqu is the Herder Committee with the most domestic animals. Table 4 below provides some insight into the composition these groups, and there is more detail in Bayar (2002)[3]. The inhabitants of the project area are wholly dependent on livestock. Before the snow disaster in 1985, the total amount of livestock was 250,000 with more than 70 livestock per capita. At the end of last century, the total amount of livestock was 81,022, consisting of 20,519 cows, 49,922 sheep, 1,664 horses, and 8,917 goats, and livestock per capita was 15.6. The district maintains a boarding school, two tent primary schools, a township clinic, a veterinary station and 16 locally trained doctors.

At the end of 20th century, the "Four Activities for Settlement" Program (housing, fencing, planting grass and poisoning pikas and pests), and a road construction project were implemented in the project area. At present, the second phase of Zhisuo Road Construction has not been finished and road construction of the Herders Committee is still in progress. Without external support, however, these projects will be difficult to complete.

2.5.2 Socio-Economic Development

The project area has a large population of livestock and commodious pastures. The grazing is dominated by sedges and herbs, of high quality, palatable to livestock and endures trampling. However, due to the isolated geographical location and high altitude, livestock is hard to raise. Because of the low production of grazing, deficient pasture in the cold season, harsh climate and high densities of wildlife, the development of animal husbandry is slow and unstable.

[3] Bayar, N (2002) Stakeholders and Socioeconomic Analysis, annex below.

3. CURRENT SITUATION OF BIODIVERSITY CONSERVATION AND MANAGEMENT

3.1 BIODIVERSITY

3.1.1 Ecological Environment

Most of the Suojia Township lies in the transitional regions of three prevalent formations: alpine desert, alpine steppe and alpine meadow. The hydrothermal conditions are diverse. The vegetation condition here is conspicuously better than in the alpine desert to the west and the alpine steppe to the north, resulting in a better habitat for wildlife.

Suojia is a vast and remote area with very poor transport and a sparse human population. There has been no industry or mining to date.. Overgrazing has not occurred since the establishment of Suojia Township in 1966, due to the hard conditions, slow increase in livestock numbers, and occasional severe loss of livestock caused by frequent snowstorms since the 1980s. The ecosystem is still intact or semi-intact compared to the eastern area, and therefore hosts various wildlife species in large populations.

Due to the severe weather, the prevailing alpine meadow and alpine steppe yield a thin sod layer, and have a short growth-period and low productivity. The ecosystem is vulnerable to overgrazing and degradation due to its simple structure, slow energy flow, inefficient recycling, poor resistance to damage and low capacity for rehabilitation. Similarly, under the severe conditions, the soil substrate, largely made up of alpine meadow soil and alpine steppe soil, is vulnerable to strong freeze-thaw and wind erosion, because of its short history of development, poor quality, bad decomposition and accumulation of organic matter, and thin substrate.

As a remote hinterland, no environmental quality monitoring has been carried out in this area. However, the air, soil and water are almost pristine as there are no polluting industries or resource exploitation in Suojia and adjacent areas, plus the prevailing traditional lifestyle is nomadic, and there have been few mass poisoning campaigns against pikas.

3.1.2 Ecosystem Diversity

The Project Area is dominated by the alpine meadow and alpine steppe ecosystems with small patches of marsh meadow, alpine scrub, cushion vegetation and alpine desert. The habitats are summarised below and described in depth by Mallon (2002).

3.1.2.1 Grassland ecosystem

The grassland ecosystem is the most important habitat for the majority of wild animals, including Wild ass (*Equus kiang*), Brown bear (*Ursus arctos*), Tibetan antelope (*Pantholips hodgsoni*), Tibetan gazelle (*Procapra picticaudata*), Red deer (*Cervus elaphus*), White-lipped deer (*Cervus albirostris*), Wild yak (*Poephagus mutus*), Red fox (*Vulpes vulpes*), Snow leopard (*Panthera uncia*), Blue sheep (*Pseudois nayaur*) and various Rodents. The common rodents include Black-lipped pika (*Ochotona curzoniae*), Tibetan pika *(Ochotona thibetana*), *Pitymys leucurus*, Himalayan marmot (*Marmota himalayana*) and zokor (*Myospalax baileyi*). The Black-lipped pika also comprises the primary dominant population in parts of the alpine meadow and alpine steppe. The grassland ecosystem is rich in bird species, including raptors such as Upland Buzzard (*Buteo hemilasius*), Common buzzard (*Buteo buteo)*, Griffon (*Gyps hinalayensis*), Bearded vulture

(*Gypaetus barbatus*) and Common kestrel *(Falco tinnunculus)*, and larks such as *Calandrella rufescens*, Tibetan Lark (*Melanocorypha maxima)* and Horned Lark *(Eremophila alpestris).*

3.1.2.2 Wetland ecosystem

The Project Area contains the vast high altitude plain, with various rivers and lakes, the Snow Mountains, diverse ancient glaciers, Karst terrain and wildlife. Many important rivers including the Yaqu, Moqu, Dangqu, and Jiongqu run into the Tongtian River from south to north. The perennially frozen earth forms a staunch substrate for wetland. Whenever the ice and snow begin to melt, various marshes, channels, wet ground patches and shallow lakes are formed, and the low-lying margins of rivers develop large wetlands. The wild animals in the wetland ecosystem mainly comprise fish and bird species. Bird species include Black-necked crane (*Grus nigricollis*), Bar-headed Goose *(Anser indicus*), Pallas's Gull *(Larus ichthyaetus)*, Brown-headed Gull *(Larus brunnicephalus)*, *Phalacrocorax carbo sinensis,* Ruddy Shelduck (*Tadorna ferruginea*), *Pluvialis fulva*, *Bidorhyncha struthersii*, Redshank (*Tringa totanus)*, and Common Tern (*Sterna hirundo)*. Fish species include *Gymnocypris eckloni*, *Przewalskii Przewalskii*, *Schizopygopsis pylzovi*, and Huanghe naked carp (*Chuanchia labiosa*).

3.1.2.3 Desert ecosystem

Wild animals inhabiting the desert ecosystem largely consist of rodents and ungulates. The former includes species such as *Meriones meridianus*, *Euchoreutes naso*, *Allataga sibirica*, *Dipus sagitta* and Black-lipped pika (*Ochotona curzoniae*). The latter includes species as Goitred gazelle *(Gazella subgutturosa)*, Tibetan gazelle, Tibetan antelope and Wild ass. The bird species include Tibetan Sandgrouse (*Syrrhaptes tibetanus*), Rock pigeon (*Columba livia*) and Larks.

3.1.3 Species Diversity

According to the preliminary count, there are 484 species, 184 genera and 50 families of seed plants in the Project Area, among which only two are scrub and the remaining are all herbaceous plants. The seed plants comprise the following: 34 species and 14 genera of Ranunculaceae; 29 species and 7 genera of Apocynaceae; 30 species and 6 genera of Scrophulariaceae; 25 species and 4 genera of Cyperaceae; 20 species and 7 genera of Leguminosae; 18 species and 13 genera of Cruciferae; 15 species and 4 genera of Saxifragaceae; 12 species and 10 genera of Labiatae; 14 species and 6 genera of Rosaceae; 14 species and 9 genera of Umbelliferae; 13 species and 5 genera of Capyophyllaceae; 10 species and 4 genera of Primulaceae; 10 species and 4 genera of Polygonaceae; 11 species and 2 genera of Crassulaceae; 13 species and 4 genera of Liliaceae. There is only one tree species, the Tibetan juniper (*Juniperus tibetica*). Among the 484 plant species, there are about 50 species of grazing plant, 150 of medical plant, 20 of food plant and over 100 species of ornamental plant.

Wild animals include frigid zone species, plateau alpine species and a few species that are widespread in the Project Area. There are 5 orders, 11 families and 23 species of mammals; 12 orders, 22 families and 45 species of birds; 1 order, 2 families and 2 species of amphibians; and one species of reptile. There are 8 first-class protected animals in this area, including Snow leopard, Wild ass, Wild yak, Tibetan antelope, White-lipped deer, Golden eagle, Bearded vulture and Black-necked crane. There are 12 second-class protected animals, 3 Endangered species on the IUCN Red List 2002 (Snow leopard, Tibetan antelope and Tibetan argali (*Ovis ammon hodgsoni*)); 3 Vulnerable species on the IUCN Red List 2002 (White-lipped deer, Wild yak and Black-necked crane); 2 Least Concern species on the IUCN Red List 2002 (Tibetan gazelle and Pallas' cat (Felis manul)); and 1 Near Threatened species on the IUCN Red List 2002 (Tibetan

argali). The total population of wild animals in the Suojia Area is over 16,000.

3.1.3.1 Mammals

KIANG or TIBETAN WILD ASS (*Equus kiang*)

Kiang were seen in all parts of the Project Area except the Tramkar Rasan mountains and Yachu in the northeast. They are the most numerous ungulate species in the Project Area. Numbers were highest in Jiongchu (Kiang Local Protected Area (LPA)) and adjacent plains. The total population in the Project Area is estimated at a maximum of 7,500. Many herders felt there was increasing competition for grazing with their livestock.

WHITE-LIPPED DEER (*Cervus albirostris*)

One group of 25 animals on Churazaleye Mountain, on the southern side of the Ya Chu river, is the only confirmed population of white-lipped deer remaining in the Project Area. Around 260 white-lipped deer are kept in a large fenced enclosure at the county centre of Zhiduo and farmed for their antler velvet, sold for its medicinal properties.

MUSK DEER (*Moschus chrysogaster*)

Musk deer were formerly distributed sparsely in the Project Area but no longer occur there. All species of musk deer have long been an object of hunting for their musk across their entire range.

WILD YAK (*Bos grunniens*)

Wild yaks formerly occurred widely in the Project Area but have disappeared in recent years as a resident species. Hunting brigades organised following the establishment of the Suojia township in order to feed the newly-arrived people no doubt contributed to the decline of this species in the Project Area.

TIBETAN ANTELOPE OR CHIRU (*Pantholops hodgsoni*)

Tibetan antelope occur on the Bazgonka plain, between the Mug Chu and the Yangtze, an area that forms the Tibetan Antelope LPA (approximately 1000km^2). Tibetan antelope formerly occurred right across the steppe zone in the Project Area, from the Yangtze to Jiongchu Bridge. Tibetan antelope disappeared from the Dilangaton steppe, east of the Mug Chu river, following the October 1985 snowstorm.

TIBETAN GAZELLE OR GOA (*Procapra picticaudata*)

This is a widespread species in small numbers across the Project Area. The total population in the Project Area is unlikely to exceed 1000.

BLUE SHEEP (*Pseudois nayaur*)

Widespread and numerous in Tramkar Rasan and mountains east of the Ya Chu River. Blue sheep were formerly hunted for meat on a local subsistence basis by some families but all hunting is now banned. Several groups of blue sheep were seen foraging close to houses and camps and the animals were clearly not hunted.

TIBETAN ARGALI (*Ovis ammon hodgsoni*)

Tibetan Argali is the rarest wild ungulate species on the Qinghai-Tibet plateau, occurring sparsely everywhere (Schaller 1998).

SNOW LEOPARD (*Uncia uncia*)

Snow leopard signs (tracks, droppings and scrapes) were widespread in the Snow Leopard LPA in Tramkar Rasan and in the adjacent mountains. Snow leopard predation on livestock was low in comparison with predation by wolves and every herder interviewed regarded the snow leopard as less of a threat than the wolf. In Yachu it was reported that over 40 snow leopards had been shot or trapped between 1972 and 1997. None had been killed since the hunting ban was imposed by the

local government.

BROWN BEAR (*Ursus arctos*)

Local inhabitants reported bear presence in all mountain areas in Mugchu, Yachu and upper Jiongchu. In Yachu there were two reported incidents of bears forcing their way into houses during spring 2002. The houses were unoccupied at the time. The bears consumed stored food and caused a lot of damage.

LYNX (*Lynx lynx*), and MANUL or PALLAS'S CAT (*Otocolobus manul*) are distributed widely but sparsely in the Project Area.

3.1.3.2 Birds

48 bird species were recorded in the Project Area. Local people described a large increase in the number of waders and waterfowl present at Tsozhaton and other wetlands during spring and autumn.

BLACK-NECKED CRANE (*Grus nigricollis*) Local: *tron-tron*. Chinese: *hei-jin-he*

Black-necked cranes are endemic to the Qinghai-Tibet Plateau with a global population estimated at 5600-6000 and declining, due to loss of wetland habitats and increased human activity (BirdLife International 2001).

LAMMERGEIER (*Gypaetus barbatus*) and HIMALAYAN GRIFFON (*Gyps himalayensis*) can be seen regularly in mountain areas.Numbers of GOLDEN EAGLE (*Aquila chrysaetos*) and SAKER FALCON (*Falco cherrug*) are small.

3.1.3.3 Reptiles and Amphibians

The only species recorded were a TOAD-HEADED AGAMA (*Phrynocephalus erythrurus*), *Scutiger boulengeri* and *Rana temporaria chensinensis*.

3.1.4 Wild Animal Habitats

Alpine (High-cold) Meadow

This covers about 75% of the Project Area and this habitat constitutes a very valuable grazing resource. Various species of *Kobresia* sedges, important fodder plants, are dominant or frequent. Much of the alpine meadow is in excellent or very good condition, while some sites are heavily grazed and rangeland quality is deteriorating. This is manifested by a lack of palatable species, frequent occurrence of the unpalatable *Oxytropis kansuensis*, reduced sward height, low percentage of palatable grasses and herbs, flattened tussocks, tussocks eaten down to the base, smaller tussock area and reduced tussock density. Areas showing signs of severe damage are restricted to patches around encampments.

Alpine Steppe

A band of alpine steppe runs from west to east across the centre of the Project Area from the Yangtze to Jiongchu Bridge and is divided into two parts by the Mug Chu river. The western sector, between the Mug Chu and the Yangtze is known as Bazgonka and constitutes the Tibetan Antelope LPA. East of the Mug Chu is the Dilangaton plain, which grades into alpine meadow to the north, south and east. Alpine steppe covers an estimated 1350km^2, about 12% of the Project Area. Bazgonka has no regular grazing due to its LPA status. Dilangaton is also rarely grazed, except at the margins near Suojia township Both areas are in generally good condition. Steppe vegetation is widely regarded by local herdsmen as providing inferior grazing.

Wetlands

There are two substantial areas of wetland in the Project Area, at Tsozhaton and Lirin Tsobja, both of which have been designated as local protected areas.

Tsozhaton wetland is situated on the east bank of the Mug Chu river, 6km south of Suojia township, and covers approximately 80km^2. Its extent is greatest during summer when rainfall soaks the perimeter grassland. Tsozhaton contains a mosaic of vegetation communities including those dominated Sand dunes and slacks occupy the northwest corner, with a striking, herb-rich flora containing three species of *Pedicularis* and a number of other species.

