



Global Environment Facility

MOHAMED T. EL-ASHRY
CHIEF EXECUTIVE OFFICER
AND CHAIRMAN

December 17, 1997

Dear Council Member:

UNDP, as the Implementing Agency for the project entitled: *Biodiversity Conservation of Titicaca Desaguadero-Poopo Salar de Coipasa (TDPS) Water Basin*, has submitted the attached proposed project document for CEO endorsement prior to final approval of the project document in accordance with UNDP procedures.

Over the next four weeks, the Secretariat will be reviewing the project document to ascertain that it is consistent with the proposal approved by the Council in February 1995, and with GEF policies and procedures. The Secretariat will also ascertain whether the proposed level of GEF financing is appropriate in light of the project's objectives.

If by January 14, 1998, I have not received requests from at least four Council Members to have the proposed project reviewed at a Council meeting because in the Member's view the project is not consistent with the Instrument or GEF policies and procedures, I will complete the Secretariat's assessment with a view to endorsing the proposed project document.

Sincerely,

Attachment:

Biodiversity Conservation of Titicaca Desaguadero-Poopo Salar de Coipasa (TDPS) Water Basin

cc: Alternates, Implementing Agencies, STAP



United Nations Development Programme
GLOBAL ENVIRONMENT FACILITY (GEF)

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12 December, 1997

Dear Mr. El-Ashry,


Subject: RLA/97/G31/E/1G/99 - Biodiversity Conservation
Of Titicaca Desaguadero-Poopo Salar de
Coipasa (TDPS) Water Basin

I am pleased to enclose the project entitled "*Biodiversity Conservation of Titicaca Desaguadero-Poopo Salar de Coipasa (TDPS) Water Basin*" approved by the GEF Executive Council Meeting in February 1995.

As per paragraph 29 and 30 of the GEF Project Cycle, we are submitting this project to you for circulation to the Executive Council Members for comments and, subsequently, for your final endorsement.

Thank you in advance for expediting the review and approval of this project.

Yours sincerely,


Rafael Asenjo
Executive Coordinator

Mr. Mohamed El-Ashry
Chief Executive Officer
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Washington, D.C. 20433
PM

UNITED NATIONS DEVELOPMENT PROGRAMME

GLOBAL ENVIRONMENTAL FACILITY

Project of the Government's of Bolivia and Perú

Title:	Biodiversity Conservation of the Titicaca-Desaguadero-Poopó-Salar de Coipasa (TDPS) Water Basin
Number:	RLA/95/G31/E/1G/99
Duration:	Five years
Project Site:	Titicaca-Desaguadero-Poopó-Salar de Coipasa Water Basin
UNDP Sector:	Natural Resources
Executing Agency:	Binational TDPS Authority (ALT)
Estimated Starting Date:	January 1998
Government's Inputs:	US\$ 1.03 million (in kind)
Total Project Cost:	US\$ 4.0 million
Cost Sharing:	US\$ 0.89 million (Government of Peru, Government of Bolivia)
GEF-UNDP Inputs:	US\$ 3.11 million

Brief Description:

The Titicaca-Desaguadero-Poopó-Salar de Coipasa Water Basin (TDPS) located in the High Andean Plateau of Bolivia and Perú houses outstanding global and regional, terrestrial and aquatic biodiversity. This biodiversity is under increasing pressure from water pollution, over-fishing, the introduction of exotic species and inappropriate land-use practices. Several endemic species are already threatened or endangered, and changing patterns in road systems and energy supply may further exacerbate already critical impacts on the biodiversity. A Binational Strategic Plan exists for the management of water resources in the Basin, however, this does not specifically address biodiversity concerns. The project proposed herein will use GEF resources to cover the incremental costs of conserving and sustainably using the biodiversity of the TDPS through the design and implementation of community-based conservation, sustainable-use and restoration activities, and through the development of a Biodiversity Management Plan. This Plan will provide guidelines to orient future sectoral investments, including the Autonomous Authority of Lake Titicaca (ALT) Binational Strategic Plan, and a framework for assessing their sustainability from an ecosystem perspective. The project will implement specific demonstration projects that offer alternative, sustainable sources of income to local communities which include the use of aquatic species, such as the lake frog and the macrophytes totora and llachu and terrestrial species, such as the vicuña, native birds suri and pisaca, and thola in mixed timber-livestock projects. The project will also undertake conservation measures including the

strengthening of two existing protected areas (Titicaca National Reserve and Ulla Ulla Reserve). And will assist in creating two new adjacent protected areas and promoting the recovery and re-introduction of threatened native species such as the boga and carachi fish. Finally, in order to provide long-term sustainability to these activities, the project will strengthen the capacity of government and non-governmental institutions, local communities and ALT, to plan, implement and monitor biodiversity management and conservation programmes within the context of the region's economic development.

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ABBREVIATIONS

ALT	Autonomous Authority of Lake Titicaca
BMP	Biodiversity Management Plan
BSP	Binational Strategic Plan
CAF	Andean Development Corporation
CDC	Conservation Data Centre (Perú)
CECI	Canadian Centre for Studies and International Co-operation (Bolivia)
CIDA	Canadian International Development Agency
CIEC	Interdisciplinary Centre for Communal Studies (Bolivia)
CONAM	National Council for the Environment (Perú)
DNCB	National Biodiversity Conservation Directorate (Bolivia)
FONAMA	National Environmental Fund (Bolivia)
FOPTUR	Peruvian Tourism Fund (Perú)
FPCN	Peruvian Nature Conservancy Foundation (Perú)
GEF	Global Environment Facility
GTZ	German Technical Cooperation
IDB	Inter-American Development Bank
IE	The Ecological Institute (Bolivia)
INADE	National Development Institute (Perú)
INRENA	National Institute for Natural Resources (Perú)
IUCN	The World Conservation Union
KfW	German Credit Bank
MDSMA	Ministry of Sustainable Development and Environment (Bolivia)
NGO	Non Governmental Organization
OAS	Organization For American States
PCBB	Bolivia Biodiversity Conservation Project (Bolivia)
PELT	Special Lake Titicaca Project
PROFONAMPE	Peruvian Protected Areas National fund (Perú)
SEMTA	Special Services in Appropriate Technologies Management (Bolivia)
SENATUR	National Tourism Secretariat (Bolivia)
SINANPE	State Natural Protected Areas System (Perú)
SINUC	National System of Conservation Units (Perú)
SNAP	National System of Protected Areas (Bolivia)
SUBCOMILAGO	Binational Sub-commission for Lake Titicaca
TDPS	Titicaca-Desaguadero-Poopó-Salar de Coipasa
TROPICO	Bolivian Association for Conservation (Bolivia)
UMSA	Universidad Mayor de San Andrés (Bolivia)
UNEP	United Nations Environment Programme
USAID	United States Agency for International Development
WB	World Bank
WWF	World Wildlife Fund

A. CONTEXT

1 Description of subsector

Bolivia is located in the center of South America and due to its altitudinal and physiographical characteristics, presents a wide variety of ecosystems, ranging from the high Andes to the tropical Amazon. Bolivia, with a surface of 1,098.581 km², has a population of 6.42 million inhabitants, and an annual population growth of 2.6%. It has a relatively low per capita income (US\$ 800 for 1995) compared to the average Latin America (\$US 3000) . The population has been characterized as pluri-cultural and multi-lingual because of its ethnic composition, given that different indigenous groups are found within the territory. The country's economy is based mainly in the exploitation of natural resources such as minerals (lead, tin, zinc), natural gas and timber.

Perú, located on the occidental coast of South America, has an estimated population of 22.6 million over a surface of 1,285.216 km² and an annual population growth of 2.2%. The population in Perú is also composed of different indigenous groups from which quechuas and aymaras are more numerous. The economy is based on agriculture, even though industry has become important over recent years. The country presents a variety of ecosystems and is one of the mega-diversity countries of the world.

2 Characteristics of the TDPS

The Titicaca Water Basin covers 143,900 km² and includes in one system Lake Titicaca, Desaguadero River, Lake Poopó and the salt deposits of the Salar de Coipasa, together with their surrounding land masses . It is commonly referred to by the acronym TDPS for Titicaca-Desaguadero-Poopó and Salar de Coipasa.

The largest and most well-known body of water in the system is Lake Titicaca (8,400 km²), which, at 3,810m above sea level and 283m at its deepest point, is the highest tropical navigable lake in the world. This is followed by Lake Poopó, the Salar de Coipasa, and several lagoons of varying sizes with Uru Uru (260 km²) being the largest. In the north, the TDPS borders the Madera River Basin which is located within the Amazon system and in the south, the Salar de Uyuni system. In the east the Eastern Cordillera separates it from the Amazon and Pilcomayo/La Plata River Basins, while the Western Cordillera separates it from the river valleys of the Pacific system. It has no outflow to rivers that reach the sea and thus forms a unique endorheic system.

There are five major river inlets into Lake Titicaca (Ramis, Coata, Ilave, Huancane and Suches) accounting for slightly more than 50% of the total water input into the system with rain making up the balance. The only river outlet from the lake is the Desaguadero River which leaves Titicaca at a point on the Bolivia-Perú border and flows 398 km south to Lake Poopó in Bolivia, then into the Salar de Coipasa when water levels are high. However, the Desaguadero River represents only a very small percentage of the water leaving Lake Titicaca; approximately 91% of water-loss occurs through evapo-transpiration from the lake itself.

Water from Lake Titicaca flows to the lower TDSP through the Desaguadero River outlet. The level of water changes over time , with differences of over 6 meters recorded over the past 80 years. Therefore the

amount of water flowing from Lake Titicaca through the Desaguadero River is not constant. As much as 80% of the water entering the lower TDPS does not come from Lake Titicaca but rather from tributaries of the Desaguadero River.

Geo-politically the TDPS encompasses both Peruvian and Bolivian territories. Approximately 30% of the TDPS falls in Perú and 70% in Bolivia corresponding to 3.5% and 9% of the national territories respectively. With reference specifically to the Lake Titicaca Basin, however, the ratio is reversed with 75% of the lake in Perú and 25% in Bolivia.

The TDPS population totals approximately two million with 45% in Perú and 55% in Bolivia. This corresponds to 4% of the total 22.6 million Peruvian population and 17% of the total 7.5 million Bolivian population. Rural population comprises 70% of the total in the TDPS which contrasts strongly to national figures of approximately 30% for Perú and 40% for Bolivia. Of this rural population, 810,000 (approximately 60%) live in Bolivian territory and 600,000 in Perú.