Lirin Tsobja wetland lies in the northeast of the Project Area in the upper course of the Bam Chu river. It covers about 75km^2 of undulating *Kobresia tibetica* marsh-meadow interspersed with around 150 pools and lakes. There is little emergent or marginal vegetation apart from small stands of *Hippurus vulgaris*. The flora is markedly less diverse than at Tsozhaton.

Three small permanent lakes and pools in the steppe north of Suojia town consist of a small complex of shallow spring-fed pools and marshy areas.

Wetlands of all kinds including open water cover an estimated 3-4% of the Project Area. The condition of these habitats varies. Tsozhaton is in general in excellent condition. This is largely due to the attitude of the local inhabitants who accept its status as the Black-necked Crane LPA and recognise the need for light or seasonal grazing. Lirin Tsobja has a much higher density of livestock and the effects of heavier grazing pressure on the vegetation are clearly visible in lower overall sward height, reduced tussock density, absence of palatable grasses and herbs and low proportion of new shoots. Some local herdsmen in the area voiced concern over the declining quality of their pastures, but blamed it on lack of rain rather than high numbers of sheep and yaks. The smaller wetlands are mainly in good condition, their location in the steppe zone protecting them from regular grazing.

Scrub

There is very little scrub in the Project Area. Small patches dominated by a sparse cover of *Dasiphora fruticosa* bushes occur in some stony valley beds in the mountains. Bushes may reach 60cm in height where ungrazed.

Montane

This habitat occurs above the alpine meadow, beginning at varying elevations from about 4750-4900m depending on aspect, slope and other factors. There is no sod layer, this being replaced by a stony or gravel substrate. This habitat covers an estimated maximum of 5% of the Project Area. Livestock only occasionally reach these elevations and there were no visible effects of grazing.

Glacier and Rock

These are devoid of any vegetation cover and occupy only a small area, estimated at a maximum of 2-3%.

3.1.5 . Local Protected Areas (LPAs)

Snow Leopard Local Protected Area

The Snow Leopard LPA covers approximately 350 km^2 of the Tramkar Rasan mountains in the north of Soujia district. These mountains run northwest-southeast and lie between the Mug Chu and Ya Chu rivers. They are bordered on the north by the Yangtze River. The range contains rocky peaks and ridges and sections of gorge. Summits reach 5300m in altitude.

Tibetan Antelope LPA

Situated in the Bazgonka steppe, between the Mug Chu river and the Yangtze, with an area of approximately 1000km^2. The terrain consists of a gently undulating shallow plain sloping down to the Baz Chu river and bounded on the north and south by hills and mountains. Elevations are

4400-4500m. Apart from some alpine meadow at the eastern end, habitat is predominantly sandy steppe.

Kiang LPA

This is located in the upper course of the Jiong Chu river in the southeast of the Project Area. An inscribed stone pillar marks the western end of the LPA at Jiongchu Bridge on the main road into Suojia and it extends from there along the southern bank upstream to the headwater springs. The total area covered is about 750km^2. Elevations range from 4500m to over 5000m. It is possible to drive over the eastern third of the area, but the rest is accessible only on horseback or on foot. Kiang are common throughout the area. Local inhabitants said they were especially numerous in the vicinity of Chungu Ama Spring, where "thousands" could be counted in winter.

Black-Necked Crane LPA

This comprises the Tsozhaton wetland, situated in a shallow bowl on the east bank of the Mug Chu River south of Suojia township. It consists of lakes, marshes and wet steppe at elevations around 4475m. It covers an overall area of about 80km^2. It is bounded on the north and south by low mountains rising to about 5000m, and on the west by the wide, muddy bed of the Mug Chu river.

Lirin Tsobja Wetland LPA

This is situated in the northeast of the Project Area in the upper valley of the Bam Chu and consists of around 150 pools and small lakes set in an area of *Kobresia tibetica* marsh-meadow at elevations of 4700-4800m. A low ridge of drier ground runs down the centre of the site. The area covered is about 75km^2.

3.2 RELEVANT ADMINISTRATIVE ORGANIZATIONS

Qinghai Environment Protection Bureau (EPB)

As the administrative and supervisory department for ecological and environmental protection throughout Qinghai Province, EPB has been implementing "Planning and Construction of the Protected Areas for Ecological Functions in the Yangtze River Headwaters Region" since 2000. The State Environment Protection Administration approved the Yangtze River Headwaters Region as the first State Protected Area for Ecological Functions (PAEF) in 2001. A management bureau will be set up and the planned Quma River Construction Site will border the project area to the south.

Qinghai Forestry Bureau (QFB)

QFB is the administrative department for forestry and wildlife conservation. Since 2001, QFB has been preparing for the establishment of Sanjiangyuan Nature Reserve. This was approved at the National level by the State Council in 2003. The Management Bureau of this nature reserve is under the immediate administration of QFB.

Management Bureau of Sanjiangyuan Nature Reserve

In terms of organizational structure, the Management Bureau of Sanjiangyuan Nature Reserve is under the direct administration of the Qinghai Forestry Bureau. It was approved by the Provincial Authorization Committee in 2001.

According to the Master Plan for the nature reserve, Sanjiangyuan will adopt a four-graded management system comprised of the Management Bureau (Province level), Management Sub-bureau (Prefecture level), Protection Station (Township level) and Patrolling Spot (in the field). The reserve is now seeking approval for constructing the management system. 21 Protection Stations will be set up in 18 core zones of the reserve. Suojia Protection Station will be

established in the Project Area with ten staff, under which are two patrolling spots. According to the *First Phase Construction Programme of Sanjiangyuan Nature Reserve*, the initial phase of infrastructure construction for the Protection Stations is being carried out in 2004.

Local Administrative Organizations

The Forestry & Environment Protection Bureau of Yushu Prefecture is the administrative department for ecological and environmental protection in this prefecture, but has no projects in Suojia at present. The Animal Husbandry, Forestry & Environment Protection Bureau of Zhiduo County is the administrative department for ecological and environmental protection in this county, and at present mainly takes charge of animal husbandry and the protection and exploitation of grassland. The Suojia Township Government is responsible for local social and economic development and environmental protection. The environmental protection, agriculture, animal husbandry and forestry bureaus at prefecture and county levels have been combined together, forming a good basis and work environment for cooperation between these authorities.

Relationship Between Classified Areas

The construction of the Nature Reserve and the Protected Area For Ecological Functions (PAEF) will not conflict with each other at the policy level, as the *"Guidelines For Planning Protected Areas For Ecological Functions"* states "Strict actions should be taken to protect the important regions that are currently in good ecological condition with ecological functions working normally, to prevent these districts from additional human disturbance and degradation; nature reserves can be set up under the PAEF in natural regions with high, typical and integrated biodiversity".

At present, protected areas comprise the Yushu Longbaotan State Nature Reserve (100 km^2), to the southeast of the Project Area; the Dangqu Core Area (located in the headwaters of Dangqu River in the southwest of Zaduo County) of the Sanjiangyuan Provincial Nature Reserve to the south; the Geladandong Core Area (located in the Geladandong Snow-mountains in Tanggulashan County) to the southwest; the Tong Tian River Core Area (located in the Qumalai County and the bordering area between southern Zhiduo County and Kekexili Region) in the north.

The core areas and buffer zones of the Sanjiangyuan Nature Reserve lie mainly in the region with no or extremely sparse human population. However the areas with dense human population or extensive human activities, where the ecosystem is more severely threatened, require more protection. The current protected areas are not sufficient to meet the need for integrated protection of ecological functions in the Yangtze River headwaters region.

The aim of establishing the Chang Jiang Yuan State PAEF is not only to conserve particular species, habitats or typical ecosystems, but also to assess the current status and dynamics of the ecosystem and the main factors leading to deterioration. Relevant counter-measures will then be put forward to stop further degradation of the environment, and improve it gradually with the overall aim of protecting drainage into the Yangtze River; stopping the trend of environmental deterioration; protecting ecological functions of the Project Area; and promoting sustainable regional development of the local society, economy and environment.

The Nature Reserve and Chang Jiang Yuan PAEF will complement each other. The construction of the nature reserve will expedite protection of the environment and its regional ecological functions, especially in the ecologically fragile areas. PAEF will help to solve problems of local economic development and livelihoods for the inhabitants of the large tract of headwaters, particularly in the area with extensive human economic activities. One of the important objectives of constructing the PAEF is to coordinate social, economic and environmental activity. Therefore, the construction

of PAEF will provide a good environment for a nature reserve, and effectively assure the development and management of the reserve. At the same time, the arrangement, planning and implementation of projects (e.g. the protection and rehabilitation of ecological functions) during the construction of Chang Jiang Yuan PAEF, should obey the relevant rules and regulations of the reserve.

3.2.3 Problems

- Protection stations have not yet been set up.
- Lack of staff to patrol, collect daily data, prevent problems and guide tours in the core zone.
- Infrastructure is currently poor.
- Lack of co-management between government departments and local communities.

3.3 RELEVANT LOCAL AND INTERNATIONAL NGOS

3.3.1 Local NGOs

Upper Yangtze Organization (UYO)

The director of the Upper Yangtze Organization (UYO), Hashi Zhashiduoji, together with other core members, founded this local NGO on 26 May 1998. Its mission is to promote environmental protection and sustainable development in the local communities. The NGO now has more than 100 members, of whom 80% are herders, with about 10 professional consultants, some from international institutions. The UYO has been active in initiatives relating to environmental protection and local development in Suojia, including the following:

Qinghai Environment Protection Promotion Council of Great Rivers Headwater Areas (EPPC)

EPPC is a semi-NGO affiliated to QEPB. Since establishment, this organization has recruited many volunteers from local society, and carried out several publicity and education activities on ecological and environmental protection in the Headwaters region of large rivers in Qinghai Province.

Though cooperation with Green Rivers (a national NGO), this organization participated in the preparation and construction of Suonandajie Natural Protection Station in Kekexili, as well as organizing environmentalist volunteers for this station. EPPC also arranged a publicity activity, “Hiking for Green World”, for environmental protection.

EPPC participated in a field survey on the ecological environment in the Great Rivers Headwater Areas together with NGOs and environmentalists from the US, UK, Germany and Japan. In partnership with FFI, EPPC conducted some surveys in the area adjacent to Kekexili in 2001, and are also involved in this project.

3.3.2 International NGOs

In recent decades, some international NGOs have been involved in local affairs such as biodiversity protection and social development (e.g. establishing schools). This kind of support is needed in order to enable the local community to maintain their current environmental conditions and to improve their living standards.

Fauna and Flora International (FFI)

Since 2000, this British based NGO has been involved in the design and management of the current project in Suojia, in collaboration with UYO and EPPC. Its mission is to conserve threatened species and ecosystems worldwide, choosing solutions that are sustainable, based on sound science and taking account of human needs.

Plateau Perspective (PP)

This Canadian NGO for environmental protection has participated in biodiversity surveys and the development of a primary school in the Suojia community since 1997. Marc Foggin, head of the organization, has worked "both as an expert consultant and an international liaison for the Upper Yangtze Organization" in local environmental protection activities (Foggin 2000:276).

Bridge Foundation

This American NGO contributed to the establishment of a local primary school by providing funds and equipment such as an electricity generator and satellite TV receiver.

Save the Children Fund

This British organization has helped in the construction of a primary school at Suojia.

3.3.3 Problems

The local NGOs need more information and moral, financial, and technological support from outside sources in order to maintain their present effectiveness.

3.4 BIODIVERSITY PROTECTION

3.4.1 Governmental Departments

To protect local wild animal resources effectively, the provincial government demarcated the Suojia Area as a Provincial Preserve in 1994, and banned any activity that would destroy wild animals and their habitat, such as hunting. The forestry and environmental protection bureaus at province, prefecture and county levels were designated to implement this management action.

The Qinghai Animal Husbandry Bureau included the Project Area in the provincial programme "*Pasture Construction and Protection*", and carried out the construction project "*Four Activities for Settlement*". This involved settlement, fencing, planting grass and constructing heat-preservation barns, with a focus on the construction of pasture.

The Project Area belongs to the Tong Tian He Yuan Core Protected Area of the Sanjiangyuan National Nature Reserve. The SFA, QFB, QEPB and relevant institutes finalised the scientific survey and planning in 2001, and planned to build a Core Zone Protection Station in this district.

SEPA and QEPB have been conducting a PAEF evaluation plan in the Yangtze Headwaters region since 2000. This plan has identified Suojia as an important protected area for water and biodiversity conservation, and development of a pilot site will be launched here from 2003 to 2004.

The Suojia Township set up the Ecological Protection Monitoring Committee, and appointed 16 ecological monitors from 16 Herder Sub-groups in Suojia.

3.4.2 Conservation Activities of Communities

There are four communities of herders in Suojia: Moqu, Dangqu, Yaqu and Jiongqu. Since the establishment of the Ecological Protection Monitoring Committee, regulations or contracts on biodiversity conservation have been made within the communities. Since 1998 the communities have been conducting regular patrolling and monitoring in the four local protected areas with the facilitation of UYO. From 1999 to 2000, UYO designed a questionnaire on populations of focal species, their regular activities, and habitats, and distributed it to the 16 ecological monitors. The information was recently put together and analyzed. The monitors revealed two illegal hunting cases committed by external persons for snow leopard and Tibetan antelope respectively, demonstrating the power of the communities' conservation actions. In line with the culture of local communities, local herders have shown commitment to wildlife conservation. Herdsmen themselves set up stones to mark the boundaries of the local protected areas at the main

intersections in 2002. At present, four Herders Committees pay close attention to wildlife conservation, and each herder is an active participant.

3.4.3 Problems

- Most governmental ecological/environmental protection projects have not been implemented.
- The outcome of protection activities is restricted due to the vast area involved, difficult topography and scarce funds.
- Local herders still rely largely on the natural resources in the reserve due to the under-developed community economy and absence of alternative income.
- Ecological protection and management actions of communities have not been authorized or approved by relevant government departments.
- Protection activities of herders within the communities can't be rewarded or compensated due to lack of an incentive mechanism.

3.5 SCIENTIFIC RESEARCH

3.5.1 Institutes and Government Departments

According to the requirements and regulations of the State Terrestrial Wild Animal Census, the Yushu Forestry Bureau carried out a terrestrial wild animal census in the Project Area from 1997 to 1998. The Sanjiangyuan Scientific Survey Team organized by the Chinese Academy of Forestry conducted a comprehensive investigation in the Suojia Area in July 2001. Through public bidding organized by the Qinghai Science & Technique Bureau, the Northwest Institute of Plateau Biology undertook the project *"Research on the Migration Pattern and Reproduction of Tibetan Antelope"* in Kekexili and Suojia District in 2002.

3.5.2 NGOs

In a joint project run by FFI, UYO, EPPC and governmental departments, "*Research, Survey and Biodiversity Planning on the Qinghai-Tibet Plateau*", two field surveys were conducted in November 2001 and July to September 2002 respectively. During the implementation of this project, training documents and reports were provided, including *Field Survey Handbook for Species*, *Guidelines for the Assessment of Wildlife Habitats in the Grassland of Project Area*, *Standard Form of Recording the Wildlife Habitats*, *General Information of Ecological Environment in the Suojia District*, *Stakeholders Analysis in Suojia*, *Wild Animals Field Survey Report in the Suojia District*, *Current Socio-economic Situation of Suojia District*, and *Current Situation of Environment Protection and Participation of Communities in the Suojia Area.*

In partnership with Plateau Perspective (PP), UYO conducted an investigation on Environment and Health. In addition, UYO, PP and local protection organizations cooperated in the wild animal census.

3.5.3 Problems

- Scientific research is suffering from a deficiency of external financial support such as state or provincial funds.
- The simple country roads are passable only in certain seasons, restricting the scope of scientific research. Research lacks continuity due to the remoteness of the area, poor transportation and harsh climate.

3.6 PUBLICITY AND EDUCATION

3.6.1 Governmental Departments

The West Working Committee of Yushu Prefecture is a governmental organization that carried out wild animal conservation and publicity early on in this region. The authorities and society have

been highly concerned with wild animal protection since the establishment of the Kekexili Nature Reserve and Suojia Preserve. The Provincial Forestry Bureau organized the Forestry Bureaus at prefecture and county levels to enhance publicity and enforcement, setting up markers at the intersections of main roads, holding various workshops on the ground, and achieving broad publicity in the media. These actions have been effective to some extent.

3.6.2 NGOs and Others

Since its establishment, UYO has undertaken many elaborate activities relating to publicity and education about environmental protection. UYO conducted broad and detailed surveys in local communities in partnership with Plateau Perspective and FFI. During these field surveys, experts in zoology, botany, anthropology and ethnology also gave lectures to herders on the ground.

The "Great Rivers Headwaters" team of journalists from the Qinghai Daily surveyed the communities in Suojia for over half a month in 2000, and published 20 articles on aspects of the ecology, cultures and economy, in Qinghai Daily.

3.6.3 Problems

- Lack of specialized staff and text books for environmental conservation education in communities.
- Difficulties in accessing remote villages due to lack of transportation and bad road conditions.
- Means for publicity and education are lacking, as are visualization materials and equipment.

3.7 DEPARTMENTAL AND EXTERNAL COOPERATION

As mentioned above, many collaborative projects have been conducted on biodiversity conservation and natural resource management in the Suojia Area. The Forestry Bureau, The Public Security Bureau, Environment Protection and Animal Husbandry Bureaus have already carried out long-term cooperation in publicity, education and protection activities, especially in countering illegal hunting. Collaboration has been strengthened since the end of the 1990s. During the adjustment of governmental organization in 2001, the Forestry, Environmental Protection, Animal Husbandry and Water Conservancy Bureaus were combined into one at the prefecture and county levels. This action clarified the management relationships between departments, which will consequently benefit biodiversity conservation and management.

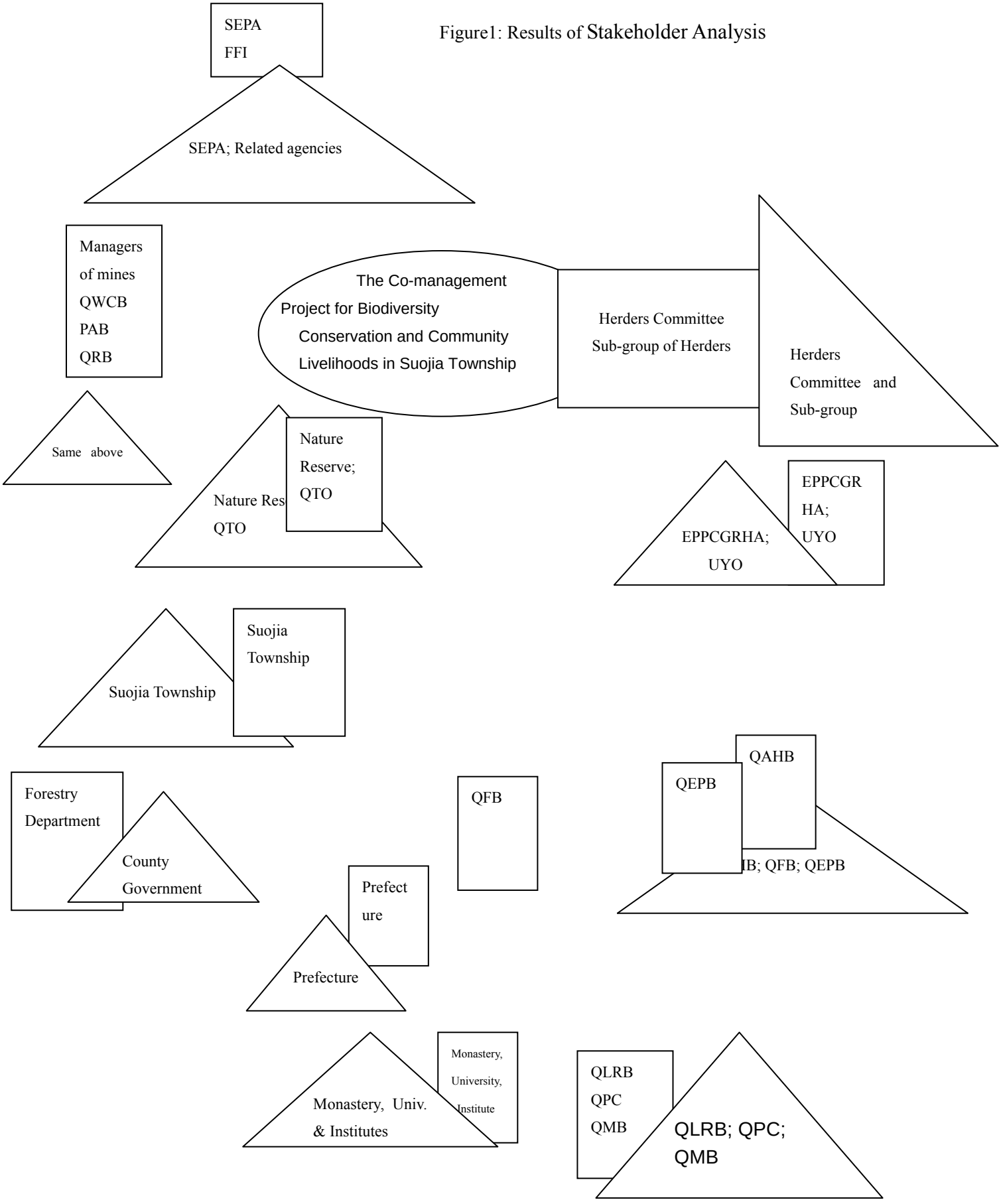
4. EVALUATION AND COUNTERMEASURES

4.1 STAKEHOLDER ANALYSIS

Stakeholders' analysis was an important aspect of the project *"Research, Survey and Biodiversity Planning on the Tibet-Qinghai Plateau"* in the sense that it provided insight into the interaction between human society and the world of biodiversity, and the impacts of social, economic, and cultural changes in the community upon the environment. This analysis dealt with the background, position, and interests of the stakeholders relevant to our project area.

The stakeholders in our project area can be classified into the following six groups: local residents, local governments, local non-government organizations, local monasteries, higher-level units of administration, and international institutions.

Figure1: Results of Stakeholder Analysis



Notes: SEPA = State Environment Protection Agency
INGO = International non-governmental organizations
QWCB = Qinghai Water Conservancy Bureau
PAB = Poverty Alleviation Bureau
QRB = Qinghai Railways Bureau
QTO = Qinghai Tourism Office
EPPC = Environment Protection Promotion Council of Great Rivers Headwaters Areas
UYO = Upper Yangtze Organization
QFB = Qinghai Forestry Bureau
QEPB = Qinghai Environment Protection Bureau
QAHB = Qinghai Animal Husbandry Bureau
QLRB = Qinghai Land Resource Bureau
QPC = Qinghai Planning Committee
QMB = Qinghai Mining Bureau

4.1.1 Local Herders

4.1.1.1 Lifestyle

The household is the basic unit of production and consumption in Suojia. A household usually consists of a nuclear family (a married couple and their children), with five members on average. There are some extended families and some single-parent families (usually through the death of a spouse, as divorce is rare in the project area).

The main means of production, based on the household, is animal husbandry. In other words residents in the project area are all ethnic Tibetan herders. On average each household owns 62 head of livestock. Since a terrible snowstorm struck the Tibetan plateau in 1985, local herders have started to live in brick-built or sun-dried brick houses. Although in summer and autumn most herders will move with livestock and live in yak hair tents according to their traditional nomadic lifestyle, seasonal grazing movements are changing as the herders begin to live in settlements. The government has played and is playing a crucial role in this process of change. From the perspective of the state's ideology of development, 'settlement' is an indicator of progress.

In the past three decades, there has been no immigration to the township. In contrast, during the same period, many local people have moved out of Suojia to the county seat or at least to areas near the center. This is due mainly to natural disasters, poverty or diseases. For example, there were 500 households in Jiongqu prior to the 1985 snowstorm. Now there are only 150 households in the area. Most of the people went to the county seat or to nearby townships.

The herders rely almost exclusively on livestock as their main source of income, which is earned from the sale of animals, dairy products (butter), animal skin and hair. The incomes of Yaqu and Moqu are higher than that of the other two groups due to the more advantageous location for commerce and transportation. Further income comes from collecting traditional Tibetan medicines (mainly Dongchongxiacao, the product of a parasitical fungus, *Cordyceps sinensis* Berk growing on the insect *Hepialus armoricanus Oberthur*), running small stores, transportation and other services such as driving. Most of the local residents are able to make a living from animal husbandry, although a few poor families and 'five-guarantee families' need support from the government and others. It is common for the local herders to lack currency and so to barter for goods and livestock. Even the local township government requests payment in kind

for services. Of those who own a truck, motorcycle or jeep, almost all bartered for them in exchange for domestic animals. In the view of local people, the main forms of wealth are livestock and money, but most local herders prefer livestock to money. The number of livestock owned is still the main measure of wealth in the community.

4.1.1.2 Interests

The primary method of exploiting natural resources is the utilization of pasture. Due to the size of the area, there is no shortage of pasture. The local herders have lived in harmony with wildlife and nature due to their traditional culture. The herders think that the protection of pasture will benefit their livestock, ensuring plenty of grazing land. With the publicity and education undertaken by governmental and non-governmental organizations, awareness of this has been significantly raised among the herders.

Among the various stakeholders, local herders are clearly the primary stakeholders as they live in the environment and directly affect local biodiversity and wildlife protection. Local Tibetans are engaged in a way of life and production for subsistence, which is harmonious with the existence of wildlife and their habitats. On the other hand, there are several potential factors that might affect their current means of production, way of life, and natural surroundings in the future.

(1). Stock raising and grazing as the sole means of production

The traditional method of stock raising relies on natural resources, with herders moving around to graze the animals. This results in herders having a very low standard of living compared with other countryside people. Employment opportunities and chances to earn more income are very low due to minimal economic structures and no conspicuous new industries to accelerate economic development. The majority of herders still live an autarkic lifestyle, which means the family has to self-supply everything besides a few commodities and tools. Since such traditional means of production have been in place for a long time, herders lack commercial awareness and marketing concepts, and stock products have a low market value. Since the 1980s, regulations fixing the allocation of stock to family units have been established, but herders are still used to the old production system, which might take some time to change.

(2). Ecological environment degradation problems

The majority of land in this area is alpine meadow-type grassland. Its features include a shallow layer of soil, which easily degrades into sand, and many areas are not suitable for manually grown grassland due to severe natural conditions. Lack of fuel resources mean most local residents still use cow dung, which has certain impacts on the local environment. Hunting is another problem, as some poor people still rely on hunting for extra income to subsidize family life.

(3). Influence of traditional concepts of wealth

According to the traditional way of thinking, the more animals you have the richer you are. Thus, locals like to keep animals but not sell them, leading to high costs of feeding the animals. There is only a very low level of modernisation and herders hardly have a chance to experience a modern lifestyle. To break this kind of production model, investment is required to improve their living environment and standard of living. As a result, local people need to raise more animals, leading to huge consumption of natural resources.

(4). Low levels of education and lack of alternative skills

Due to historical legacy, most herders have very low levels of education, and don’t have other skills apart from simple animal grazing. Religious influence has infiltrated every corner of herders social life, providing value judgements and norms of behaviour, which is a big barrier to the

spread of science, technology, and the development of productivity.

4.1.2 Local Governmental Departments

Suojia Township Government is the only authorized government organization in Suojia, and is responsible for social, economic and environmental management. There are a total of 12 officials or administrative staff in the Township Government and affiliated Township Communist Party Committee.

4.1.2.1 Responsibilities

Collecting taxes and charges and managing schemes of socio-economic development: The local government is playing an important role in organizing and reorganizing social structure and economic development. In recent decades they have led significant reforms/social movements such as the allocation of pasture and the de-collectivization of livestock, and have encouraged the settlement of pastoral people.

Alleviating poverty: Zhiduo County was identified as a 'Province-Level Poor County' in 1989, and as a 'State-Level Poor County' in 1992. The latter category is supposed to get more financial assistance from the central government than the former. Zhiduo County reallocates the money to subordinate townships including Suojia. Poor families and 'five guarantee households' are eligible to apply for money to live on.

Organizing rescue work in the event of natural disasters and disease among livestock: Once a natural disaster occurs, the government organizes an anti-disaster campaign among the herders. For example, as a result of a very severe snowstorm in 1985 the authority organized rescue operations, and imported food and fodder into Suojia. The local Tibetans lost 50% of their domestic animals in this natural disaster. The government provided further help in the reconstruction of the area, in the form of finance and by organizing cooperative efforts.

Responsibility for environmental protection: The local government encouraged and supported the local NGOs (UYO, STEPPC) to conduct projects on biodiversity conservation and sustainable development of communities in this area. With the support of local government, UYO has undertaken two field surveys on wildlife and habitat, which promoted public awareness of biodiversity protection amongst the herders.

Providing education and public health services: The government of the township maintains two primary schools and a clinic as its contribution to the social development of the community. The leaders also encourage the herders to send their children to school for education.

4.1.2.2 Interests

There are four subordinate Herder Committees under the Township Government, which are Moqu, Dangqu, Yaqu and Jiongqu respectively. Each Committee consists of four further subgroups of herders. Any activities, including economic and environmental protection, are arranged and undertaken by these organizations. The local authorities have a direct socio-economic impact on local herders through policy implementation, which in turn impacts on their social behavior and ultimately affects the local environment. The government may also plan and implement construction programs in the area. These authorities are thus considered to be important stakeholders in the project. Since the 1990's the local administrations, in line with central government policies, have recognized the significance of biodiversity protection, and are aware of the seriousness of the environmental issues that confront both their society and the rest of the world. They have organized many activities and won the support of local herders. Their departments have a positive attitude towards all aspects of environmental protection.