Over half of the TDPS population is concentrated in the provinces that directly border Lake Titicaca, predominantly on the western side along the main transport route La Paz-Desaguadero-Puno-Juliaca. This route has existed as the main thoroughfare since pre-Hispanic times, linking the Inca Empire (Cuzco) and the sub-tropical areas of the now Department of La Paz in Bolivia. Today this road, with its continuation to the Peruvian port of Arequipa, constitutes one of the main routes for Bolivian external trade.

Although the TDPS falls within the territories of two countries, each with its own characteristics, several common features have affected the design of this project. Both Bolivia and Perú have an extraordinary ethnic and cultural diversity. Fifty-five percent of the Bolivian population are bilingual with 34.3% who speak Quechua/Spanish and 23.5% Aymara/Spanish. In Perú 25% of the population speaks Quechua. Many ethnic groups that still maintain their ancestral customs and traditional practices are found in the TDPS.

Similarly, both countries face the challenge of alleviating poverty. Recent structural changes have produced more stable economies in the two countries with high inflation rates under control and growth rates increasing substantially. Despite these advances, poverty is still widespread with 72% of the Bolivia population and 68% of the Peruvian, classified as poor. These figures are even higher in the TDPS where productive activities are severely limited by harsh climatic conditions where dry cycles, floods and frosts impose a seasonal characteristic on agricultural activities. Furthermore, the rapid growth of urban population and increasing pressure of the transition to a market economy and modern technology has put pressure on productive systems.

Agriculture and livestock-rearing are the principal sources of income for the TDPS population. In the case of the Department of Puno, in 1990, 58% of the population was employed in this sector. In Bolivia this figure rises to 88%. This contrasts with national figures of 34% in Perú and 44% in Bolivia. Agricultural activity is most commonly found along river courses and near lakes where the more fertile soils favor high production. In these areas introduced species such as barley and Andean species such as quinoa, potatoes, broad beans are common. In intermediate areas, cutting the totora water reed is the principal activity as it is needed for fattening cattle and sheep rearing. In upland areas, South American camelids such as llama and alpaca - which feed on native pastures and peat-bog-like areas of the humid grasslands known as "bofedales" - are more dominant.

The agricultural sector is followed in order of importance by the commerce and services sector and, to a lesser extent, by agro-industrial activities, especially in the Peruvian TDPS urban settlements. Most of the trade is carried out in large town markets and involves a complex network of intermediaries, which results in rural producers receiving only a small percentage of the profits.

Fishing constitutes another, though less important, activity in the TDPS. This is mainly based on small-scale fishing which previously used only traditional capture techniques but is increasingly relying on more predatory methods such as drag nets. Introduced species constitute the bulk of fishing, with pejerrey substituting the once more abundant trout as the most important resource in this sector. Trout fishing is now mainly restricted to small-scale fish-farming activities that rear this species in floating cages. Of native fish, the "ispi" (*Orestias ispi*) is the most abundant and consequently the most exploited.

Organized fishing in Lake Titicaca is very rudimentary: fish are sold directly by fishermen or their wives in local markets. There are no organized systems of unloading, collection, or transport and up to 20% of the catches are lost. Transformation processes are weak and those that exist are usually within private farms and account for no more than 5t in both countries. Due to naturally high - and rising - salinity levels and heavy metal pollution from mining activities, fish populations have dropped drastically in Lake Poopó, reducing fishing activities to low levels.

3 Institutional framework

3.1 Biodiversity conservation and protected areas in Bolivia

The institutional basis for the conservation of natural resources in Bolivia has existed since the General Forestry Law, and the Wildlife, National Parks, Fishing and Hunting Law were enacted in the mid seventies. However, it was not until the eighties that conservation issues, led mainly by academics and NGO's, took a central position in Bolivia. In 1987, the governmental role was more firmly clarified when the Sub-Secretariat for Natural Resources and Environment was set up within the Ministry for Rural Farmers, Agriculture and Livestock. In 1990, the National Environmental Fund (FONAMA) was created and, in 1991, the Sub-Secretariat for Natural Resources and Environment was raised to the level of Secretariat where it became directly dependent to the Presidency of the Republic. An Environment Law was enacted under Law 1333 in 1992 and the following year the Executive Reform Law created the Ministry of Sustainable Development and Environment (MDSMA), Environment Secretariat and the National Biodiversity Conservation Directorate (DNCB). This ministry has been responsible for the formulation of the National Sustainable Development Plan which emphasizes the importance of maintenance and sustainable use of natural processes and resources.

DNCB is responsible for the management of protected areas, wildlife and genetic resources although some responsibilities still fall under the charge of the Bolivian Institute for Agriculture and Livestock Technology and the Centre for Forestry Development. Biodiversity conservation is achieved at different levels and with close collaboration between the government and civil society including NGO's, academia, unions and communities. This is being further strengthened through the new popular participation and decentralization laws. A proposal for a biodiversity conservation law that would provide a stronger and clearer legal framework for the management and control of the National System of Protected Areas (SNAP), wildlife, and genetic resources is presently under revision in the National Congress. A further proposal will establish a biodiversity conservation network of institutions involved in this area including *ex situ*, and *in situ conservation*, research and sustainable use.

The National System for Protected Areas (SNAP) is a central part of conservation efforts in Bolivia. It currently includes 21 areas of national importance under different land-use/protection categories. There are two major categories. The first category, which includes national parks, sanctuaries and monuments, are areas in which human populations can live only in exceptional cases. This limitation is determined by the State with national interests in mind. The second category includes reserves and natural areas for integrated management. These are areas where protection and sustainable use co-exist. In these areas, zoning and restricted use are defined with the participation of inhabitants, balancing national interests with those of local communities.

Bolivia's Biodiversity Conservation Project (PCBB) supports the operation and coordinated management of nine areas and the 12 remaining areas have other different sources of funding. In addition, a variety of NGO's and academic institutions support the management of protected areas and, in line with government policies, local communities are playing an increasingly important role in the management of protected areas.

Within the Bolivian TDPS there are six different categories of protected areas. However, four of these (the Huancaroma Wildlife Reserve, Flavio Machicado Vizcarra Wildlife Sanctuary, Llica National Park and Tuni Condoriri National Park) are not currently operational. The National Fauna Reserve Ulla Ulla and the Sajama National Park are the only two legally established protected areas in the Bolivian TDPS that are operating. These are both included in the SNAP and have been declared a national priority in the DNCB policies.

The Ulla Ulla Reserve, was established in 1972 and declared as Biosphere Reserve by UNESCO the same year. It is located in the north of the Lake Titicaca Basin, along the Peruvian frontier, in the provinces of Bautista Saavedra and Franz Tamayo in the Department of La Paz and on the Peruvian frontier. It covers an area of 150,000 hectares with an altitude ranging from 3,600 to 6,000 m. It has areas of high, humid Andean grasslands together with grasslands, peat-bog-like areas or "bofedales", scrub land and lakes. It houses the largest populations of protected vicuña in the country, abundant populations of the Andean deer and a variety of aquatic birds in its lakes. Scattered Quechua, Aymara and mixed communities are found throughout the area, living in farms and small settlements and carrying out agriculture and alpaca, llama and sheep livestock-rearing. A Management Plan is currently being formulated with the participation of these communities, (see section B Subsection 1.3).

The second area, the Sajama National Park (created in 1939), is in the Department of Oruro on the frontier with Chile and adjoins the Lauca National Park of Chile. It is a scenic volcanic area in the Puna vegetation zone with grasses, bog areas, lakes, thermal springs and a variety of animals including the largest terrestrial bird of the Americas, the suri, the Andean cat, the vicuña and the vizcacha. The highest mountain in Bolivia, the Sajama (6,542m), is located within the park as well as one of the highest forests in the world made up of the native species "keñua" (*Polylepis tarapacana*). Populations of Aymara origin are found in traditional settlements within the park, as well as sites of archaeological and cultural value, such as churches and rock constructions. The administration of the park in charge of DNCB in strict collaboration with local populations, is funded with IDB resources. These funds are allocated to the mitigation of the impacts of the Patacamaya-Tambo Quemado highway that crosses the park (see section B1.3).

3.2 Biodiversity conservation and protected areas in Perú

Conservation in Perú, like Bolivia, has taken an increasingly important position in government

priorities. In 1990, the Environmental Statute was enacted and there is presently a proposal for a Forestry and Wildlife Law. A Protected Areas National Protection Fund (PROFONANPE) established in 1993 is responsible for a Trust Fund and other financial resources for the conservation of national protected areas and for the sustainable use of biodiversity located in buffer zones. Institutionally the main responsibility for biodiversity conservation in Perú falls under the National Institute for Natural Resources (INRENA-Ministry of Agriculture) and more specifically in its Protected Areas and Wildlife Directorate. The recently established National Council for the Environment (CONAM) now constitutes the lead authority on environmental issues and is presently formulating an environmental and biodiversity conservation strategy. INRENA now plays a more executive and operational role in biodiversity conservation.

As in many countries, biodiversity conservation in Perú depends heavily on its system of protected areas. In the past these have been grouped under the National System of Conservation Units (SINUC). Recently they have been included together with other natural areas in the State Natural Protected Areas System (SINANPE). INRENA is responsible for the policies, plans and norms of SINANPE and the establishment of new areas. A Protected Natural Areas Strategic Plan for this system has recently been formulated with support from GTZ and is under revision by INRENA. It is expected to be approved by the Ministry of Agriculture in the near future.

SINANPE is made up of 46 areas which include parks, reserves, national and historic sanctuaries, reserved zones, protection forests, hunting reserves, national forests, and communal reserves. Approximately 10% or 12 million hectares of the national territory is covered by these areas. Despite these advances, many of these areas are insufficiently funded at the operational level. The public sector contributes with less than 10% of the total cost of the system, with the Peruvian Nature Conservancy Foundation (FPCN) being the most important institution in protected area management, contributing more than 50% of total costs.

Until very recently there was only one protected area in the Peruvian section of TDPS. This area, known as the Titicaca National Reserve is located in the provinces of Huancané and Puno and is made up of two parts: Ramis with 7,300 hectares and Puno with 29,150 hectares. Dominantly aquatic (Foroba Island constitutes the only terrestrial area) the reserve was established in 1978 to protect the emergent totora water reed which has the highest densities in this region. Totora plants cover 80% of the territory and support a diverse avifauna as well as the floating islands of the Uros indigenous group which is closely associated with this reed. Characterized by a semi-dry and cold climate it is physiographically varied and is the only protected area in the TDPS which includes parts of Lake Titicaca.