4.1.3 Buddhist Monasteries

In identifying the key stakeholders and estimating their interactions with one another and the environment (including environmental protection), the role of local monasteries cannot be ignored. The reason for this is that all the local Tibetans are Buddhists and the monasteries are influential in local day-to-day affairs. During a survey on the importance of local institutions to local people, most of herders placed the monastery first. According to the locals, monasteries function in the community as follows:

- providing religious services;
- mediating disputes between locals;
- relieving poor families;
- donating money or animals for local occasions (e.g. horse-racing festivals);
- helping the local school either financially or in kind;
- sending emergency patients to the county seat in their jeep for free;
- assisting in natural disaster relief campaigns;
- supplying accommodation and food to those who travel between Suojia and the county seat.

The biggest monastery in the county is called Gongsa Monastery headed by Choiji, Living Buddha. Gongsa Monastery has some 300 lamas resident in the main monastery, plus others appointed to work at its three satellite branches in annual rotation, two of which are situated in the project area. Obviously, the monastery is an economically powerful institution in the local society. The Buddhist institution plays a significant role in the ideology, culture and daily life of the local people. The local NGOs have worked together with the monastery to promote public awareness of the environment. The religion provides a solid worldview of nature, including biodiversity. For example, human beings should treat with respect all forms of life including wildlife.

4.1.4 Local NGOs

According to a logical framework analysis, UYO is a key stakeholder in biodiversity conservation in Suojia District. UYO is an important force because they are a link between various local groups including religious, official, local and non-local groups such as international NGOs and Beijing-based Chinese NGOs. In addition, they have developed a series of ideas that focus upon the relationship between local environmental protection and sustainable development, and have coordinated relationships between different partners in certain projects.

4.1.5 Governmental Departments at Provincial and Prefecture Levels

The governmental departments at provincial and prefecture levels influence policy-making and implementation in the project area connected to socio-economic issues and environmental protection. These departments have direct or indirect impacts on environmental protection through relevant authorities in the communities in Suojia and Zhiduo County. It is thus reasonable to regard them as key stakeholders.

Table 6: Departments of Ecological Conservation

Department	Relevance to the project area
Qinghai Planning Committee	Planning ecological construction and socio-economic projects
Qinghai Environment Protection Bureau	Supervising conservation and construction projects; coordinating other stakeholders
Qinghai Forestry Bureau	Managing nature reserves

Table 7: Administrative Departments of Resource and Infrastructure Development

Department	Relevance to the project area
Qinghai Railways Bureau	Construction of a railway; running a deer farm in the project area
Qinghai Tourism Office	Planning and managing tourist projects
Qinghai Water Conservancy Bureau	Constructing hydroelectric stations
Qinghai Finance Bureau	Funding provincial projects
Qinghai Transportation Bureau	Highway construction
Qinghai Construction Bureau	Urban construction
Qinghai Animal Husbandry Bureau	Construction in animal husbandry
Qinghai Land Resource Bureau	Gold mining and management

Table 8: Administrative Departments of Social Development

Departments	Relevance to the project area
Education Bureau	In charge of school education
Science & Technology Bureau	Research projects on Yangtze headwater
Affairs In Ethnic Groups Bureau	Ethnic minorities' affairs
Public Security Bureau	Social security
Civil Affairs Bureau	Defining boundaries of administrative territories
Public Health Bureau	Development of public health
Radio & TV Broadcasting Bureau	Management of TV and radio broadcasting
Poverty Alleviation Bureau	Distribution of funds for poverty alleviation
Earthquake Bureau	Survey of earthquakes
Meteorology Bureau	Survey of weather and RS of the environment
Institute of Veterinarians	Research on plateau animal diseases
Institute of Agriculture	Research on sustainable development
Institute of Geology	Mapping relevant ecological environment
Institute of Salt Lakes	Research on grassland and its recovery
Academy of Social Sciences	Research on ethnic groups, society, Buddhism
Qinghai University	Research on issues relevant to the project area
Qinghai Normal University	Research on issues relevant to the project area
Qinghai College for Nationalities	Research on issues of religions and ethnicity
Qinghai Medical College	Research and treatment of plateau diseases
Institute of Plateau Biology	Research on biodiversity and wetlands

4.1.6 International NGOs

With assistance and collaboration from Qinghai EPB and UYO; FFI, Plateau Perspectives, the Bridge Foundation, and Save the Children Fund are involved in local development, through activities such as education, medical services, and biodiversity protection.

4.1.7 Results of Stakeholder Analysis

Figure 1 illustrates the key stakeholders in the Suojia area. The size of each square indicates the

degree to which this project impacts on the interests of each stakeholder. The size of the triangle indicates the degree of impact of each stakeholder on biodiversity conservation and community livelihood co-management in the Suojia Area. The distance from each square or triangle to the project circle is proportional to the relevance of each stakeholder to the project area.

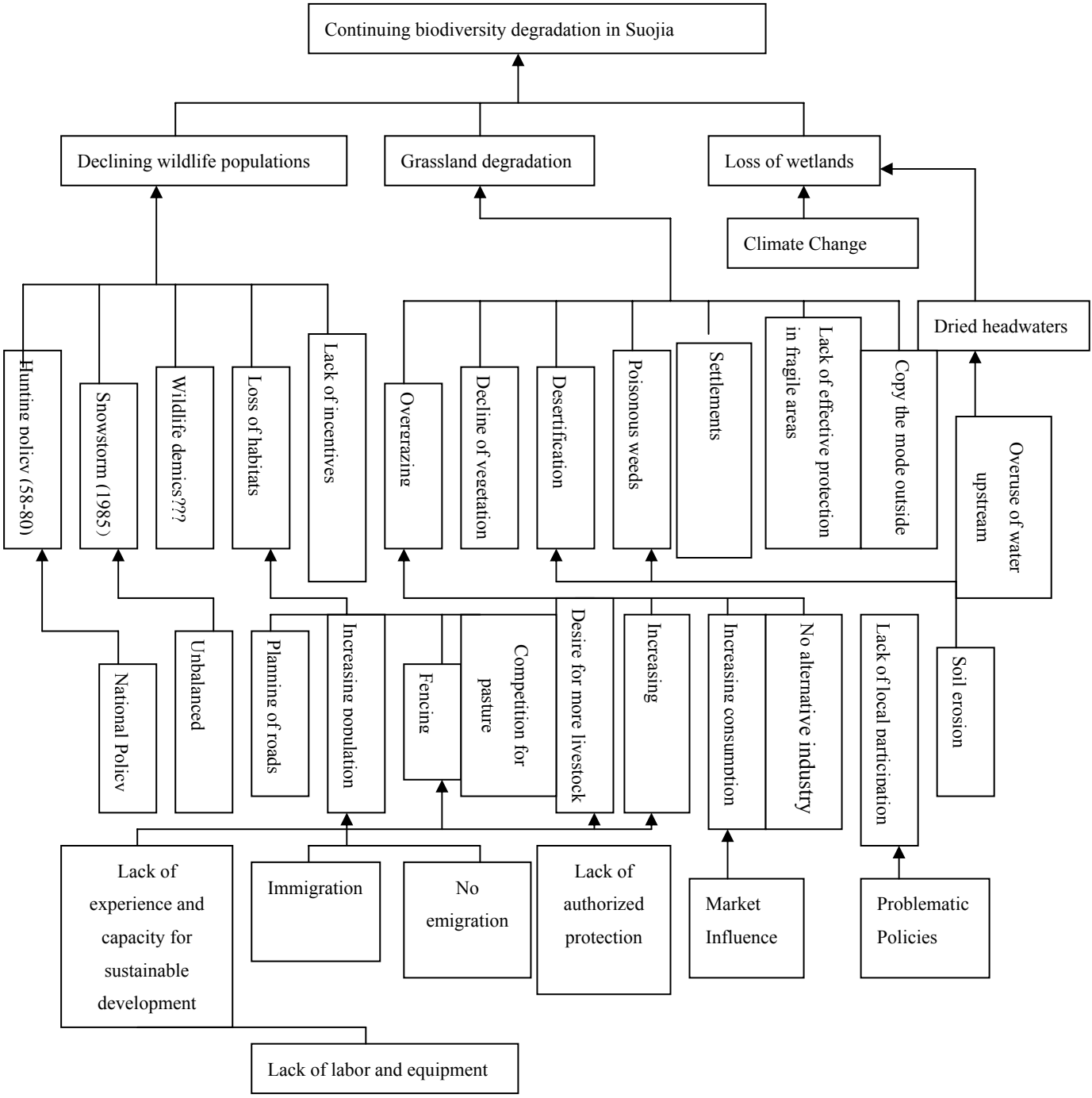
Stakeholders Analysis showed that:

- local communities, local NGOs and local government are the most important stakeholders;
- administrative departments at the province level and international NGOs have a close relationship with biodiversity conservation in Suojia;
- local Buddhist monasteries and other relevant departments also impact local biodiversity conservation to some extent.

In addition, Logical Framework Analysis revealed nine root reasons for the continuous degradation of local biodiversity.

4.2 PROBLEM ANALYSIS

4.2.1 Figure 2: Causal Problem Tree



On 15 Jan 2003, the "Workshop on Qinghai-Tibet plateau wildlife conservation and community co-management plan" hosted a seminar on logical framework analysis. Representatives of different stakeholders reached an agreement on degradation problems in Suojia district, and put forward a problem tree as an output (see Figure 2).

First, they summarised three reasons for biodiversity degradation in Suojia district: declining wildlife populations, grassland degradation and loss of wetlands. From the beginning, stakeholders thought human activities alongside natural factors (including climate change) were the fundamental reasons for biodiversity degradation in Suojia district. The 1984 snow disaster caused

the deaths of many wildlife and domestic animals, and populations still have not recovered. Since the 1980s, continuous dry weather has caused grassland degradation and loss of wetlands. Those climatic events are no doubt contributing factors. However, the focus of this project is local human impacts on wildlife. Second, through the logical framework analysis, factors related to local human activities were considered in depth, including: hunting and poaching; ecological imbalance; over-grazing; increasing human population; increasing settlement, poor protection of fragile areas; road construction; and mining. Third, these problems were summarised and classified, and countermeasures proposed regarding: imperfect policies; the snow disaster; infectious wildlife diseases; unreasonable fencing; increasing human populations; habitat disputes regarding herders from other areas; grassland desertification; decreasing plants species; soil erosion; traditional concepts of wealth; lack of motivation; increasing consumption and demand; a single production model and lack of local opinion regarding conservation. The final results revealed the following basic constraints that prevent improved protection of biodiversity in Suojia district.

- Lack of the awareness of ecological protection and sustainable development.
- Lack of experience in incorporating ecological environmental protection approaches into the implementation and planning of sustainable development programmes.
- Lack of necessary funds and conservation techniques.
- Lack of awareness of participation of communities in protection and management activities.
- Lack of integrated land use planning.
- Deficiency in the human resources necessary for ecological environmental protection and sustainable development.
- Poor condition of primary education in communities.
- Lack of alternative incomes in local communities.
- Incomplete community services and social security systems.

4.2.2 Main Problems

The main problems for biodiversity protection in the Suojia Area are as followings:

4.2.2.1 Degradation of Some Part of the Grassland Due to Overgrazing

According to the literature, grassland has degraded year by year, while the number of livestock in the whole province has increased nearly 3 times. The reasons for the degradation of grassland are as follows:

- Lack of opportunities for sustainable development.
- Lack of knowledge of sustainable and ecological grazing due to lack of support from other organizations.
- Decline of nomadic animal husbandry along with the increase of settled grazing.
- Persistence of traditional concept that number of livestock owned is the sole measure of status and wealth.
- Low market price of livestock.
- Low awareness of the negative impact of overgrazing on economic development and the ecosystem.
- The increase of local human population due to migration.

4.2.2.2 Loss of Habitat

With the increase in human activity, wildlife habitats are diminishing. There is a lack of awareness regarding the importance of habitat protection and sustainable development. Grazing and

increasing livestock numbers are considered to be the only way to make a living, which results in heavy pressure on wildlife habitats.

4.2.2.3 Desertification of Grassland

Since 1980, the desertification of pasture has been more and more obvious. The climate has become warmer and drier. Grassland has degraded due to drought. Decrease river water volume has caused desertification of riverbanks. Due to lack of resources, sod and dung are over-used for fuel. Collecting traditional medicine and mining have led to soil erosion and the destruction of vegetation.

4.2.2.4 Environmental Problems Resulting from Gold Mining

Collecting alluvial gold was once a traditional industry in the history of Qinghai Province. Although there is no gold mining in the Suojia Area, it was common in the adjacent area before 2001, which had a negative impact on the environment of Suojia. Alluvial gold is distributed along the river channels. The process of gold mining destroys vegetation, changes the river channels and imbalances the water bodies' recharge system. The process of gold mining has destroyed and polluted the natural environment, and has been out of the control since the 1980s.

4.2.2.5 Lack of Ecological Consideration in Planning

Due to limited knowledge of natural laws, resource exploitation was emphasized in planning without considering the ecological environment, biodiversity, or sustainable development. The main reasons are:

- lack of awareness of the effect of draining landscapes on the economy and environment;
- lack of a sustainable, scientific, and comprehensive land-use plan.

4.2.2.6 Degradation of Fragile Areas with High Biodiversity

In the period when exploitation of natural resources was emphasized, fragile areas with high biodiversity were always the most severely degraded regions. Key and fragile areas were not protected effectively, and there was a lack of effective management.

4.2.2.10 Low Capacity of Organizations for Biodiversity Conservation

Lack of experience in environmental protection resulted in problems such as

- deficiency in the coordination of different departments;
- poor success in adopting sustainable economic and ecological development approaches in planning;
- deficiency in necessary equipment and resources.

4.3 STRATEGY ANALYSIS

4.3.1 Analysis

FFI and EPB, EPPC and UYO organized a workshop on problem analysis and logical framework development. All of the participants agreed on priority strategies to counter the root causes of continuing loss of biodiversity in the Suojia Area

4.3.1.1 Lack of Awareness of Ecological Environmental Protection and Sustainable Development

According to the analysis, training, publicity and research are the most effective ways to improve awareness of ecological environmental protection and sustainable development at all levels of government in organizations and relevant staff. Among the countermeasures, strengthening training for communities is ranked as the most important.

1. Lack of Awareness of Ecological Environment Protection and Sustainable Development

Ratings / Countermeasures	Effectiveness	Funds Required	Time Required	Sustainability	Total score
Training	3	2	1	3	9
Publicity	2	1	3	2	8
Investigations	1	3	2	1	7

4.3.1.2 Lack of Experience in Incorporating Ecological Environmental Protection Approaches into the Implementation and Planning of Sustainable Development Programs

Implementation and planning should be coordinated by the relevant departments, and tailored to local conditions. It is beneficial and necessary to obtain useful protection experience from other countries and provinces. Through community participation, approaches to ecological environmental protection should be incorporated into plans for sustainable development. Implementation of the project aims to improve awareness of the development of both the environment and the local economy.