Perú has recently declared a new protected area adjacent to the Bolivian border in the head waters of one of the main Desaguadero River tributaries, the Mauri River. This falls within the area being analyzed in the UNEP-OAS environmental management study (see section B1.3) for a binational protected area.

All the eco-regions of the TDPS system have been classified as maximum regional priority in accordance with the recent WB/WWF study¹ however, only 2.6% of the area is currently included within the protected areas system. This will increase to approximately 10% with the establishment of the two newly proposed protected areas.

¹ Dinerstein, E., Olson, D. M., Graham, D. J., Webster, A. L., Primm, S.A., Bookbinder, M. P. And G. Ledec. 1995. An Evaluation of the Conservation State of Terrestrial Eco-regions from Latin American and the Caribbean. World Bank. Washington, D.C. 135 pp

3.3 The TDPS Water Authority and the Binational Strategic Plan

In 1955 the governments of Perú and Bolivia took the first steps towards a binational management of the TDPS by signing an agreement to study the exploitation of Lake Titicaca's water. In 1957 a plan was formulated to undertake this study. This document confirmed the "indivisible and exclusive joint ownership" that both countries have over Lake Titicaca and formed a Binational Sub-Commission known as SUBCOMILAGO for the development and integration of Lake Titicaca in the plan.

In September of 1987, following the hard drought of 1983 and the floods of 1986, this Sub-Commission requested funds from the European Community to undertake a study aimed at the regulation of Lake Titicaca's water. It was based on the management of the entire hydrological unit or, in other words, the whole TDPS system. A Special Lake Titicaca Project (PELT) was established in each country to formulate the study's terms of reference and to co-ordinate its execution. In 1992, SUBCOMILAGO established a Binational Commission that depended directly on the Ministry of Foreign Affairs of both countries and an *ad hoc* Transition Commission in charge of the guidance of the Plan and its approval. The Plan, to be known as the Binational Strategic Plan (BSP), (*Plan Global Director Binacional*) would provide a comprehensive framework for future development in the TDPS system. The final plan, prepared between 1991 and 1993 by a consortium of European consultants and entitled "*Binational Strategic Plan for Flood Protection and Prevention and Exploitation of TDPS Resources*", as its name implies, focused primarily on management of the TDPS's hydrological resources for flood prevention and irrigation. The BSP was fully completed in early 1995 and approved by both governments later the same year. The Plan consists of an analysis and diagnosis of the situation in the TDPS including information on the systems geomorphology, hydrology, climatology, hydrogeology, hydrochemistry, contamination, fluviometry, soils, vegetation cover and soil erosion, topography and batimetry. One of the main conclusions of the study is that only 20m³/sec of the water from Lake Titicaca can be exploited for economic-productive uses. Based on this, priority irrigation projects with a potential of 50,000 hectares in Perú and 26,000 hectares in Bolivia have been designed. Along with basic information on a wide range of parameters, and a broad portfolio of projects for further research on water-related aspects, water regulation and control through a series of infrastructure projects were included in this study. Included are floodgates and the above mentioned irrigation projects. Although some projects for social programmes and environmental protection are included, it does not consider a comprehensive approach to biodiversity conservation and water pollution control.

Following the completion and approval of the Plan, the Bolivian PELT was transformed into the Bolivian Operative Unit under the Ministry of Sustainable Development and Environment (MDSMA), while its Peruvian equivalent has continued operations with the PELT under the National Development Institute (INADE). The *ad hoc* Binational Committee was replaced by the Binational Autonomous Lake Authority for TDPS (ALT-TDPS) in June of 1996, and charged with the coordination and regulation of programmes and projects in the BSP, and the establishment and enforcement of zoning, control and protection norms in relation to the administration of the system's water resources.

4 Stakeholder Biodiversity Conservation in the TDPS

Different stakeholders are involved in biodiversity conservation activities within the TDPS in both

Perú and Bolivia. The most important of these are the numerous communities and traditional groups within the TDPS that rely on the biological resources of the system for food and shelter, either directly or indirectly for their incomes. Without the active participation of these groups no biodiversity conservation activities will be effective.

On another level, the ALT-TDPS plays a crucial role with its mandate over water regulation and its clear links with environmental conditions and biodiversity in the system. In addition to ALT, regional and local governments of both countries are playing an increasingly important role in this area. Bolivia has recently enacted the Decentralization Law which has generated new dynamics within the government, decentralizing executive-power responsibilities to the regions through departmental governments. In relation to the environment, regional MDSMA units that have authority in regional environmental affairs offices will be created. At the local level, the Bolivian Participation Law has set up a new approach to land management that strengthens the role of municipalities which will have responsibility for the correct management of natural resources in their territory, albeit within national and regional policies. In Perú, a National Environment System proposal is being formulated which will strengthen the role of local governments in environmental management.

Another group of stakeholders are NGO's active in the TDPS. In Bolivia, a growing number of regional-development NGO's within the TDPS have started focusing on environmental issues and biodiversity conservation. In addition, traditional environmental NGO's that work at the national level, have become involved in conservation within the TDPS. These include, the Interdisciplinary Centre for Communal Studies (CIEC) which focuses on environmental education and institutional development in cities such as El Alto, and in rural areas in the Andean region; the Bolivian Association for Conservation (TROPICO) which promotes sustainable development and provides technical and scientific support for conservation planning as well as running a conservation data bank; the Special Services in Appropriate Technologies Management (SEMTA) which works in the south of the TDPS; the Canadian Centre for Studies and International Cooperation (CECI) which focuses on the sustainable production of camelids in the Ulla Ulla reserve and has recently been contracted by DNCB to administer the area; the Group for Analysis on the Environment that works on the Sajama National Park; The Nature Defense; the Bolivian Ecology Society working in urban areas; and the Environmental Defense League that assembles 21 environmental NGOs at the national level, many of whom undertake activities within the TDPS.

Likewise, in Perú, there is a wide variety of NGO's associated with biodiversity conservation. These fall broadly into two groups: (i) those focusing on protection, conservation and restoration of representative ecosystems and protected areas; (ii) those focusing on the economic exploitation of natural resources and the social organization of local communities involved in this use. In general, the first group concentrates their activities and projects in coastal and forest regions while the second works in mountain regions such as the TDPS. Related to this category in Perú there are two stakeholder groups that are particularly relevant to the project proposed herein: the National Council for South American Camelids and the National Society for Vicuna rearing.

Academic institutions form another group that is active in biodiversity conservation in the TDPS. In Bolivia, the Ecological Institute (IE) of the Universidad Mayor de San Andrés (UMSA) is well known for its work in hydrobiology, water quality and community-based agroecology within the TDPS. The recently set up IE environmental quality laboratory is the most modern in the country. The National Natural History Museum has worked with the recently established IE, setting up the National Herbarium and the Bolivian Fauna Collection which includes species from the TDPS ecoregions.

In Perú, the most active universities are the Universidad Nacional del Altiplano; the Universidad Católica de Perú which has recently set up an Environmental Studies Institute that has become active in the TDPS; and the Universidad Nacional Agraria La Molina where the Conservation Data Centre (CDC) is based.

Biodiversity conservation is not restricted to environmental sectors or communities that are directly dependant on the land for their survival. Another major group of stakeholders is institutions involved in sectoral development in the TDPS including tourism, transport, industry and energy sectors.

The innovative implementation arrangements designed for this project will involve a wide range of the above mentioned stakeholders in project execution, through a series of agreements to implement specific project activities.

B. PROJECT JUSTIFICATION

1. Present situation and problems to be addressed

1.1 Biodiversity in the TDPS

The geographical, hydrological and climatic characteristics of the TDPS have given rise to an outstanding *aquatic biodiversity* that includes several endemic as well as globally threatened and endangered species. The fish genus *Orestias*, three macrophytes species, *Elodea potamogeton*, *Myriophyllum elatinoides* and *Lilaeopsis andina*, and the famous giant lake frog (*Telmatobius culeus*) or "huankele" are some of the species endemic to the basin.

Whilst biodiversity of global importance is found throughout the basin, the highest endemism is found in Lake Titicaca. This lake has been classified recently as being of the highest regional priority for aquatic conservation in A recent WWF report². The low temperatures and oxygen content of the lake water, the high radiation and wide daily temperature range, exert severe selection pressure on all flora and fauna of Lake Titicaca. This has led to intense diversification within existing species and a high degree of endemism. One of the most outstanding examples of this is the genus *Orestias*. Endemic to the Central Andean waters, 23 of the 43 species of this genus are endemic to Lake Titicaca alone. Additionally, one hundred percent of the sponges, 90.9% of anhipods, 88% of fishes, 61.9% of mollusks, 32% of aquatic insects and 28.6% of amphibians, associated with the lake, are endemic.

The emergent water reed, *Schoenoplectus tatora*, commonly known as the "totora" reed, plays a critical role within the lake's ecosystem and its unique biodiversity. It is the dominant macrophyte in depths from 2.0 to 4.5m and covers large extensions of the shallow lakeside waters, growing outwards from small clusters of plants. As these clusters grow in size, the plants at the centre die, decompose and regeneration of the inner cluster begins. The resultant nutrient rich waters provide an exceptional feeding ground for both herbivorous and omnivorous fish species. The thick clusters of reeds also provide shelter for adult and juvenile fish and protect the shoreline from destructive waves. The subsequently calm waters between the totora reeds and the shoreline afford ideal breeding grounds for fish. Indeed, all the *Orestias* species breed in this zone.

² Olson, D.M. and E. Dinerstein. 1997. The Global 200, Conserving the World's Distinctive Ecoregions. WWF. USA.

Much of the aquatic avifauna of the TDPS is also directly or indirectly dependent on the totora reeds. This includes a variety of migratory species which use the lake as a feeding site and the reeds as a resting point in their migratory routes. Approximately 40 species of resident birds also depend on the lake and the reeds for nesting sites and feeding grounds. Fifteen of these are endemic to the TDPS, including the two flamingo species *Phoenicoparrus jamesi* and *P. andinus* and the Lake Titicaca short-winged duck (*Rollandia microptera*).

In addition to the key role in supporting unique biodiversity, for centuries the totora water reed has held a central position in the Uros culture. This ethnic group lives on vast floating man-made islands of totora reeds and are well known for the boat making skills using this plant. Totora reeds are still widely used in the area by traditional and local communities for livestock fodder, handicrafts, boats, fuel, and domestic use.

The terrestrial biodiversity of the TDPS also includes the camelid endemic to the Altiplano, namely the vicuña (*Vicugna vicugna*), and threatened species such as the fox (*Dusicyon culpaeus*), Andean deer (*Hyppocamelus antisensis*), american coot (*Fulica americana Peruviana*), Andean ostrich (*Pteronemia pennata*), and “pisaca” (*Nothoprocta ornata*).