2. Lack of Experience in Incorporating Ecological Environmental Protection Approaches into the Implementation and Planning of Sustainable Development Programs

Rating / Countermeasures	Effectiveness	Funds Required	Time Required	Sustainability	Total Score
Participation of communities	1	2	1	3	7
Coordination of relevant departments	3	3	3	1	10
Learning from external experience	2	1	2	2	7

4.3.1.3 Lack of Necessary Funds and Techniques

Biodiversity protection in the Suojia District should benefit from governmental investment. We should enhance the inventory and survey of wildlife, and extend research on reproduction of endangered species. The development of both wildlife conservation and communities' economies needs to be realised. International cooperation should be sought for financial support and project implementation.

3. Lack of Necessary Funds and Techniques

Rating / Countermeasures	Effectiveness	Funds Required	Time Required	Sustainability	Total
Government Investment	3	3	3	1	10
Support from International Cooperation and Society	2	1	1	2	6
Scientific research	1	2	2	3	8

4.3.1.4 Lack of Awareness of Community Participation in Protection and Management

The participation of communities in environmental protection is becoming a prevalent approach used all over the world. However, the communities in the Suojia Area cannot find equal opportunities or effective ways to actively participate in conservation due to such constraints as location and poor education etc. The analysis thus indicates that an important solution is to enhance training and education for local herders and community leaders, and to improve primary education.

4.3.1.5 Lack of Integrated Land Use Planning

Although Zhiduo County completed comprehensive planning of agriculture and animal husbandry before the 1980s, this plan lacked many essential analyses and information, which consequently affected its integrity and scientific underpinning. Thus, we should try to seek funds and organize people to formulate integrated land-use planning as soon as possible.

4.3.1.6 Deficiency in Human Resources Necessary for Ecological Environmental Protection and Sustainable Development

At present, the improvement of human capacity should be emphasized to solve this problem. In this phase, we should not only enhance cultural and environment education, but also introduce technical assistance for publicity and education and set up a good mechanism for recruitment to promote environmental protection and sustainable social development.

Countermeasures for 4, 5, and 6

Rating / Countermeasures	**Effectiveness**	**Funds Required**	**Time Required**	**Sustainability**	**Total**
Primary education	1	1	1	4	7
Further education	2	3	2	1	8

Introduction of professionals	3	2	3	3	11
Recruitment mechanisms	4	4	4	2	14
Education and training of relevant staff	1	2	2	3	8
Communication, exchange and coordination	3	1	1	1	6
Establish and improve incentives and accountability mechanisms	2	3	3	2	10

4.3.1.7 Poor Condition of Primary Education in Communities

The analysis reveals that implementing education projects through local communities is an important, economical and effective means for the improvement of primary education, and recommends. seeking funds and support from government and other social organizations Besides this, the other forms of education are also helpful to solve problems.

Question 7. Poor condition of Primary Education in Communities

Rating / Countermeasures	Funds Required	Human Resources	Enthusiasm of local people	Effect	Sustainability	Impact of policy	Total scores
Support from within communities	2	2	2	2	4	5	17
Support from government	5	4	4	4	5	3	25
Support from external funds	4	3	3	3	3	1	17
Commissioned education	1	5	1	5	1	2	15
Vocational education	3	1	5	1	2	4	16

4.3.1.8 Lack of Alternative Income in Communities

As with other regions in the headwaters of the Great Rivers, there is no other alternative income besides traditional animal husbandry in the Suojia Area, which is an important reason for overgrazing and loss of wildlife habitat. The analysis indicates that due to the particular environment of Suojia, participation in local environmental protection will be an important way for the communities to earn money. Local herders can earn income through working for conservation agencies and organizations as patrolling staff, guides or people supplying various

services (e.g. transport). In addition, development of commerce and ethnic handcrafts are also effective and important alternative incomes.

Question 8. Lack of Alternative Income in Communities

Rating / Countermeasures	Pressure on the environment	Benefits	Sustainability	Practicality	Impact on traditional culture	Impact from Policy	Speed of arrival of benefits	Cost	Total Scores
Community participation in ecological protection	6	3	3	6	5	1	6	6	36
Compensation	5	1	1	1	4	2	5	2	21
Tourism	2	6	4	5	1	3	2	1	24
Commerce and handicraft	3	2	6	3	3	5	4	5	31
Herdsmen plus companies	4	4	5	4	6	6	1	4	34
Others	1	5	2	2	2	4	3	3	22

4.3.1.9 Incomplete Community Services and Social Security System

A complete community service and social security system is necessary for environmental conservation and sustainable socio-economic development. Strengthening the construction and development of health organizations and service systems is very important to local communities.

Question 9. Incomplete Community Services and Social Security System

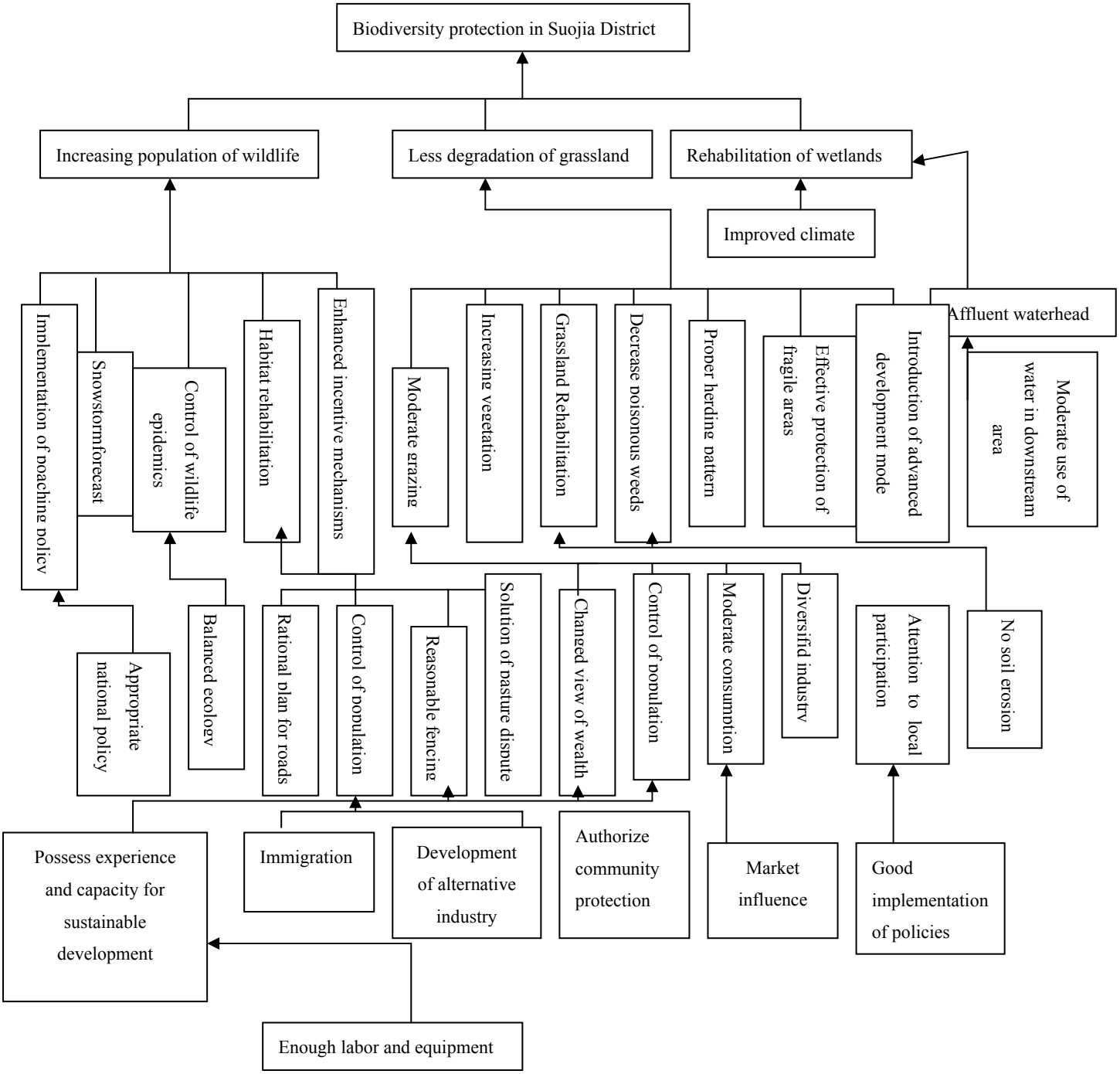
Rating / Countermeasures	**Acceptability by herders**	**Difficulty**	**Support from policies**	**Benefits**	**Sustainability**	**Total scores**
Health organizations	2	3	2	3	3	13
Training	3	2	3	2	2	12
Installment of social security fund	1	1	1	1	1	5

4.3.2 Strategy Tree

Strategy analysis suggested the following solutions to the problems mentioned in 4.3.2:

- Increase quality of training community staff, promoting local herders' awareness of ecological conservation and sustainable development
- Improve government and non-government function, management, publicity and education.

- Establish an investment mechanism where government plays the main role with technical and financial support from international organizations.
- Strengthen research through wildlife surveys and other conservation programs for endangered species.
- Increase local people's income by involving them in environmental conservation work
- Advance the community social security and service systems
- Strengthen environmental education by introducing specialized education and publicity.


Biodiversity protection in Suojia District
Increasing population of wildlife
Less degradation of grassland
Rehabilitation of wetlands
Improved climate
Affluent waterhead
Implementation of poaching policy
Snowstormforecast
Control of wildlife epidemics
Habitat rehabilitation
Enhanced incentive mechanisms
Moderate grazing
Increasing vegetation
Grassland Rehabilitation
Decrease poisonous weeds
Proper herding pattern
Effective protection of fragile areas
Introduction of advanced development mode
Moderate use of water in downstream area
Appropriate national policy
Balanced ecology
Rational plan for roads
Control of population
Reasonable fencing
Solution of pasture dispute
Changed view of wealth
Control of population
Moderate consumption
Diversifid industry
Attention to local participation
No soil erosion
Possess experience and capacity for sustainable development
Immigration
Development of alternative industry
Authorize community protection
Market influence
Good implementation of policies
Enough labor and equipment

4.4 A LOGICAL FRAMEWORK

The overall goal of this program is to establish wildlife conservation and a system for community collaborative management Suojia Township within 4-5 years by bringing together various Qinghai governmental sectors, international agencies, international and national NGOs and local herders to carry out a series of management activities according to this management plan

Logical Relationships between Problems, Causes and Countermeasures

Problems	Causes	Countermeasures
Loss of habitat	● Lack of awareness of the importance of maintaining habitats and of sustainable development ● Grazing and increasing livestock numbers are considered as the only way to make a living, thus putting heavy pressure on wildlife habitats	1. Conduct research on the feasibility of fostering captive wild animals such as deer and Tibetan antelope 2. Set up small loan support system 3. Develop a pilot eco-tourism program 4. Develop small-scale sustainable industries 5. Form an integrated market mechanism for sale of plateau products
Desertification	● Climate change ● Excessive use of dung and sod as fuel ● Overgrazing ● Soil erosion due to destruction of the vegetation and the land surface ● Lack of resources	1. Develop alternative energy sources in developed countries 2. Develop and implement a grazing management plan, to prevent animal husbandry causing overgrazing 3. Study and develop methods of soil and vegetation rehabilitation, including fencing in overgrazed districts for regeneration, replanting and weed control 4. In seriously degraded areas, undertake research on methods of soil rehabilitation, including reconstruction, raising organic matter, and managing soil humidity 5. Develop ecological methods to control pests, instead of using pesticides and rodenticides 6. Develop a model of rodent and pika population and habitat state to predict the population dynamics of these animals
Loss of wetlands	● Wetlands are destroyed because areas are fenced to provide access to water. ● Climate change ● Overgrazing in certain areas	1. Conduct research on wetland loss and rehabilitation 2. Set up a management system for grazing, so as to ensure ecological sustainability 3. Elevate the water level in suitable places by artificial construction programs 4. Study the feasibility of rainwater harvest technology so as to tackle impacts of global warming 5. Re-arrange fencing so as to alleviate pressure on wetlands and riverbanks

		6. Incorporate the concerns of wetlands and habitats into the land management plan
Unsustainable collection of traditional Chinese medicine	● Lack of knowledge of sustainable collection ● Unsustainable collection driven by high market profits ● Unsustainable collection by people from outside Qinghai Province	1. Improve the awareness of the negative impacts of unsustainable collection on the environment 2. Control the collection and selling of protected species through the Herder Committees and families in local communities 3. Study incentive measures and punishments to control unsustainable collection 4. Strengthen enforcement 5. Study the acceptable intensity of collection for sustainable use of key species 6. Reproduction and market support of artificial TCM products
Poaching	● The attractive high market profits of wildlife products ● Poor enforcement against poaching ● Poachers from other provinces	1. Through improvement of consumer awareness, reduce the market demand for luxurious products. For instance, the trade in Shaatoosh 2. Set up monitoring and report system in communities 3. Strengthen enforcement and support government control of poaching
Environmental Problems Resulting from Gold Mining	● Illegal exploitation of gold mines destroys and pollutes the natural environment ● Illegal exploitation by people from outside Qinghai Province	Strengthen enforcement and support the counter-measures by government
Lack of Consideration for Landscape in Planning	● Lack of awareness of the effect of landscape deterioration on the economy and environment ● Lack of a sustainable, scientific, and comprehensive planning of land use	1. Improve understanding of the processes of environment and economy 2. Plan participatory management at the scale of valley landscape 3. When making landscape level management plans, try to seek organizational support through capacity building (especially training and exchange between organizations) 4. Improve capacity by making a cross-government plan and ensure the effective implementation of proposed plans
Degradation of Fragile Areas with High Biodiversity	● Key and fragile areas are not protected effectively ● Lack of effective management	1. Reinvestigate the current status of the reserve 2. Review data of the project area and implement field surveys in key areas 3. Review the zoning of the reserve to make it easier to manage and more effective

		4. Incorporate improved policies of protected areas into the landscape level management plan 5. Investigate the ecological carrying capacity of the proposed protected areas 6. Monitor projects in the reserve
Low Capacity of Organizations for Biodiversity Conservation	● Lack of experience in the projects for environmental protection, e.g. deficiency in the coordination of different departments ● Lack of experience in adopting sustainable economic and ecological development approaches in planning ● Deficiency in the necessary equipment and resources	1. Identify current resources and techniques 2. Identify the demand for resources and techniques 3. Formulate a plan for capacity building 4. Implement the development plan