The three terrestrial eco-regions found in the system have all been classified as being the highest priority for regional conservation³. These eco-regions - Dry Puna, Humid Puna and Central Andean Puna - have similar characteristics: all occur at high altitudes and are characterized by hard grasses growing in clusters, and resinous bushes from the *Parastrephia*, *Baccharis*, *Senecio* and *Adesmia* genres.

Each of these macro eco-regions can be subdivided into distinct zones. In the High-Andean Grassland zone of the Humid Puna eco-region, seasonal peat-bog areas, known as “bofedales”, play a critical role in maintaining outstanding biodiversity. These bogs have extremely high productivity, maintain critical humidity, and provide habitats for significant microfauna and flora as well as supporting grasses used as livestock fodder. They constitute one of the main habitats for camelids such as alpacas and llamas.

In the Central Andean Puna, the bushes *Parastrephia lepidophylla* and *Baccharis spp*, known as thola, assume the same. Their twisted branches and dense structure provide micro-climates that support a wide range of small organisms, as well as providing food for larger animals including the endangered bird sub-species *Pteronemia pennata garlepi*, or “suri”, that is endemic to the Altiplano. In the High-Andean Microfoliate Forest zones of the three ecoregions, the small-leaved Andean trees *Polylepis tarapacana* and *P. tomentella*, known as queñua, play a similar role providing key habitat for a range of species.

In the Dry Puna zone, characterized by sandy areas, and lesser biodiversity, the bush *Lampaya castellani* and yareta *Azororella compacta* are found.

³ Dinerstein, E., Olson, D. M., Graham, D. J., Webster, A. L., Primm, S.A., Bookbinder, M. P. And G. Ledec. 1995. An Evaluation of the Conservation State of Terrestrial Eco-regions from Latin American and the Caribbean. World Bank. Washington, D.C. 135 pp.

1.2 Threats to Biodiversity in the TDPS

Proximate threats to aquatic biodiversity

The unique aquatic biodiversity of the TDPS system is being increasingly threatened. This is largely a result of increasing pressures on the key habitat provided by the totora reed. Populations of this ecologically, economically and culturally important reed, have fallen considerably in the last fifty years with some areas registering a drop of as much as 40%. Diversity among aquatic flora and fauna are being affected as this critical habitat is altered and populations of some endemic native fish species are falling substantially. A small part of these changes can be attributed to the high, and increasing, levels of salinity in the bodies of water located in the lower TDPS, however, in Lake Titicaca, most of these changes are the result of natural factors.

Quality of Inflow Water

Water quality is increasingly poor near lakeside urban centres and densely populated areas on river inlets. Untreated sewage discharged into the lake results in high levels of nutrients, organic content and fecal coliform bacteria. Outbreaks of the floating duckweed (*Lemna spp*), that occur near sewage outflows, create large mats of weed, preventing sunlight from reaching lower levels of water and killing rooted aquatic plants such as the totora reed. High pathogenic, bacterial and parasitic eggs concentrations jeopardizes the use of this reed for animal fodder and makes its use for crafts unhealthy.

The most critical area is the western shore of Puno Bay near the city of Puno. Less than half of Puno's population is connected to a sewer system. Sewage interceptors that do exist are heavily overloaded and discharge 90-95% of untreated sewage into the Bay. The one stabilization lagoon is often inundated during periods of high water causing overflow into the bay. Water in this region is unsafe for drinking recreation and any other use that involves direct contact with the water. Pathogen and parasite blooms are common with periodic massive fish kills occurring in this area.

Fifty percent of the totora in Lake Titicaca is found within the Puno Bay and the nearby bays of Chucuito and Huanacán. It is in these areas that losses are highest and species that depend on the reeds, for example, the native fish *Orestias spp*, are much lower in number in Inner Puno Bay than in other areas. The Uros people that rely heavily on totora live in areas adjacent to the Bay and are also affected.

To a much smaller degree, industrial effluents contribute to poor water quality in areas of larger urban development. The most important of these is pollution from the Juliaca textile and leather industries that runs into the Ramis River and hence to Lake Titicaca.

Soil erosion from mining activities and effluents from water used to wash minerals, has also caused a drop in water quality in some specific locations; particularly in the tin mining areas in Bolivia. However, this is on the decline since the closing of some mines, such as the Matilde tin mine near La Paz, due to the 60% drop in world tin prices and the adoption of new mining norms in 1995. More recently illegal gold mining in the Ulla Ulla area is of concern because of the associated use of mercury and consequent contamination of surface and ground water. Very localized pollution is caused from petroleum leaking (50 /sec) from badly sealed wells near Juliaca in Perú.

To a lesser extent water quality and hence aquatic biodiversity is also being affected by near-shore agricultural activities. Increases in lake-side urban populations, are creating greater demands for crops for domestic consumption. The more favorable growing conditions of this region, with agricultural rotation cycles of between 3-5 years compared to 15-20 years in the arid south west, have resulted in more intensive agricultural use in this part of the system. This intensive agriculture is based mainly on introduced crops rather than native species and use of agrochemicals are increasing. Run-off containing these chemicals and soil particles is of some importance in near-shore areas where it is affecting the quality of shallow water and in totora reed habitats.

Unsustainable methods of harvesting totora

Harvesting of totora at the wrong height or in the wrong season has also contributed to decreased populations of this important resource. This is particularly common in Perú where the Coast and Shore Law places totora, as an aquatic plant, under State domain. The reeds can consequently be harvested by anybody and there is little control over amounts cut or methods used. In Bolivia the totora reed falls under the dominion of the small-holder that owns the land on the adjacent shore. This ownership stimulates a more rational use of the reed to ensure supplies over long periods of time. Despite this, there are few structured organizations that help promote and control the management of this resource by communities and appropriate harvesting techniques are not widely known.

Natural changes in population dynamics of native species

The decline in the population of native fish species in Lake Titicaca cannot be solely attributed to the loss of totora reed habitat. Years of isolation and unique climatic and hydrological characteristics have given rise to complex and little understanding of the population dynamics and evolutionary cycles in native species. This is especially notable in the *Orestias* genus. Populations of the 26 endemic species fluctuate considerably with apparently cyclical dominance of successive species. *O. ispi*, once very rare, is now the most common *Orestias* species in the lake. *O. pentlandii* -the boga- was the most common until very recently, but currently has extremely low populations and has been listed as endangered. *O. mullieri*, *O. olivaceus* and the endemic *Trichomycterus* species *T. rivulatus* and *T. dispar* are classified as threatened.

Overfishing of native fish species

Overfishing is one of the anthropic causes for the decline in native fish species. Fishing has been an important activity for traditional communities in the region for centuries. Communally-controlled fishing territories - in which only members of the community are allowed to fish - were common throughout the Lake until recently. Increased settlement in the area has led to more fishing, the break down of community-controlled territories, and the overfishing of reproductives and juveniles in the shallow easily-accessible waters where large numbers of fish are found, especially during the spawning seasons. In contrast, fish in the deeper water are still relatively unexploited due to a lack of knowledge and modern fishing techniques.

Introduction of exotic fish species

Exotic species may also play a role in the declining populations of native fish species. In 1940, several attempts were made to introduce a variety of trout species into the different bodies of water within

the TDPS system. The rainbow trout (*Salmo trutta*) was introduced through eggs brought from Chile to the Huenque River in Perú. Populations of this species flourished and spread in to Titicaca Lake where they became important in the local economy. Populations peaked in the mid-sixties but are now much lower. The brown trout (*Onchorrinchus sp*) was introduced in Chucuito, Perú, and is the species that has adapted best to the lake; it spawns in June and July, migrates, and returns in October and November.

In the late fifties the pejerrey (*Basilichtys bonariensis*) was accidentally introduced to Lake Titicaca from Lake Uru-uru via the Desaguadero River. This omnivorous species has a very high reproductive rate, spawning two to three times a year, compared to the one time of other exotic and native species. As a result, populations of this species have greatly increased and now account for 20% of the total fish biomass in Lake Titicaca. Competition and predation of this species appear to be partly responsible for the decline in populations of some native fish, and possibly to a lesser extent, the rainbow trout.

Proximate threats to terrestrial biodiversity

The harsh climatic conditions of the Altiplano have given rise to unique, yet very fragile terrestrial ecosystems that are particularly vulnerable to inappropriate land-use practices. Three key habitats, thola and keñua complexes and peat bog “bofedales”, play vital roles in the functioning of these systems and support many of the endemic species found in the region. Changing land-use patterns are exerting increasing pressures on these habitats and associated species biodiversity.

Livestock rearing has characterized the Altiplano for centuries and the unique biodiversity of this region has co-existed and evolved within this context. However, recent increases in rural populations have caused an increase in livestock activities in the region. Much of this stock consists of introduced species, principally sheep and some cattle. These require a higher ratio of area of pasture to unit weight than native domesticated camelid species such as alpaca and llama. This, together with small-holdings of often less than a hectare in size, is causing over-grazing as carrying capacities of these key habitats are being surpassed.

Additionally, since 63% of domestic fuel in the Bolivia comes from wood, pressure on the thola and keñua habitats that are vital to terrestrial biodiversity, are increasing with the rising rural population.

The peat bog areas, equally important for terrestrial biodiversity, are also under pressure. There is limited awareness of the economic value of these areas in terms of ecological services and of their potential for alpaca rearing under appropriate management practices. This has resulted in land-use proposals, for example the drainage of the bogs for irrigation schemes, that would alter their unique characteristics, lower productivity and effect their vital role in maintaining biodiversity.

Intermediate causes of biodiversity loss

Water pollution, unsustainable harvesting of totora, overfishing, introduction of exotic species, overgrazing and wood gathering for fuel, are the main proximate causes that are *directly* exerting pressure on key habitats in the TDPS, resulting in the loss of aquatic and terrestrial species biodiversity. There are two main *indirect*, or intermediate, causes of biodiversity loss. The first of these is the lack of clearly defined techniques for the sustainable management of crucial habitats and species and the demonstration of these as alternative sources of income to stimulate rural inhabitants to change current biodiversity threatening practices.

The second and closely related area is the weak structure of environmental institutions, inadequate regulatory frameworks and poor enforcement of existing norms in both countries. Mandates of the central environmentally related institutions overlap, and regulatory frameworks are often insufficient or contradictory with conflicting or superimposed norms. Inconsistencies exist between the frameworks of the two countries and sectoral plans rarely incorporate biodiversity management principles. The Sustainable Development Plans in Bolivia have made steps to incorporate biodiversity issues, however, in Perú there is still little incorporation of biodiversity criteria in the public sector and much development planning continues independently.

This dispersed and uncoordinated approach to biodiversity conservation at the national level reflects in the TDPS. For example, the important Binational Strategic Plan, recently approved for the TDPS, will effect development activities in the system. While it provides considerable detail on hydrology-related issues and presents water-regulation projects, it does not include biodiversity principles, or incorporate them into sectoral plans. Environmental Impact Assessments will be undertaken for specific water-regulation structures, such as dams and floodgates, proposed in the BSP, but no coherent approach is made towards regional biodiversity conservation and management.

The regulation of the water level will affect land-use patterns. The current seasonal changes in land-use following periods of drought and flooding, will be reduced. This will affect large areas of the key totora reed habitat. It will also allow for more permanent, stable land-use in the more fertile areas around the lake. Clear guidelines for sustainable use and conservation of both terrestrial and aquatic biodiversity will be required to avoid the adoption of land-use practices that increase present threats to biodiversity.

Protected areas, and their management, are directly affected by weak institutional and regulatory frameworks. This is particularly true in the TDPS where protected areas cover land that has been inhabited for centuries and that is now privately owned⁴. This situation requires specific approaches to protected areas and the selection of management categories that allow selected land-use practices and inhabitation rather than restricted use and isolation. The selection and control of these land-use practices needs an extensive consultation processes with communities that live within the areas. It also requires the demonstration and dissemination of techniques and practices that put less pressure on biodiversity whilst providing sustainable, and often alternative, livelihoods.

The existing protected areas in the TDPS require strengthening in order to better develop and implement such participatory management plans and demonstration projects. New areas need to be legalized and made operational to adequately protect populations of threatened endemic species and develop community approaches to land-use control. However, structural changes and high rates of poverty in both countries, have hindered these actions as public funds are channeled to poverty alleviation programmes such as the National Compensation and Social Development Fund in Perú.

Only small amounts of public funds have been made available for the management of protected areas. In Perú, only 10% of the total costs for the SINANPE comes from the public sector. NGO's and private institutions contribute extensively to the management of protected areas, but priority has often been given to more exotic areas, such as the tropical rainforests, that have a high biodiversity and low human

⁴ In Perú, land has been divided into privately owned smallholdings since the agrarian reform established in the eighties. In Bolivia communities and traditional groups have domain over the land and the last Constitution declares it ineligible for state intervention or impoundment.

population. The more desolate and populated Altiplano areas that have a lower, but more globally unique, biodiversity have received less attention. The Titicaca National Reserve, for example, has had no public funding for five years. It has only two staff, one assigned by INRENA and a park-guard working *ad honorem*. The Puno office administration building, and the only control post that exists lack funds to fully operate.

Recent provisions for funding have been made for the Titicaca National Reserve through the PROFONANPE and Ulla Ulla through the PCBB (see section B1.3). This will allow for a consistent approach to biodiversity conservation in these protected areas and provide a solid foundation on which to base the activities proposed herein.

Potential future threats to biodiversity

Biodiversity loss within the TDPS is already significant and requires increased efforts and actions if globally important species are to be conserved. Pressures on this biodiversity are likely to alter with the changes in transport systems that serve the TDPS and with increased energy supplies. Adequate management techniques could provide opportunities for the promotion of the region's biological resources and their sustainable uses. Without these techniques, however, an increase in biodiversity loss could result.

Transport systems

One of the primary thoroughfares for Bolivian external trade is presently the La Paz-Desaguadero-Puno-Juliaca-Arequipa corridor that runs along the western coastline of the lake. The development of small ribbon settlements take place along the road axis as do several intermediate size urban centres such as Tiquina and Huatajata. The Juliaca-Arequipa section of this road is unpaved making the route slow in this section. A new road from Desaguadero to the Peruvian port of Ilo is presently under construction, financed through the Andean Development Corporation (CAF) and IDB loans and will be completed by late 1997. This road will provide Bolivia with an alternative, shorter outlet to the sea thus reducing the use of the Puno-Juliaca-Arequipa corridor and will open up other areas to urban development, especially in the area of Desaguadero. A road from Bolivia to the coastal port of Arica in Chile has just been finished and provides an alternative route for external trade.

The effect of these alternatives will be to lessen the importance of the Desaguadero-Puno-Juliaca-Arequipa corridor and will possibly reduce the pressure along the lake shore. These changes may however be counteracted by the proposal to pave the Arequipa-Juliaca section, making access to the coast quicker and increasing its competitive value with the two new roads.

Important changes will also occur with the projected trans-oceanic corridor. It is expected that the new Pacific-coast access roads will be linked to major transport systems that access the Atlantic-coast, including the Pantanal Hydrovia and the transoceanic highway through Bolivia and Paraguay.

Increased availability of markets and competitiveness through reduced transport costs will affect productive systems in the Altiplano and, in some cases, this may not be favorable. Some crops for domestic consumption are already more expensive to produce in the Altiplano than to transport from the coast. These will be even less competitive once transport costs from the coast are reduced. Products from the fast growing industrial and agriculturally much more favorable Santa Cruz zone in Bolivia, will have more readily available markets, while goods produced in the Altiplano will have to face stronger competition. Shifting

trends in the productive system may aggravate the already critical poverty in the Altiplano, which in turn may increase land-use pressures and threats to biodiversity.

In addition to the changing market availability for agricultural and agroindustrial goods, the changes in the transport system will alter tourist numbers and routes. In 1995, 40% of approximately one million tourists who arrived in Perú went to Machu Pichu and on to Puno. This is likely to increase when the projected paving of the Cuzco-Juliaca section is complete and with the increased security resulting from reduced terrorist action in Perú.

Alternative energy supply

The most heavily populated areas of the Peruvian TDPS currently rely on energy from Bolivia. This energy is of low quality and has hindered more extensive industrial development. Completion of the Zangavan hydroelectric plant in the Amazon region, financed by the Japanese EXIBANK, will supply a reliable source of electricity to Juliaca within the next three years. The present administration of this city is promoting a change from micro to medium size industries. This city already has the highest growth rate in Perú and with a higher, more reliable quality of electric supply and increased access to markets, this industrial expansion may increase still further.

Similarly, the gas to be produced in Camisea (Shell-Mobil) will bring a further and alternative energy source to the region in 2004. While these trends in energy supply should be positive, increased and rapid development may alter pressures on biodiversity if management capacities are not reinforced.

1.3 Baseline Scenario

Water pollution

Solutions to the threat of untreated domestic effluent on biodiversity are being sought through baseline initiatives to improve on-site sewage collection and treatment, and build sewage treatment plants in larger urban sites. Puno, for example, is negotiating basic sanitation projects with IDB and Japanese funding. This form of sewage treatment is not economically viable for the smaller urban communities and alternative solutions that do not rely on heavy capital expenditure must be developed and put in place before pollution from these communities reaches critical levels.

Mining activities in Bolivia have caused environmental damage including, in some areas, water pollution. Some of this has been in the TDPS especially in the Oruro zone where tailings from the mills, waste rock, underground and open-pit workings, roads, wastewater ponds and landfills have caused land degradation and contamination of surface and, in some cases, ground water. The water quality of Lake Poopó has been seriously affected and in some areas there are high levels of heavy metal contamination. Baseline initiatives in Bolivia are promoting extensive changes in the mining sector with a move from a State controlled sector to a more open system with private participation. A US\$ 22 million IDA and Nordic Development Fund project will support the implementation and refinement of a regulatory framework, to ensure that privately-led mining and industrial activities incorporate environmentally appropriate technologies. This will not only strengthen institutions, but also directly address mining derived threats to biodiversity by including projects to remedy contamination from past mining activities. The project components include: (i) studies aimed at improving environmental management both at the national level and in areas which include some TDPS territory (e.g. El Alto). One of these studies would be basic data

collection to identify mines and industries with significant environmental impacts; to analyze water quality baseline data for selected surface and subterranean bodies of water; and to evaluate the potential costs and benefits of pollution control for selected industries. The second study is aimed at policy development and the implementation of environmental management in mining and industrial activities. It will include: (i) a review and update of environment quality standards and a national strategy for environmental monitoring and enforcement; (ii) laboratory upgrading to develop more accurate laboratory testing services throughout the country; (iii) remedial investments for environmental improvement interventions including the San Jose mine in Oruro; (iv) technical assistance and training to support environmental management in the mining sector.

Water regulation and land-use

The Binational Strategic Plan is critical in defining the baseline situation as it provides important information on the prevailing state of affairs. It includes projects to prevent flooding and to encourage better use of resources in the TDPS. The Plan is currently undertaking a feasibility assessment and design of specific projects. Proposals for irrigation, hydrological regulations and development of fisheries have been developed with assistance from bilateral funding agencies and financing of these is currently under negotiation with the European Union, and the Andean Development Corporation (CAF). Flood control will be achieved through a series of floodgates in the affluents of Lake Titicaca and in the Desaguadero corridor with a cost of US\$ 43,757 million for infrastructure and US\$ 874,000 for maintenance costs. Associated with this water-regulation project four irrigation projects, costing US\$ 216 million for infrastructure and US\$ 63.4 million for agricultural development. These projects aim to irrigate 74,262 hectares (Lagunillas 31,041 ha, Huenque 17,766 ha, Chilahuala 18,855 ha and El Choro 6,600 ha) and benefit 6,085 families (over 30,000 persons). Present agricultural and livestock production in these areas will increase from 19,661t to 214,648t. Ten existing irrigation systems will also be improved affecting 22,485 hectares of irrigated land at a cost of US\$ 31.7 million.

A hydrobiological management programme will focus on the long term development of fisheries including studies on extraction, evaluation of biomass, the modernization of fisheries and improvement of markets. Short and medium term investment requirements for this are calculated at US\$ 5.2 million for the development of fisheries.

The environmental programme in the BSP plan is outlined very generically and does not figure in the list of priority projects, nor does it have a specific calculation of investment needs. It has four components: (i) the control of erosion and soil conservation in the river basins Ramis, Ilave, Mauri and Jacha Jahuri; (ii) the control of water pollution with improvement of effluent treatment in Puno, a sewage collection system and treatment in Oruro, treatment plants in Juliaca and Desaguadero, and the routing of El Alto effluents to the Seco River; (iii) the control of river sedimentation through a series of fluvimorphological studies and correction and control of river courses and, (iv) a component for the creation of protected areas. A US\$ 730,000 UNEP-OEA project, now in its final stage, was designed to detail these components. The Geographical Information System and preliminary plan for protected areas of the TDPS produced in this UNEP-OEA project will provide important inputs to the project proposed herein.