5. MANAGEMENT OBJECTIVES

5.1 ECOLOGICAL INTEGRITY STATEMENT

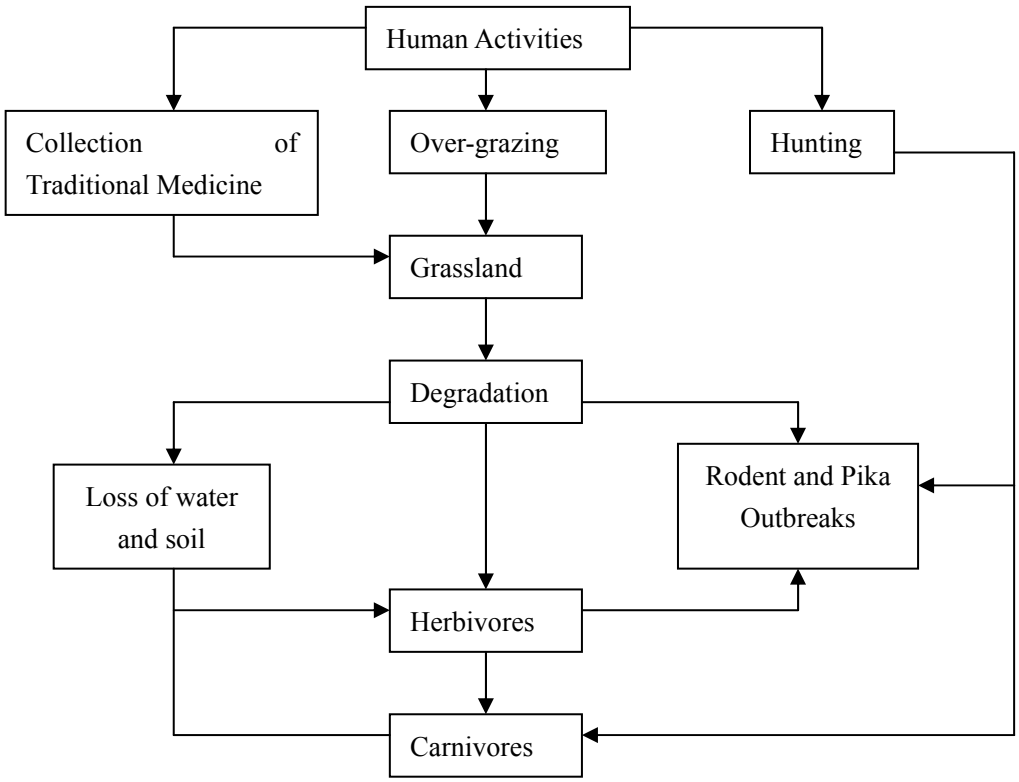
The natural ecosystem of the project area is nearly intact and has a high biodiversity because of its remote location, complex topography and harsh climate. In this area pasture is the primary formation of vegetation. The alpine meadow dominated by *Kobresia* spp. covers an area of 8,350 km^2 (about 75% of total area) and is the main grassland for domestic yak. The alpine steppe covers an area of 1,350 km^2, about 12% of total area, and is mainly used by domestic sheep; alpine steppe is also the habitat of wild Tibetan antelope and wild ass. The third major type of habitat, wetlands, covers an area of about 155 km^2 and is the habitat of waterbirds such as Black-necked crane and Bar-headed goose. Sporadic scrub covers 1% of the total area while alpine rock and glacier cover 5%. There are over ten animals of first or second class national conservation priority species in the project area including Tibetan antelope, wild ass, wild yak, snow leopard, blue sheep, white-lipped dear, Tibetan fox and wolf etc. Clearly, the project area is one of the districts with the highest biodiversity and most abundant natural resources on the Tibetan Plateau.

The snowstorm in 1985 resulted in the death of a large number of livestock and the emigration of significant human populations, which to some extent reduced human disturbance. Despite localized degradation, the natural ecosystem is still complete and in the process of recovery, with local people living largely in harmony with nature. The rare or endangered alpine wildlife resources on the plateau can therefore be effectively protected through the biodiversity conservation in this management plan. In addition, the implementation of this management plan will further improve the public awareness of biodiversity conservation, stop the continuous deterioration of the ecological environment of the Three Great Rivers Source region, create a good habitat for the wildlife, and make the Suojia area a “refuge of wildlife” and “natural gene base” as well as a resource for scientific research. All this will benefit not only China but also the entire world.

5.2 GRASSLAND ECOLOGICAL MODEL

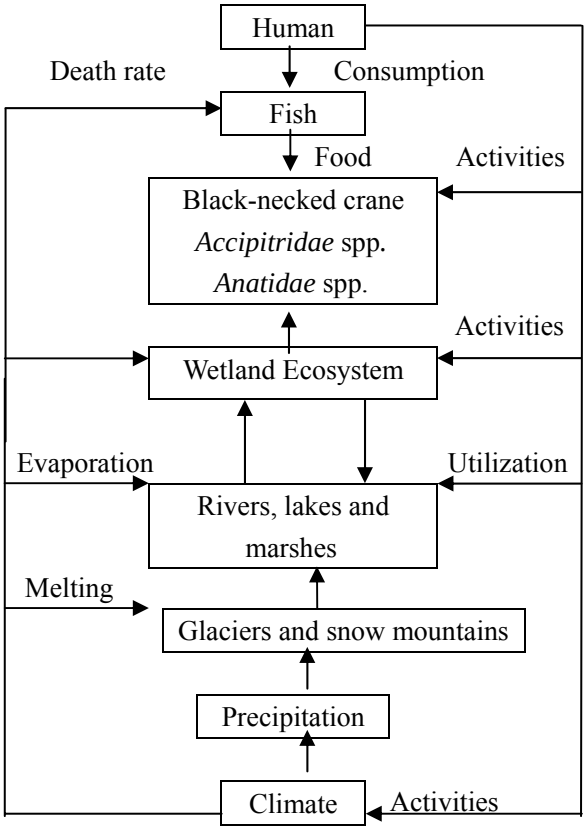
Wild animal populations are affected by many factors, with human activity being the most important. For example, overgrazing will lead to the degradation of pasture followed by a decrease in the numbers of blue sheep. Subsequently, the snow leopard population will decline because this species relies on the sheep for food. Sustainable utilization of pasture, managing the loss of water and soil, and effective control of illegal hunting and collecting, are thus all essential for maintaining the ecological balance.

The following figure illustrates the biological linkages between human activities and the grassland ecosystem in the project area:



5.3 WETLAND ECOLOGICAL MODEL

The function of the plateau wetlands can be seen from several perspectives, including energy flow, the recycling of matter, the support of wildlife, and environmental adaptation. First, the large tracts of wetland form the headwaters of rivers, with the critical functions of conserving water, storing rainfall and providing a continuous supply of water for the Yangtze River. Second, the plateau wetland has the function of moderating the regional climate. Wetlands mediate water resources and increase precipitation, which benefits the growth of grasslands and other plants, and stops the northward movement of the desertification process. Third, the fauna and flora inhabiting the wetlands in Suojia are abundant and include some special wildlife endemic to the Tibetan Plateau, especially waterfowl (e.g. the highly endangered Black-necked crane and *Accipitridae* spp. and *Anatidae* spp.). Furthermore, the wetlands in Suojia include large tracts of marsh meadow where plenty of palatable grazing grows, providing an important food resource for livestock. Finally, the wetlands are also a potential resource for tourism. The plateau wetland ecosystem thereby plays an important role in the biodiversity conservation and ecological balance in Suojia, as illustrated in the following figure:



5.4 MANAGEMENT OBJECTIVES

5.4.1 Goal

The goals for this management plan are to facilitate natural processes; to set up a management system consisting of management organizations and communities; to encourage local people to participate in management actively; to control and alleviate the deterioration of the ecological environment and degradation of natural resources in this area; to recover damaged ecosystems; to realize the sustainable use of natural resources; to develop Suojia into a pilot area for biodiversity and ecological environment conservation in Qinghai Province, and to extend its experience to other districts in the headwaters region of the three great rivers.

5.4.2 Objectives

The objectives for this management plan in the four years from 2004 to 2006 are as follows:

- To develop the organizational structure and management system so as to enhance the participation of communities in the management of their natural resources and environmental protection.
- To improve the capacity of UYO and the communities for livelihood development, biodiversity protection and natural resources management, and facilitate the sustainable development of the socio-economy.
- To coordinate the relationships between the nature reserve, the local community, government at all levels and national and international NGOs, and to strive for more financial and technical support.
- To conduct infrastructure construction to improve conditions for management and protection.
- To formulate a plan for wildlife protection, and to strengthen patrolling, monitoring and enforcement activities, for ecosystem protection and sustainable development.

- To formulate an eco-tourism plan, and to increase alternative income opportunities for local communities.
- To increase investment in scientific research, and to guide protection through the research.
- To strengthen education and publicity; to improve public awareness of environmental protection and sustainable development; to promote traditional ethnic culture.
- To effectively control illegal activities that destroy the ecological environment.

6. ACTION PLAN

TARGET 1: ESTABLISH ORGANIZATIONAL STRUCTURE

ACTION 1: Set up a Suojia Biodiversity Protection Program Office

Project output:

This project involves many organisations and government sectors. In order to improve the communication and cooperation among different stakeholders and to enhance their work towards wildlife conservation, Suojia biodiversity conservation project office will be set up and will be responsible for project implementation. The project office will be coordinated by the Qinghai Environmental Protection Bureau, and will include members from the Qinghai Environmental Protection Bureau, the Qinghai Forestry Bureau, the Qinghai Agricultural and Animal Husbandry Bureau, the Sanjiangyuan Nature Reserve Management Bureau, the Yushu Prefecture Government, the Zhiduo County Government, the UYO, and the Suojia Biodiversity Conservation Supervision Committee. The office will invite many experts as project consultants from the Northwest Plateau Biology Institute (CAS), the Qinghai Social Science Institute, and Qinghai University. Their work will focus on establishing a system for biodiversity conservation and community co-management in Suojia District. The main tasks are the following:

- Enhance cooperation between local government and international organisations as well as NGOs. Advance the management by government sectors and promote the development of the socio-economy. Considering the sustainable use of resources, it is necessary to establish a mechanism for exchanging and communicating among government sectors, NGOs and local communities. This mechanism can provide opportunities for attracting national and international project investment and establish a standard planning and funds allocation procedure.
- Divide the area into appropriate ecological function zones based on ecological assessment, and write up the plan for development of ecological conservation in Suojia. The plan should be consistent with government and community regulations and laws.
- Hold regular meetings in order to address any problems regarding inter-sector cooperation, environmental conservation, social and economic development, and also to organise various collaborative management and development activities with local herders and UYO. Further, to encourage local herders to participate in construction and management in the project area, and to set up community protection stations and a mechanism to assist in the work of the protection bureau.
- Help herders with practical difficulties and to compensate residents whose income has suffered from the establishment of the nature reserve, and to motivate local herders to actively take part in wildlife conservation. Tongtian River Core protection station of Sanjiangyuan nature reserve should play an active role in negotiation with local government,

local NGOs and herders.

Activities:

1. Establish Suojia biodiversity conservation programme office in Qinghai Environmental protection bureau. This office is responsible for communication with FFI and other provincial sectors, consolidate the management and coordination of the project. The Natural Ecosystem Protection Department of Qinghai Environmental Protection Bureau and QRO will allocate 2-3 people to direct the routine work.
2. Establish a workstation under the Suojia Biodiversity Conservation Programme Office in the Suojia local government. This workstation is responsible for implementation of the project, and Suojia county government and UYO will allocate 3-5 people to organise various activities.
3. Organise twice yearly collaborative management and collaborative construction campaigns between government and communities.

Budget

The operating budget is 50,000 RMB per year, totalling 150,000 RMB after three years. These funds will come from the cooperation project.

Implementation unit

The Qinghai Environmental Protection bureau is in charge of project implementation. The Suojia Biodiversity Conservation Programme Office will be set up in the Qinghai Environmental Protection Bureau.

Term of implementation: 2004-2006

Indicators for evaluation

In 2004, a project office and workstation will be set up to carry out routine work.

ACTION 2: Construct Suojia Branch of the Tongtian River Core Protection Station, for the Sanjiangyuan Nature Reserve

Project Output:

Because Suojia belongs to the Sanjiangyuan nature reserve Tongtian river core protection station, the project office decided to set up a branch of Tongtian River core protection station in West Suojia by the Qinghai-Tibetan railway in order to improve enforcement for wildlife protection in the Suojia area and to achieve better management in the Sanjiangyuan NR. The objectives of this station will include the following: carry out routine patrolling; assist the nature reserve in developing a good relationship with the local community; and strive for understanding and support from local government and society at large. Finally, the protection station will help locals find alternative ways to increase income, promote environmental awareness, and equip them with general conservation knowledge to help them to take part in practical conservation work.

Activities:

1. Employ 6 Wildlife Guards from local communities
2. Set up incentive mechanisms for the patrolling staff (e.g. reward, bonus, promotion)
3. Short-term training for the new staff
4. Fence three entrances to the primary breeding site of Black-necked crane in Gexingcuo to decrease human disturbance to this important place
5. Carry out patrolling of wildlife habitats with routine and key area patrolling. During the breeding season of birds and when animals are gregarious, there should be routine patrolling

at least 5 times each month. Key areas should be patrolled 2-3 times each year. This patrolling will be done by 4 rangers from 2 patrolling stations (2 people from each station with 5-8 participants in total). Binoculars and sleeping bags will be needed for the field work in addition to funding for the hiring of local horses and guides.

Budget: The total cost is approximately 160,000 RMB including office equipment, staff salary, and patrolling equipment.

Implementation Unit

Sanjiangyuan Nature Reserve takes charge of these activities.

Term of Implementation: 2004-2005

Indicators for evaluation:

According to the Master Plan for the Sanjiangyuan Nature Reserve, Suojia protection station is a sector level unit, including 2 patrolling stations and 10 full time staff. Wildlife guards will be employed from the local community as part time staff. According to the plan, organization, set up, and hiring of personnel and office management should be completed by the end of 2004. After that, there will be a protection station capacity evaluation each year.

TARGET 2: BUILD LOCAL MANAGEMENT CAPACITY

ACTION 3: Build capacity of local community committees to serve and monitor community and protection activities.

Project Output: Establish a committee in each local community led by Suojia township government; carry out biodiversity conservation; and participate in community co-management. The objectives are as follows:

- To set up effective local regulations on wildlife protection
- To monitor the relationship between wildlife and communities and build up a data-base
- To promote the tradition of local ethnic culture towards conservation and strengthen the participation of local people
- To set up an incentive system to strengthen communities resolve for assisting in protection and to ensure both support from the government and long lasting effects of the work.

Activities

1. Establish an organisational structure, regulations and common objectives, and clearly define each person's responsibilities and tasks.
2. Carry out a training-needs assessment, community wildlife conservation assessment and technical skills training.
3. Establish four community monitoring stations (one in each village), local herders taking turns to do the job.
4. Retain experts as consultants to provide suggestions and advice
5. Set up an information database to allow sharing of information.
6. Following the application procedure, apply to upgrade the current five Local Protected Areas to county or state level Nature Reserves. The management of the nature reserves will be in line with the 'Nature Reserve management regulations for the People's Republic of China'.