Four of the 24 volumes of the BSP will be particularly important as a source of background information. These are: (i) *water resources*: with the information from a network of 12 hydrometric stations and 117 pluviometric stations; (ii) *soils*: with information on the coverage and present-use that identifies agricultural areas, pastures, forests, bodies of water, bogs/wetlands, drained zones; initial studies on

potential use of soils; classification for use under irrigation; erosion diagnosis; and soil conservation proposals; (iii) *hydrobiological resources*: with information on the concentrations of fish and aquatic plants available in the socio-economic diagnosis of the Plan; (iv) *environmental conditions*: with a diagnosis that indicates the principal environmental problems in the system such as loss of vegetation cover and soil erosion, changes in river courses through sedimentation, and over-exploitation of hydrobiological resources.

Institutional strengthening for environmental management

Institutional weaknesses underlying many of the proximate threats to biodiversity in TDPS are being addressed through baseline activities that aim to improve environmental management capacities of national government institutions. These indirectly affect the project by improving the general background of national capacity.

In Perú there are two projects in this area. The first is a US\$ 2.2 million IDB Technical Assistance programme for strengthening the National Environment Council and supporting the design and establishment of a national environmental system. This project has four main objectives: (i) regulate the law that creates the Executive organism and the Forestry law; (ii) up-date the diagnosis of the institutional and legal situation referring to the environment and natural resources; (iii) design and test a National Environmental Information System; (iv) formulate a proposal for a National Environment System that includes decentralised units, environmental assessment procedures, environmental contamination parameters, activities for diffusion training and equipment and funding mechanisms. The design of the National Environment System will be based on consultations that are currently being undertaken at all levels including the department of Puno.

The Sustainable Environment and Natural Resource Management Project, second in importance in Perú, aims to improve the conservation and use of Perú's natural resource base through five lines of action: (i) strengthening the environmental policy-making and implementation capacity of government institutions especially CONAM; (ii) improving environmental laws and policy framework; (iii) providing reliable environmental information for environmental policy formulation and sectoral decision making; (iv) strengthening the capacity of the private sector in consensus building, problem solving and environmental policy dialogue; (v) developing and testing cost-effective, financially sustainable practices and technologies. This is a Project founded by USAID US\$ 11.885 million contribution.

In Bolivia, the first phase of a Capacity 21 project supported the formulation of a Bolivian Agenda 21 and the strengthening of decentralized and participatory planning. All nine departments have 1996-2000 departmental Development Plans or Agenda 21s and the Departmental Sustainable Development Secretariats have been trained in these concepts. By the end of 1997, 198 of the 311 municipalities will have Municipal Development Plans under a World Bank's Rural Development project. The second phase of the Capacity 21 project will strengthen the implementation of the Sustainable Development Plans in forty-two municipalities by identifying and formulating projects, mobilizing resources for their implementation and setting up Sustainable Development Councils. In addition, the National Secretary for Rural Development is supporting the process of rural participatory planning under the project for rural development funded by the WB. Rural communities will take an achieve participation in the planning and implementation of municipal plans under the policy of integrated rural and urban development, for the improvement of the quality of life in rural communities.

Trough a WB loan, the MDSMA has developed a project called Environment Technical Assistance

Project (ETAP), the main objectives are to strengthen governmental institutions related to the environment, train human resources, contribute to the establishment of a legal system and promote the development of educational activities in order to increase environmental awareness.

FONAMA, through a debt-for-nature swap programme, has set up a fund for small to medium-size environmental projects, for national institutions that work in this area. This funding opportunity is available twice a year through public announcement, and interested institutions present their projects for evaluation.

Finally the IDB has given a US\$ 19 million loan, to the MDSMA, for institutional strengthening and water basin management. This project will start in 1998.

Transport infrastructure projects

Threats to biodiversity from changing transport systems are also being addressed through baseline activities. A US\$ 92.4 million IDB loan is financing the construction of the Bolivian section of the new La Paz-Arica road which passes through the Sajama National Park. A US\$ 0.6 million sub-project will prepare and execute an environmental protection programme to strengthen the capacity of the National Roads Service and the Ministry of Sustainable Development and Environment to evaluate, supervise and execute environmental programmes related to the construction and maintenance of roads. It will also fund, for a period of ten years, the formulation of a management plan for the Sajama National Park which includes an environmental education programme, a park guard training programme, some facilities and recommendations for the definition of park limits. The environmental protection programme will also include a long-term plan for the protection of fauna and flora, and the reconstruction and protection of archaeological and colonial ruins in the vicinity of the road.

A second IDB loan (US\$ 197 million) will fund the Bolivian section of the new La Paz-Ilo road. The project is divided into two sections: the construction of a 49 km section through the mountainous region in the Yungas province north of La Paz (from Cotapata to Santa Barbara) and the paving of the 94.6 km section through the altiplano from Río Seco to Desaguadero. The project includes a US\$ 1.1 million environment protection sub-project (0.5 million IDB, 0.5 million KfW and 0.1 million Government counterpart) for the area of influence of both sections. This sub-project will strengthen environmental monitoring especially in the area of the Nogalani Mountains and protect the archaeological ruins of Tiwanaco.

Incorporation of biodiversity conservation in sectoral activities: Tourism

In addition to these major transport projects in the region, both the Bolivian and Peruvian tourism sectors have included the TDPS in their national tourism campaigns. In Bolivia, the National Tourism Secretariat (SENATUR) has developed a National Strategy for Tourism Development which focuses on the promotion of natural and cultural resources as the basis for attracting new tourists. It seeks to generate increased income from US\$ 135 million it had in 1994, to US\$ 1,000 million in 2000. It has included La Paz and its surroundings - Lake Titicaca and Tiwanaco, the Yungas and the Cordillera Real - as one of the circuits to be promoted as well as the Cuzco-La Paz circuit as a mega project area. US\$ 200,000 pre-investment resources have been earmarked for each circuit, to develop plans for the proposed Tourist Attention Centres and to support private investors and municipalities. In addition, SENATUR is promoting a US\$ 150,000 tourism project in Suriki Island which includes craft and cultural centre for training, and the improvement and building of paths.

In Perú, with funds coming from the Presidency, bungalows in Taquile will be built (US\$ 210,000) and FOPTUR (Peruvian Tourism Fund) will build a further eight bungalows on the beach of Taquile Island as well (US\$ 150,000).

Protected areas management

Baseline funding will be available for protected area management through the two national environmental funds. In Perú, PROFONANPE administers a trust fund and other financial resources for the conservation of protected areas. Set up with GTZ and Canadian Development Agency resources, a World Bank- GEF implemented project has committed US\$ 5 million as seed money for the fund. Debt for nature swaps with Germany and Finland contributed a further DM 9 million and US\$ 7 million respectively and further contributions have come from the Canadian International Development Agency and WWF-UK. PROFONANPE has set its goal at US\$ 80 million which will provide the income to cover the annual budget of the 46 protected natural areas. Through the fund, US\$ 100,000 a year for ten years will be made available in two to three years time for administration of the Titicaca Natural Reserve.

In Bolivia, FONAMA has received considerable resources. The main funding resources come from the GEF and Swiss Technical Co-operation Agency project "Biodiversity Conservation" (US\$ 8.3 million) and the Netherlands' Technical Co-operation Mission (US\$ 20 million). Resources from the fund finance the administration of the SNAP. Directly related to the project proposed herein, funds from the GEF biodiversity project have been used to undertake inventories and formulate a management plan for the National Fauna Reserve Ulla Ulla (US\$ 110,000). Resources will be available in the amount of US\$ 178,000 to help finance administration salaries, build control posts and supply transportation (e.g. canoes, horses.). The GEF project also provides funds totalling US\$ 110,000 for the Sajama National Park, and the IDB contributes towards infrastructure and control activities.

Sustainable use of biodiversity

There are several baseline initiatives for the sustainable use of biodiversity in the TDPS that will complement initiatives proposed in the present project. These include:

The PROBONA Native Andean Forests Programme in Bolivia is a regional effort in Bolivia and Ecuador with some advisory activities in the northern part of Argentina undertakes research on native forests. At present, they are implementing a project on the management and biology of the native species keñua (*Polylepis tomentella*) in the Potosí department.

Since 1991, the Japanese International Cooperation Agency (JICA) has been developing a research programme on native species (*Orestias spp*, *Trichomycterus sp* and *Telmatobius culeus*) in Tiquina. They are mainly focusing on artificial reproduction, biology and, in the future, they will work on sustainable harvesting. Puno University and CIDA have undertaken similar studies on boga.

Universidad Nacional de Altiplano and the Ecology Institute of the Universidad Mayor de San Andrés have undertaken studies on totora and lemna for water decontamination. The latter has concentrated on general biology studies and reproduction, spending approximately US\$ 150,000 over the last eight years.

The PAMPA II project in Puno has undertaken projects with alpaca.

The highly successful GEF Small Grants programme in Bolivia has several initiatives that are relevant to this project including a US\$ 20,000 community agroforestry project to improve soil management through the incorporation of agroforestry practices into existing agricultural and pastoral activities; a US\$ 22,000 project for the dissemination of Lorena stoves, which is the second phase of a project to introduce the use of fuel wood-saving stoves in the altiplano region that is suffering from deforestation and desertification; a US\$ 13,000 project to conserve soils and increase productivity through the construction of terraces and application of indigenous Andean technology; and a US\$ 14,525 project for the conservation and sustainable use of totora in Oruro.

2 Expected end-of-project situation

At the end of the project, globally-unique biodiversity will be better conserved through the strengthened capacity of the TDPS government and non-government institutions, local communities and ALT to plan, implement and monitor biodiversity management and conservation programmes. ALT will have a stronger leadership role and there will be a more solid cohesion between regional institutions and communities concerned with mainstreaming biodiversity conservation and management in the region's economic development. Biodiversity conservation in the Titicaca Basin will have been reinforced by the improved management of protected areas and programmes that promote recovery and re-introduction of threatened native aquatic species. The sustainable use of a variety of biological resources will have been demonstrated and a strategy developed for their widespread application throughout the TDPS system. Their extensive use will be seen as an alternative source of income for local communities and a reduction of present pressures on the biological resources of the region. A Biodiversity Management Plan will have been formulated and up-dated with these results to provide guidelines for future sectoral investments throughout the TDPS and a framework for assessing their sustainability from an ecosystem perspective.

Specific outputs will include:

- Pilot programmes and projects implemented to demonstrate the sustainable use of specific species of aquatic flora and terrestrial fauna and flora as alternative sources of income for local communities.
- Strategy for promoting alternative sources of income from the sustainable use of biodiversity.
- Programmes for the recovery and re-introduction of key native aquatic species, that are designed and implemented as a means of conserving aquatic biodiversity.
- Reduction of threat to aquatic biodiversity from water pollution (caused by the domestic effluent of small lakeside communities) through the design and promotion of totora-based integrated water treatment plants.
- Protected areas Ulla Ulla (Bolivia) and Titicaca Natural Reserve (Perú) strengthened through the implementation of priority actions, including demonstration projects, for the use of biodiversity as alternative livelihoods.
- Two adjoining protected areas established along the Bolivian-Perú frontier with their respective

management plans formulated and their priority actions implemented.

- A Biodiversity Management Plan formulated for the TDPS system, providing guidelines for sectoral investments and mechanisms for its permanent up-dating and incorporation into the ALT Strategic Binational Plan (ALT-BSP).
- A Biodiversity Information Campaign designed and implemented to increase public awareness on the importance of sustainable management and conservation of biodiversity and to promote wider participation in the design, execution and monitoring of biodiversity management programmes and plans throughout the TDPS.
- A Horizontal Cooperation Programme to strengthen the capacity for sustainable use of biodiversity in the TDPS through the exchange of experiences and traditional know-how between local communities and traditional groups.
- Technical and managerial capacities of local governments and non-governmental organizations in the Titicaca Basin strengthened in sustainable biodiversity management.
- Technical and managerial capacity of ALT strengthened so they may fulfill their mandate in the area of biodiversity management, focusing especially on water quality control and management .

3 Target beneficiaries

At the highest, most general level, project beneficiaries include the global community as this project encompasses the conservation and management of unique global biodiversity which has been classified as the highest priority for regional conservation.

More specifically, the direct beneficiaries will be the population in the project area especially those in rural communities estimated at 67,395 inhabitants. The 694,271 inhabitants of six Peruvian provinces (Chucuito, El Collao, Lampa, Puno, San Roman, Yunguyo) and five Bolivian provinces (Ingavi, Los Andes, Manco Kapac, JM Pando and F. Tamayo). These will profit from the demonstration of alternative sources of income based on the sustainable use of biological resources in the area, and from a more active participation in biodiversity management and prevention of loss to key habitats and species that are crucial to their livelihoods and ethnic customs.

Eventually these benefits will be spread to all those in the TDPS as biodiversity management concerns become incorporated into the ALT-BSP and other development plans and through specific municipal development strategies and programmes.

4 Project strategy and institutional arrangements

4.1 Intervention strategy

The project proposed herein will adopt a cost-effective and well-focused strategy to address the loss of globally important biodiversity in the TDPS. It will complement baseline activities addressing specific proximate threats to biodiversity, (see section B1.3) by focusing on removing barriers that effect the adoption of more sustainable uses of biological resources and addressing intermediate or underlying causes

of biodiversity loss. Action will be centred on the definition and demonstration of sustainable management techniques for three critical habitats and three endemic threatened species through pilot projects, training activities for communities and local governments and strengthened protected area management. It will also develop a broader biodiversity management plan for the region which will provide a framework for the habitat, species and protected areas management programmes. This plan will define clear guidelines to evaluate future sectoral investments in the region, including the ALT Binational Strategic Plan, from an ecosystem perspective.

To maximize cost-effectiveness the project will concentrate on the upper parts of the TDPS, namely in Lake Titicaca and the immediately surrounding area, including the headwaters of the Desaguadero River. This region has the highest levels of endemism, particularly in aquatic species, and suffers the greatest threat from water contamination and unsustainable land-use practices. Up to 80% of the water in the lower TDPS comes from the main Desaguadero River tributaries thus intervention in this area will greatly affect water quality in the lower regions of the basin. Additionally, the naturally high levels of salt that characterize the waters of the TDPS are rising above tolerance levels for some species in the southern parts of the basin (Lake Poopó, 10g/litre), and aquatic biodiversity is falling as a result of this natural phenomenon. The enormous volume of water in Lake Titicaca and lower salt levels (1g/litre) will prevent this degree of salinization from occurring in the Lake within human time scales. Proposed actions to conserve the loss of biodiversity due to anthropic causes in this lake will thus not be counteracted by natural phenomena. Furthermore, the proposed area of action is the only region of the TDPS that covers both Peruvian and Bolivian territory and requires an additional, more coordinated effort to ensure adequate biodiversity management.

Whilst action will be centred on Lake Titicaca and its more immediate surroundings, the project strategy will operate at different but complementary levels. The first level will focus directly on developing and implementing *management programmes for three key crucial habitats*; totora-reed, peat-bog and thola-bush complexes⁵. This will be achieved through a series of pilot and demonstration projects in specific localities coupled with awareness-building campaigns and training programmes for rural inhabitants and local decision-makers.

Pilot projects will be implemented to determine and demonstrate the sustainable exploitation of the totora water reed with specific techniques for cutting, harvesting and planting for multi purpose use. These will include production for artisan work and ethnotourism uses, for livestock fodder, and for rearing the native species boga (*Orestias pentlandii*) in semi-enclosed, natural habitats to assess the potential as a future source of income in rearing/release and controlled fishing programmes. It will also test and monitor the totora reed habitat as a low-cost pollution control measure for treating the domestic effluent of small lakeside communities that will increase with new transport developments.

The management of thola-bush complexes for livestock rearing with native camelids will be promoted by determining carrying-capacities for different introduced and native species and disseminating sustainable techniques through demonstration projects and awareness campaigns. Similarly the "bofedal" peat-bog habitat will be better protected by replicating successful alpaca-rearing experiences from the Peruvian TDPS to the Bolivian region and by raising the awareness of decision-makers of its economic value.

⁵ The fourth keystone species that provides a crucial habitat for biodiversity, keñua, is being addressed under baseline activities.

Demonstrations will therefore aim at providing incentives for the application of sustainable practices in the management and production of totora reed, peat-bog and thola-bush complexes.

The conservation and sustainable use of these crucial habitats will produce a strong ripple effect on a wide range of species and provide alternative sources of income for rural inhabitants. However, this will be strengthened through a second level of the project that will take specific action to protect three endemic species that are currently under threat from illegal hunting and fishing activities yet represent an additional potential source of sustainable incomes for rural inhabitants if properly managed.

These three species, the suri (*Pterocnemia pennata*), pisaca (*Nothoprocta ornata*) and giant lake frog (*Telmatobius culeus*) have commercial value; the suri for feathers and eggs, the pisaca for its meat and the frog for its meat and skin. Experiences with related species in other countries indicate the potential for commercial exploitation as a means of relieving pressure on natural populations. It would also provide alternative incomes to local communities and consequently alleviate pressure on other biological resources, for example, the overfishing of native species, and overgrazing on thola and peat-bog complexes. The endemic TDPS suri sub-species has yet to be reared commercially, yet experiences with the sub-species *P. pennata pennata* in Argentina have been successful. Similarly, species of frogs are known for their success in commercial ventures and there are strong reasons to believe that projects with the TDPS pisaca and giant lake frog will be successful if conditions for breeding, rearing and marketing techniques are better determined and its viability demonstrated through pilot projects.

Communities and localities within the boundaries of existing and recently defined protected areas in the TDPS have been selected for undertaking the majority of the initial pilot projects for both habitat and species management. Two of these protected areas are in Perú and two in Bolivia. The Titicaca Reserve located in the Puno Bay has the largest extensions of the totora reed habitat and the Ulla Ulla Reserve is the only protected area in the Humid Puna ecoregion within the TDPS and houses the country's largest population of protected vicuña. The adjacent areas Aymara Lupaca in Perú and Titicaca Mauri in Bolivia have recently been proposed as protected areas under a management category equivalent to the IUCN category Managed Resources Protected Area (i.e. protected areas managed mainly for the sustainable use of ecosystems). These areas cover the headwaters of the Desaguadero river and house the largest surviving populations of the suri.

Selecting these protected areas as initial pilot project locations will have two effects. First closer control and monitoring of the pilot projects will be possible within protected areas. Second, participatory management of protected areas will be indirectly enhanced by developing these productive projects with communities that live in the areas, demonstrating that, under adequate conditions, native species can provide sustainable incomes whilst conserving natural populations.

Resources will also be available in the project to replicate the initial pilot projects, testing results and making fine adjustments before recommendations for wide-spread adoption are fully defined. Replication of pilot projects will be undertaken using local experts as protagonists so that the strengths and skills of each community can be transferred to the new locality. The selection of these sites will be undertaken in an innovative manner designed to heighten participation of local communities in the project. At the end of the second year of the project, a mid-term evaluation will be undertaken by representatives of the communities and local stakeholders. The results of the project, including demonstration projects, will be presented and discussed in a workshop. Recommendations for adjustments will be made and the criteria for selecting sites for replication of the pilot phase will be collectively defined ensuring that communities

actively interested in the project will be able to repeat the-projects. Results from the workshop together with a more technical and traditional mid-term evaluation will be used to align strategies and workplans for the second half of the project.

In the specific case of totora reed pilot projects, four other sites have been selected for initial pilot projects in addition to localities in protected areas. These are the Peruvian islands of Taquile in the open lake near the Chucuito and Capachica peninsulas, the floating archipelago islands of the Uros culture, and the Bolivian islands of Suriki and Takiri in the extreme south of Lake Titicaca.

Each of these sites have baseline activities that are promoting ethnotourism. The totora reed could contribute substantially to tourism attraction if properly managed, and could also provide additional income through its use in crafts, animal fodder and as feeding grounds for native fish. Pilot projects in these four islands will be designed to demonstrate the multi-use potential of this habitat within an ethnotourism context. As with the other pilot-projects, they will also use local experts as protagonists, drawing on the specific knowledge of each community to strengthen weakness in the others. Suriki Island communities, for example, are well-known for their expertise in the construction of totora reed rafts, which forms an important part of the island's income. Takiri Island communities, on the other hand, rely more heavily on fishing and vicuña-rearing for income. They are also better known for their community-controlled fishing but have lost much of their ancestral knowledge regarding the management and use of the totora. The Uros of the floating islands rely on internal tourism for income, but this has been poorly organized and has often stimulated the over-harvesting of totora in contrast to ancestral practices. Taquile Island communities in contrast would provide important expertise from their successful experiences of managing tourism whilst maintaining intact the community traditional structure and decision-making processes.