Budget

Capacity building for 4 monitoring stations: 400,000 RMB (100,000 RMB for each station)

Office administration, training and consultancy fee: 150,000 RMB for 3 years (50,000RMB each year)

Total budget: 550,000 RMB

Implementation unit

The implementation will be a partnership between Suojia county government and UYO.

Term of implementation 2005-2007.

Indicators for evaluation

- Relevant regulations are in place and include clear definition of personal responsibility. Planned activities are feasible and achievable.
- Reasonable organizational structure and effective training. Building of monitoring stations completed and daily tasks begun.
- An information database built up and maintained; the database should aid with credibility and help to standardize methodologies.
- Protection measures effective and easy to operate, and match the local needs.

ACTION 4: Build capacity of the Upper Yangtze Organization (UYO)

Project Output: Enhance the capacity of UYO staff, improve essential working equipment and finish UYO's institution building and strategy

Activities:

1. Organize and carry out community training programs such as public environmental education and biodiversity protection knowledge, develop skills for project management, formulation of work plans, use of computers and foreign languages.
2. Exchange ecological tourism experience, set up an ecological tourism plan and ask experts on ecological tourism to offer suggestions for locations.
3. Organize evaluation of local experience with cultural protection.

Budget: The total cost is approximately 180,000 RMB including the allowance for experts, accommodation, transportation and equipment.

Implementation Unit: UYO

Term of implementation 2004-2006.

Indicators for Evaluation: UYO staff's knowledge of biodiversity protection improved; they have the ability to evaluate plans and manage ecological tourism; they can also assist with finding any shortcomings in the work.

ACTION 5: Build capacity of the Qinghai Environment Protection Promotion Council of Great Rivers Headwater Areas (EPPC)

Project Output:

- Promote cooperation between governmental and non-governmental organisations and introduce opportunities for projects to Suojia.
- Organise and provide training for biodiversity conservation volunteers in Suojia District.
- Promote and publicize biodiversity conservation education, and deliver training to a wide range of people.

Activities:

1. QRO workstation in Xining will be in charge of registering volunteers, introductory training, and selection of volunteers to go to Suojia to take part in local training and conservation

work.

2. Volunteers will be expected to assume tasks assigned by the Suojia biodiversity conservation project office.
3. Promotion of biodiversity conservation actions in Suojia District through the press and media.

Budget:

The budget for publicity and the volunteer project will total 90,000 RMB for 3 years (each year 30,000 RMB)

Implementation units: QRO and education and publicity branch of the Qinghai Environmental Protection Bureau.

Term of implementation

Project time-frame is 2004-5.

Indicators for evaluation

Assessment will be based on how many times the activities are publicized and how the training and delivery of volunteers is carried out.

ACTION 6: Improve education and publicity for biodiversity conservation in local communities

The herders in the project area live separately, and they are not familiar with working together. Furthermore, 80% of the herders are illiterate. It is urgent to improve the community's ability to realize the worth of natural resources and sustainable development. Thus, we stress the need for the activities for educational improvement and publicity for conservation of biodiversity in the communities.

Project Output: Education and publicity for the conservation of biodiversity in the communities to improve the overall capacity of the communities for biodiversity conservation.

- *Education and publicity for protection of the ecological environment and the Nature Reserve.* The project area is located in the Sanjiangyuan Nature Reserve. Education and publicity for protection of the ecological environment and the nature reserve will help local people understand the importance and necessity of establishing the reserve, the urgency to protect the local environment, the ecological value of grassland ecosystems, and the benefits of sustainable utilization. All of these will contribute to the sustainable development of the communities.
- *Publicity and education on relevant laws.* The Suojia area is a hinterland with poor transportation and communication. Therefore many relevant laws or policies cannot be carried out. Through education and publicity, local people will be made aware of, understand and obey the relevant laws and policies, reject illegal activities automatically and then apply themselves to biodiversity conservation.
- *Education and publicity for biodiversity conservation aimed at the young people of Suojia.* Focusing on young people will not only contribute to current biodiversity conservation in the Suojia area, but the effect will also last into the future and benefit the development of communities. This can be accomplished by tailoring the style of education to fit young people: building their awareness, improving their understanding of local culture, history and ecological environment, and by inspiring their love of nature.
- *Education and publicity focusing on people outside the Suojia area.* This will educate people

outside the Suojia area regarding its biodiversity, environmental conservation efforts and sustainable development. It will encourage them to support and participate in local conservation work. It will also ensure that tourists visiting the Suojia area obey the relevant rules and regulation.

Activities:

1. Build a base for education and publicity for conservation of biodiversity. Invite experts to lecture on nature reserves, ecological conservation, and sustainable development.
2. Set up a publicizing team and buy the necessary equipment and furniture. Use a mobile education vehicle to bring environmental education to communities. Use eye-catching publicity posters, boards and slogans. Publicize the positive content of the traditional culture, and encourage the whole society, especially Buddhist monasteries, to participate in it.
3. Print in both Tibetan and Chinese the publicity materials such as a pictorial booklet on the conservation of the ecological environment, wild animals, glaciers and wetlands and a handbook on all of the relevant laws and policies. Distribute these to each household. Show educational films (translated into Tibetan) relevant to the biodiversity in Suojia in the communities. Hold an exhibition of photography from Suojia once every year. Use newspaper, broadcasting and TV programmes to facilitate education and publicity.
4. Provide training for local herders on primary grassland ecology, the ecological processes and how to use the grassland in a sustainable way.
5. Begin special courses on ecology and environmental protection at school. Edit children's books and make CDs or slides on the Suojia biodiversity conservation with the technical support from experts. Organize a Summer Camp on biodiversity conservation, and organize tours by student groups to visit the nature reserve and experience nature first hand. Organize various activities on biodiversity conservation after school such as student knowledge competitions, drawing contests and composition contests. Encourage the students to participate as "Biodiversity Conservation Volunteers".
6. Use eye-catching publicity posters, boards and slogans. Select a logo design that best represents the communities of Suojia. Make banners with slogans during the tourism season or at public gatherings.

Budget: The budget totals 845,000RMB including 650,000 for education and publicity, 145,000RMB for writing and publishing environmental conservation materials and 50,000RMB for miscellaneous items.

Implementation Unit: Qinghai Environmental Education and Publicity Center

Term of Implementation:2004-2006

Indicators for evaluation: Complete construction of the base on schedule. The mobile education car should visit local communities once every month, and set up one education spot in the communities every year. Every community should hold three training sessions every year.

The instructive films and publicity documents completed on schedule. Over 60% of the local herders and 80% of the local young people should receive education materials.

ACTION 7: Improve the livelihood of local communities

Research and identify ways to improve the livelihood of communities. The Project Area at present only uses traditional animal husbandry, which is dependent on natural pasture to make profits. The ecosystem of Alpine Meadow is fragile and cannot withstand great pressure from human activity.

Therefore, it is necessary to look for alternative incomes to lighten the pressure on the environment.

Project Output:

- Exchange of experience between households in ways to increase livestock value.
- Foster market-oriented household production of traditional handicrafts (e.g. knitting).
- Undertake experiments in the domestication of endangered wild species
- Develop eco-tourism.
- Increase cooperation between households
- Establish and develop a Suojia tourism information bureau, with Suojia tourism publicized widely to improve popularity.
- Increase local community involvement in local biodiversity conservation, and increase government investment and ecological compensation to communities.
- Develop a sustainable market for the sale of Sea Buckthorn (a local medicinal herb).

Activities:

1. Conduct a survey of tourist resources, and formulate a development plan of tourism.
2. Cooperate with tourism agents to open eco-tourism projects focusing on exploration, spiritual inspiration and Tibetan culture.
3. Organize local skilled craftsmen to produce traditional handicrafts and art to sell to tourists.
4. Attract foreign investment and business, thus linking the development of tourism with the market.
5. Provide the education and infrastructure construction needed for tourism and conduct training sessions for the staff.
6. Protect and use Sea Buckthorn.

Budget: 750,000RMB in total including 250,000 for eco-tourism, 300,000 to explore traditional arts, and 200,000 for the protection and collection of Sea Buckthorn.

Implementation Unit :

The Suojia Biodiversity Conservation Planning Office, the Qinghai Tourism Bureau, the government in Yushu Prefecture and Zhiduo Township

Term of Implementation :2004-2006

Indicators for evaluation:

Local people's income increased, conflict with environment lessened, success and growth of eco-tourism.

TARGET 3: STRENGTHEN WILDLIFE PROTECTION

ACTION 8a: Restore and manage breeding corridors for important wild animals: Fencing

In the 1960s and 1970s, the project area was known to be a major habitat and migration route for Tibetan Antelope. Because the pasture is contracted to households and a large area of pasture has been fenced, the migration corridors for wildlife are blocked and habitats are fragmented over the Project Area. As a result, normal migration for the wildlife is impeded. To improve the situation, field surveys and monitoring should be conducted. Furthermore, the main corridors and habitats should be assessed so fencing can be adjusted and/or removed accordingly.

Project Output:

Restore and manage migration corridors important for wildlife.

Activities:

1. Conduct field survey and monitoring, and form a practical scenario for the protection of the migration corridor and habitat.
2. Remove fence, and improve the movement route for wildlife.

Budget:

Relocation of homes for herders: 78,000RMB (3000 RMB/family *26)

Remove fence 10,000 meters plus subsidy: 100,000 RMB

Total: 178,000 RMB, with the majority coming from Sanjiangyuan nature reserve project funds

Implementation Unit:

The implementation is a partnership among, the Zhiduo county government, the Suojia government, the Qinghai forestry bureau, monitoring stations and UYO.

Term of Implementation: 2004-2006.

Indicators for evaluation:

After the project is finished, monitor wildlife usage of the migration corridor, and assess the corridor's success.

ACTION 8b: Restore and manage breeding corridors for important wild animals: Roads

With changes in the transportation network since 1990, the main route from Yushu to the Qinghai-Tibet Highway passes through the project area, and about 200 motorcars use this route every winter. As a consequence, the habitat and migration routes of Tibetan Antelope have been severely damaged.

Project Output:

Restore and manage migration corridors important for wildlife.

Alter the road and remove fencing to link and reconstruct the fragmented habitats.

Activities:

1. Alter the route of the winter road for about 100 km between Suojia and Road 109, and completely block the winter road in the habitat of the Tibetan Antelope in Basigongyong
2. After field research and monitoring, rehabilitate the integrity of the core foaling grounds of the Tibetan Ass (e.g. Junququguocharen, Quguoama), by moving the road about 30 km.

Budget:

- Road and bridge construction: 9,600,000 RMB
  90,000 RMB/km × 100 = 9,000,000 RMB
  600,000 RMB for a medium-sized bridge
- Road alteration 30 km: 270,000 RMB

Total: 9,870,000 RMB, with the majority coming from Sanjiangyuan Nature Reserve project funds

Implementation Unit:

The implementation is a partnership among the Qinghai transportation bureau, the Zhiduo county government, the Suojia government, the Qinghai forestry bureau, monitoring stations and UYO.

Term of Implementation: 2004-2006

Indicators for evaluation:

After the project is finished, monitor wildlife usage of the migration corridor, and assess the corridor's success.

ACTION 9: Open a Wild Animal Rescue Clinic

Project Output: To rescue rare and injured wild animals and release them after recovery. To protect rare and endangered wild animals.

Activities:

1. Ensure that 2-3 veterinarians and biologists are on duty, have a regular work place and accommodation as well as medical equipment and 1 ambulance.
2. Conduct necessary research on biology and diseases of wild animals and undertake both *in situ* and *ex situ* protection
3. Set up a Wild Animal Rescue Team composed of animal doctors and local people.

Budget: 68,000 RMB

Implementation Unit: The Qinghai Veterinary Station and the Zhidouxian Veterinary Clinic

Term of Implementation: 2004-2006

Indicators of Evaluation: Successful release of rescued wildlife

TARGET 4: Improve research to support conservation

ACTION 10: Conduct research on natural disasters

Project Output: Natural disasters in the Project Area and Sanjiangyuan Nature Reserve are frequent, especially snowstorms, which cause great loss of livestock and death of wildlife. These snowstorms can retard or even reverse community development, possibly leading to an increase in poaching. The objective of this project is to assess the impacts of natural disasters, so as to prepare an effective management system (see Action 23).

Activities:

1. Carry out research on the effect of disasters on wildlife populations
2. Propose relief and prevention mechanisms
3. Participate in development of an assessment system for disaster

Budget: 200,000 RMB

Implement Unit: Qinghai Weather Bureau and Qinghai University

Term of Implement: 2004-2006

Indicators for Evaluation: Useful research report, feasible construction plan.

ACTION 11: Conduct research and protect local culture of Suojia

Project Output: Due to the remote location, sparse population and ecological culture of the local community, large populations of wildlife remain in the Suojia District. Unlike other uninhabited areas like Kekexili, this area is under the protection of local citizens. As a result, it is more difficult for outside poachers to operate. The ecological culture of local communities thus provides a foundation for the permanent security of local biodiversity The objective of this action is to research and protect local culture, especially the ecological culture of local community, searching for sustainable development trajectories compatible with the local communities' needs and current situation. The experience can be extended to similar areas. Research will contribute to the protection of biodiversity by local communities and to sustainable development of the communities.

Activities:

1. Organize experts on Anthropology and Tibetology to collect sagas, stories, and ballads related to ecological culture, and conduct surveys of folklore, culture, and customs.

2. Compile and edit a book on the ecological and ethical aspects of the culture.

Budget: 130,000 RMB, including 30,000 RMB for document collection and 100,000 RMB for publication (e.g. editing, publishing)

Implementation Unit: Qinghai Institute of Social Sciences, Qinghai Ethnology College, UYO

Term of Implementation:2004-2006

Indicators for evaluation: The publication finished in 3 years

ACTION 12: Control diseases in wild animals and livestock

Project Output: The pasture in Suojia District is typical Alpine Meadow, with short swards and low grazing production. Due to traditional grazing methods, livestock are subject to frequent diseases. As a result, effective approaches should be used to control diseases, in order to guarantee the sustainable development of animal husbandry.

Activities:

1. Based on the character of livestock diseases in Qinghai province, pertinent research will be conducted. (e.g. research on controlling infectious diseases, verminosis, and the common diseases in winter and spring)
2. Introduce and spread advanced techniques of animal disease control

Budget: 50,000 RMB

Implementation Unit: the Qinghai Animal Husbandry and Veterinary Station, the Qinghai Grassland Station

Term of Implementation:2004-2005

Indicators for evaluation: Decrease of mortality and incidence of livestock disease

ACTION 13: Research on pikas and biological countermeasures for control of pika infestations

Output: In some areas with heavily degraded pasture, pikas occur at high densities. In order to mitigate their impact, protect the pasture in the project area, balance the development of biological resources in the area, and avoid pollution to the environment, research will be conducted on techniques of biological control to limit high densities of Pikas.

Activities: To find methods to control pika infestation that have quick effect, are safe to people and livestock, cause no pollution and are compatible with the goals of the Sanjiangyuan Nature Reserve

Budget: 50,000RMB

Implementation Unit: Qinghai Animal Husbandry Bureau, Qinghai Pasture Protection Station

Term of Implementation: Jan 2004-Dec 2004

Indicators for evaluation: The killing effect should reach 90%. There should be no detrimental impacts on the environment.

ACTION 14: Conduct research on migration of wild animals

Project Output: The area of fenced grassland and household pasture has been increased in an effort to alleviate the degradation of pasture. However, this phenomenon has interfered with the migration of wildlife. Therefore, it is necessary to establish a monitoring system for wildlife migration and find ways for migration to co-exist in harmony with fences.

Activities:

1. Identify the migration routes of wild animals in the Project Area
2. Study the impact of fencing on wild animals
3. Formulate a new fencing plan

Budget: 200,000 RMB

Implementation Unit: Qinghai University

Term of Implementation: 2004-2005.

Indicators for evaluation: The relationship between fencing and wild animal protection is understood and a reliable and practical solution is found.

ACTION 15: Study the impact of settlement and changes in nomadic lifestyle on grassland ecosystems

Project Output: Animal husbandry is the only industry in Suojia. The traditional nomadic pattern is changing, and settlement and seasonal grazing have influenced the livelihood of herders. Due to the increasing pressure on the pasture and overgrazing, the grassland has suffered degradation. Therefore, it is necessary to find a balance between settlement and nomadic patterns. The objective of this action is to research the changes caused by settlement and changes in the nomadic lifestyle on the pasture as an ecological environment, as well as the impact on the livelihood of local herders.

Activities:

1. Study the impact of settlement and change of nomadic lifestyle on the ecological environment
2. Put forward a reasonable and practical proposal for a system of animal husbandry

Budget: 50,000 RMB

Implementation Unit: The Qinghai Animal Husbandry Bureau and the Suojia Township Government,

Term of Implementation: Jan 2004 to Dec 2005

Indicators for evaluation: The result is reliable; the new proposed system is effective

ACTION 16: Conduct research on key species and ecosystems

Project Output: The objective of this action is to conduct an inventory survey of key species, and to maintain the long term ecological integrity of the Suojia District. It will help us understand both the behavior of key species such as wetland bird migration and the changes in the environment.

Activities:

1. Understand the current status of biodiversity and key species in Suojia District through an inventory and survey of local biological resources, communities and economy.
2. Carry out the research for a biodiversity information system for Suojia District. Provide community representatives training courses on computer data management and China Biodiversity Information Management System (BIMS) in communities; collect and process data, conduct periodic field monitoring with herders; provide information for the adaptive management of key species
3. Establish inventory data and plan for the protection and management of biological resources; analyze the habitat of key species and wildlife populations, including status, range, location, management data, demand for rehabilitation, and ecological relations with other habitats. The data should be stored in the form of maps. Catch birds in the field by standard methods under

supervision of the Bird Banding Centre (Beijing), record the species, sex, and time of capture, then band the birds and observe and record the birds in the same location each year.

Budget: 150,000MB, 100,000 for surveys, 25,000 for BIMS and 25,000 for bird banding

Implementation Unit: Qinghai University, the North-West Plateau Institute, CAS

Term of Implementation:2004-2005

Indicators for evaluation: Reliable report and published papers

TARGET 5: IMPROVE INFRASTRUCTURE AND ENHANCE LOCAL HERDERS' LIVES

ACTION 17: Construct community schools

Project Output: To construct community schools to improve the education conditions.

Activities:

1. 3 schools are to be constructed, in total comprising 6 buildings. Each new school will consist of: 6 classrooms, 4 rooms for student dormitories, 1 meeting room, 6 sets of staff housing with kitchens, 1 room for storage.
2. All schools are to be furnished with desks, chairs and teaching equipment.

Budget: 2,500,000 RMB, including:

Six buildings: 100,000RMB each × 6 = 600,000RMB

Desks and chairs: 280RMB each set × 180 = 504,400 RMB

Teaching materials: 6,000RMB each set × 300 = 1,800,000RMB

Other teaching supplies: Around 5,000 RMB

Total: 2,500,000 RMB

Implementation Unit: UYO, the communities and relevant government departments,

Term of Implementation:2004-2006.

Indicators of Evaluation: All community schools have been completely and adequately constructed.

ACTION 18: Construct heat preservation barns for livestock

Project Output: To construct heat preservation barns for each household in the project area, in order to increase the survival rate of livestock during winter, and keep livestock in paddocks.

Activities: Construct a 200m^2 heat preservation barn for each household.

Budget: The cost of each 200m^2 heat preservation barn is 38,640 RMB. There are 1,048 households in the Suojia Area. The total investment is 38,640 × 1,048 = 40,494,700 RMB

Implementation Unit: Qinghai Animal Husbandry Bureau,

Term of Implementation: 2004-2006

Indicators of Evaluation: Barns of good quality, completed on time.

ACTION 19: Prevent grassland fires

Project Output: Fire causes tremendous damage to the local ecosystem and grassland resources, and threatens the safety of wild animals. The objective of this action is to effectively prevent grassland fires.

Activities:

1. Set up a wireless transmitter-receiver system and equip each team with GPS
2. Provide fire fighting equipment for each protection station

3. Enhance patrolling and precautions against fire
4. Conduct fire fighting as soon as it is discovered
5. Become involved in the fire prevention system of the township
6. Recruit 4-5 local herders as firemen

Budget: 90,000 RMB in total, over three years

Implementation Unit: County government and village community

Term of Implementation: 2004 – 2006

Indicators of Evaluation: Successful prevention of damage to ecosystems from fire

ACTION 20: Set up a market for trading livestock

Project Output: This action aims to improve the system for livestock trading and other products of animal husbandry, to encourage people to sell more livestock and relevant products, to expand the market for livestock products, and to protect prices and the herders' gross income.

Activities:

1. Search for cooperation with a company that undertakes processing and trading of products of animal husbandry, and set up long-term collaboration.
2. Form a production chain model of 'Company + Production Base + Association + Household'
3. Encourage external corporations to set up a livestock trading market in Suojia
4. Implement price protection of animal husbandry products in project area

Budget: 330,000 RMB in total including 130,000 RMB for preliminary coordination costs (from government funds) and 200,000 RMB for construction and operation cost (from corporate investment)

Implementation Unit: Zhiduo County and Suojia Township Government

Term of Implementation: 2004-2006.

Indicators of Evaluation: The number of head of livestock traded reaches 20,000 individuals every year (there are a total of 72,526 livestock in the project area).

ACTION 21: Improve public health in communities

Project Output: The Project Area is short of medical services and medicine, and the health condition of herders is relatively bad. The communities do not have public health service centers, so the herders have to see a doctor in urban hospitals several hundred kilometers away, which can be very costly. The lack of affordable health care indirectly puts great pressure on local resources, and this project aims to solve these problems.

Activities:

1. Establish 4 public health service centers in the communities
2. Train 16 local medical staff

Budget: 448,000 RMB including 400,000 RMB for the establishment of 4 service centers and 48,000 RMB for the training of 16 local medical staff.

Implement Unit: The Local Communities, the Public Health Bureau at county level and the Suojia Biodiversity Conservation Programme Office

Term of Implement:,2004—2006

Indicators for Evaluation: Health centres established and doctors trained; local public health is improved

ACTION 22: Establish a community management system for natural disasters

Project Output: Natural disasters in the Project Area and Sanjiangyuan Nature Reserve are frequent, especially snowstorms, which cause great loss of livestock and death of wildlife, resulting in the retrogression of community development and an increase in poaching. At present, the Project Area lacks an effective management system for disasters. The purpose of the project is to guarantee the development of communities and improve the environment.

Activities:

1. Establish a Management Committee for Disaster Relief
2. Establish relief and prevention mechanisms for disaster (See also Action 10)
3. Set up a relief fund for disaster relief and raise funds for it
4. Develop an assessment system for disasters
5. Establish forage-base and identify relevant management measures

Budget: 900,000 RMB, in total, including 400,000 RMB for the Relief Fund and 500,000 RMB for forage-base construction

Implementataion Unit: Local Communities and the Suojia Biodiversity Conservation Programme Office

Term of Implementation:2004-2006

Indicators for Evaluation: Establish 4 Management Committees for Disaster Relief and set up an effective relief mechanism, 4 forage bases, an effective assessment system for disasters, and raise 400,000 RMB for Relief fund.

7. MONITORING, EVALUATION AND ADJUSTMENT MECHANISM

7.1 PURPOSE

Monitoring and evaluation of the implementation the programme will help management staff understand the progress of implementation, know the effect of implementation on the ecological integrity of this area, and adjust the plan according to the real situation.

7.2 MONITORING

The management staff should monitor the activities of all action plans. The people who are responsible for the implementation of a special project should put forward the indicators for monitoring and evaluation before the launch of the project.

7.3 EVALUATION

A Monitoring and Evaluation Group will be set up, with members from UYO, various Protection Stations and local communities. This group will monitor and evaluate the implementation of each proposed action plan, and then put forward comments or suggestions on the adjustment of the management plan, with the help of relevant consultants.

7.4 METHODOLOGY

The standard of evaluation will change with the different characteristics of the proposed action plans. Each action will be evaluated regularly or periodically during implementation. Generally, an interim monitoring and evaluation will be undertaken for each action, and a final evaluation will be conducted after the project is completed.

7.5 ADJUSTMENT OF THE MANAGEMENT PLAN

The management plan will be adjusted in the face of changing situations according to the results of monitoring and evaluation.

8. TIMETABLE AND BUDGET

Target	Action	Schedule			Budget (RMB)	Implementation Units	Indicators for Evaluation
Target 1: Establish organizational structure	Action 1 Set up Suojia Biodiversity Protection Program Office	2004	2005	2006	150,000	QEPB	In 2004, a project office and workstation will be set up to carry out routine work.
	Action 2 Construct Suojia Branch of the Tongtian River Core Protection Station	2004	2005		160,000	Management Bureau of Sanjiangyuan Nature Reserve	● 2 patrolling stations ● 10 full time staff ● Wildlife guards employed part time from local community ● Set up completed by end of 2004 ● Protection station capacity evaluation each following year.

Target 2: Build Local Management capacity	Action 3 Build capacity of local community committees	2005	2006	2007	550,000	Suojia County government and UYO	● Regulations in place. ● Organizational structure and training. ● Set up monitoring stations and daily tasks begun. ● Build up An information database ● Set up protection measures, and match the local needs.
	Action 4 Build capacity of UYO	2004	2005	2006	180,000	UYO	● Knowledge of biodiversity protection; ● Ability to evaluate plans and manage ecological tourism; ● Assist with finding any shortcomings in the work.
	Action 5 Building capacity of EPPC	2004	2005	2006	90,000	QRO	● How many times the activities are publicized. ● How the training and delivery of volunteers is carried out.

	Action 6 Improve education and publicity for biodiversity conservation in the communities	2004	2005	2006	845,000	Qinghai Environmental Education and Publicity Center	● Complete construction of the base on schedule. ● The mobile education car begins working in local communities. . ● Hold three training sessions every year in every community. ● Complete instructive films and publicity documents. ● Over 60% local herders and 80% local young people receive education materials.
	Action 7 Improve the livelihood of local communities	2004	2005	2006	750,000		● Local people's income increased ● Conflict with environment lessened, ● Success and growth of eco-tourism.
Target 3 Strengthen Wildlife Protection	Action 8a Restore and Manage Breeding Corridors for Important Wild Animals	2004	2005	2006	178,000	Zhiduo county government, Suojia government, Qinghai forestry bureau, monitoring stations ,UYO	● Monitor wildlife usage of the migration corridor ● Assess the corridor's success

	Action 8b Restore and Manage Breeding Corridors for Important Wild Animals	2004	2005	2006	9,870,000	Zhiduo county government, Suojia government, Qinghai forestry bureau, monitoring stations ,UYO	● Monitor wildlife usage of the migration corridor ● Assess the corridor's success
	Action 9 Open a Wild Animal Rescue Clinic	2004	2005	2006	68,000	Qinghai Veterinary Station, Zhidouxian Veterinary Clinic	Successful release of rescued wildlife
Target 4 Improve research to support conservation	Action 10 Conduct research on natural disasters	2004	2005	2006	200,000	Qinghai Meteorological Bureau, Qinghai university	Useful research report, feasible construction plan
	Action 11 Conduct research and protect local culture of Suojia	2004	2005	2006	130,000	Qinghai Society Science, Qinghai Ethnology College, UYO	The publication finished in 3 years
	Action 12 Control diseases in wild animals and livestock	2004	2005		100,000	Qinghai Animal Husbandry and Veterinary Station, Qinghai Grassland Station	Decrease of mortality and incidence of livestock disease
	Action 13 Research on Pikas and Biological Countermeasures for Control of Pika Infestations	2004			50,000	Qinghai Animal Husbandry Bureau, Qinghai Pasture Protection Station,	The killing effect should reach 90%. There should be no detrimental impacts on the environment.

	Action 14 Conduct research on migration of wild animals	2004	2005	▲	200,000	Qinghai University	Understand relationship between fencing and wild animal protection Find a reliable and practical solution is found
	Action 15 Study the impact of settlement and changes in nomadic lifestyle on grassland ecosystems	2004	2005	▲	50,000	Qinghai Animal Husbandry Bureau, Suojia Township Government	The result is reliable; the new proposed system is effective
	Action 16 Conduct research on key species and ecosystems	2004	2005		150,000	Qinghai University, North-West Plateau Society ,CAS	Reliable report Published papers
Target 5 Improve Infrastructure and enhance local herder's lives	Action 17 Construct community schools	2004	2005	2006	2,500,000	UYO, Communities Relevant government departments	All community schools have been completely and adequately constructed.
	Action18 Construct Heat Preservation Barns for livestock	2004	2005	2006	40,500,000	Qinghai Agriculture and Animal Husbandry Bureau	Barns of good quality, completed on time.
	Action 19: Prevent grassland fires	2004	2005	2006	90,000	County government and village community	Successful prevention of damage to ecosystems from fire

	Action 20: Construct a market for trading livestock	2004	2005	2006	330,000	Zhiduo County and Suojia Township Government, corporate	The number of head of livestock traded reaches 20,000 individuals every year.
	Action 21: Improve public health in communities	2004	2005	2006	448,000	Local Communities, Public Health Bureau at county level and Project Group	Health centres established and doctors trained; local public health is improved
	Action 22: Establish a community management system for natural disasters	2004	2005	2006	900,000	Local Communities and Core Group of the Project	● 4 Management Committees for Disaster Relief ● An effective relief mechanism ● 4 forage bases ● An effective assessment system ● Raise 400,000 RMB for Relief fund