In addition to the indirect *reinforcement of protected areas* attained through the community-based pilot projects within their boundaries, more direct strengthening will be addressed at another level of the project. The Titicaca National Reserve, presently divided into two different areas, will be reassessed in the light of the severely contaminated Inner Puno Bay and increased colonization. New boundaries that provide more adequate protection to the important totora reed habitat will be delimited and a detailed management plan developed with the full participation of local communities. Similarly, management plans for the protected areas Aymara Lupaca in Perú and Titicaca Mauri in Bolivia will be developed through participatory processes. The project will also define mechanisms to ensure community and stakeholder participation in the implementation of management plans and monitoring of activities.

The Titicaca Mauri protected area will first require its legal approval based on the recent proposal under the completed UNEP-OAS project. This reserve will cover a large territory including the headwaters of the Desaguadero River and an area of the Lago Menor providing an important aquatic protected area on the Bolivian side. It will incorporate heavily settled areas including the town Desaguadero and will require a very detailed and innovative management plan based firmly on land-owners' and development stakeholders' participation in the zone. It also corresponds to an area where settlements are expected to grow with the new Desaguadero-Ilo road and where strong management is essential to avoid increased environmental degradation and species loss.

Direct action will not be taken in the other existing protected areas in the TDPS - the Sajama National Park in the Central Puna eco-region and the Andean Fauna Reserve in the Dry Puna eco-region - as these are being covered by baseline initiatives. However, coordinated approaches in the management of all the TDPS protected areas will be achieved by holding annual workshops with protected area managers and

community representatives to establish common approaches to planning and exchange experiences in management techniques.

The project will also develop a Biodiversity Management Plan (BMP) for the TDPS that will provide a broad framework for the habitat, species and protected area management programmes, and guidelines to evaluate the sustainability of future sectoral investments. This will be developed through participatory workshops with local stakeholders. Stakeholder participation will be facilitated by building on baseline initiatives that strengthen local decision-making processes, such as the decentralization programmes in both countries, the Capacity 21 programmes, municipal plans, and rural community development programmes. Mechanisms will be defined for the revision and permanent up-dating of this plan results from the demonstration projects become available, and for its incorporation into the Binational Strategic Plan and other sectoral development plans.

Finally, the project will focus on capacity building and training activities. These will be directed at two main target groups. The first will be local governments and decision-makers that need training for developing and enforcing environmental legislation and norms that will support the adoption of the sustainable management programmes developed by the project. In order to better design this capacity building programme, a study to determine the cultural perception and values assigned to native fauna and the importance they have in local economies, will be undertaken to identify potential barriers to new norms and regulations. The capacity building programmes will include a series of modular courses on developing norms, enforcement tools such as audits and community control programmes, reviews of relevant national regulatory frameworks identifying inconsistencies between the two countries, and mechanisms for long-term funding of conservation efforts.

The second capacity building target-group will be fishing communities that are currently putting pressure on the stocks of native fish species from over-fishing. The initial part of the programme will be implemented in the first three years of the project. It will train fishers on how to correctly identify juvenile and adult forms of different species of native fish that are very similar, to facilitate selective fishing and accurately monitor populations. It will also build awareness of close-season periods, norms and regulations and on less detrimental fishing techniques.

The second part of the artisan fishing programme will disseminate the results of the pilot projects with totora as a natural habitat for rearing native species and with the giant lake frog rearing which could prove an alternative income in close seasons of native fish species. It will also address the possibility of stimulating the over-fishing of the introduced pejerrey as part of a programme to increase native species by reducing competition. As the exact relationship between the pejerrey and native species is still unclear, during the first year of the project, work will be undertaken in Lake Arapa in Perú to understand this relationship before promoting the selective over-fishing of pejerrey. This lake is currently the only place where the native *Orestias pentlandii* (boga) is fished in significant numbers and until recently there was no pejerrey in this lagoon. The floods of 1986 created a connection between the lagoon and Lake Titicaca and the introduction of pejerrey to these waters. This site thus provides a natural laboratory for studying the effect of pejerrey on native species to provide invaluable information for control programmes.

Additional capacity-building will be achieved in a broader range of stakeholders by the participatory processes that underlie all the major actions of this project. It will also be achieved through the innovative implementation strategy (see section 4.2.) which is based on a series of sub-contracts/agreements with a

range of stakeholders from national and local government institutions, NGO's, academia and local communities.

Finally, project impact monitoring will be facilitated in two ways. Firstly, through activity performance indicators that will be defined at a pre-implementation workshop with implementers and participating communities and reviewed during the definition of each annual operational plan. Secondly, a monitoring programme will be set-up under this project to observe threatened key habitats and species and provide essential information for realigning project activities, evaluating results and defining national follow-up activities.

4.2 Implementation and institutional arrangements

Responsibilities for the TDPS System and its binational nature

The government institutions responsible for the TDPS System are the Ministries of Foreign Affairs of Bolivia and Perú. Both countries agreed to establish the "Autoridad Autónoma" of the TDPS System (ALT) with the mandate of supervising the formulation of the Binational Strategic Plan, of promoting its approval, and subsequently, of coordinating its programmes and projects. Its statutes have also given it the mandate to protect the system's biological diversity. The ALT is mainly a Consulting and Coordinating Group with the primary mandate of controlling water regulations, and enhancing the diffusion of biodiversity conservation and management measures when related to land-use patterns.

The government counterparts of the project will be the Ministries of Foreign Affairs of Bolivia and Perú. The executing agency will be the ALT.

Implementation Strategy

To guarantee a high level of participation and commitment to the Project Objectives by all the different actors, and a strong cohesion around such an important project, it will be necessary to establish Project Operative Units (one on each country) as well as to issue subcontracts for with the various groups in the region, including local and national governmental institutions, NGO's, universities and local communities.

This does not only imply cost-effectiveness, reduction of equipment needs and infrastructure costs, but it will also ensure the utmost use of local experience and will be in line with the actual operational model of the ALT (see section A, points 3 and 4, and section B, points 1.2 and 1.3).

The integration of the results of these activities and their inclusion in the objectives of the project will be possible through the effective coordination and conduction of the ALT, which is in a key position to obtain the participation of local institutions and communities in project execution. This was clearly demonstrated during the workshop in Puno, which took place in order to conclude the elaboration of the Project Document with representatives of various institutions and local communities.

Project activities will be implemented by the Project Operational Units, and by several institutions and organizations (on an open competition basis), they will focus on different aspects of biodiversity conservation, and they will be based on a common package of operational criteria. These have already been identified through exhaustive consultations with groups involved and operating in the project area, and were validated at the binational workshop in Puno.

A Project Management Committee and a Consultative Committee will be established to provide the general orientation and to guarantee the sustainability of the project.

The implementation of the project will be carried out nationally in each country and will have the administrative support of the UNDP Offices in Bolivia and Perú. The Executive President of the ALT as the Director of the project, will be responsible for its execution and for the performance of two National Project Managers, one for Bolivia and the other for Peru.

The execution of the project will be carried out in accordance with annual operational plans, which will be prepared by the executing institution (ALT) in collaboration with the Project's Operational Units, and will be approved by the Management Committee.

The execution of the project will be carried out within the regulatory frameworks, guidelines and policies developed by the sectoral heads related to the subject of the project, for each of the countries.

The Management Committee

The Management Committee will be composed of representatives from the Bolivian and the Peruvian Ministries of Foreign Affairs; representatives of the GEF focal points in each country; the Vice-Ministry of Public Investment and International Cooperation on behalf of the Bolivian Government, and the National Environmental Council on behalf of Perú; representatives from sectoral institutions involved in the project, the Bolivian Ministry of Sustainable Development and Environment, and the Peruvian National Institute for Development; the Executive President of the ALT; and the Resident Representative from local UNDP Offices in Bolivia and Perú.

The Management Committee will be in charge of the following tasks:

- Selection and appointment of the National Project Managers in Bolivia and Perú, in accordance with UNDP procedures. Since the project will have joint execution between Bolivia and Perú, it will be necessary to go through a public announcement for the posts, both in Bolivia and Perú. ALT and UNDP will define the professional profile and requirements for the posts. A team composed of the ALT, UNDP and a representative of the environmental authority in each country, will review the received Curricula Vitae and submit their recommendations to the Management Committee for approval.
- Approve technical and administrative internal regulations for the project.
- The Executive President of the ALT, as the Director of the project, will participate as the Technical Secretary in the Management Committee.
- Monitor the progress of the project in terms of technical and management development.
- Participate in the Tripartite evaluations of the project and analysis of the external technical evaluations. Based on this information, it will be necessary to assess project impact, based on the identification of reliable and quantifiable success indicators, and to carry out recommendations, design to ensure project sustainability and adequate diffusion of best practices.

- Discuss recommendations with the Consultative Committee and formulate pertinent recommendations to be implemented.
- Approve project workplans.
- The sessions of the Management Committee will be organized by UNDP offices and will take place alternatively in Bolivia and Perú. UNDP will coordinate with the Executive President of the ALT to ensure the timely submission of progress reports and other monitoring requirements and appraisals at least two weeks before the Management Committee meets. The minutes of the meetings will be prepared by the UNDP so that they can be signed at the end of each session.

National Execution Arrangements

Although the project considers the TDPS as a unit, the binational nature of this system requires a careful approximation of the location of activities, and of the funds that will be disbursed for implementation. The activities were designed within the framework of the binational and national diversity of norms, policies and objectives in order to be executed following the guidelines that regulate them. Wherever possible, it has been decided that project activities should involve organizations and institutions from both countries in a sequence, so that results from one can benefit the other.

The Executive President of the ALT will be responsible for general coordination and administration of the project, and will guarantee the conceptual and operational coordination of activities between Bolivia and Perú. National activities of the project will be administrated by two National Project Managers. Each one of them will be responsible for the execution of the activities within two subprojects (one for Bolivia and the other one for Perú), where each will be financed through two different budgets that will be implemented in each country.

Responsibilities of the ALT:

The ALT is the institution responsible for the execution of the project, and will be in charge of:

- Coordination with the corresponding UNDP Country Offices of Bolivia and Perú,
- Supervision of project implementation and monitoring.

The Executive President of the ALT as the Director of the project.

This person will be the technical and administrative coordinator of the project in the ALT, and will be responsible for its execution in accordance with the approved operational project workplan and objectives, based on a concept of integrity and homogeneity in the binational scope of the TDPS System.

This person will directly conduct the binational and national activities and actions, coordinating within this framework with the ALT Operational Units of each country through the National Managers.

This person will be responsible for directing the activities, coordinating their execution and guiding the project's policies under the supervision of the ALT and of the Consultative Committee's guidelines; and will

also be responsible for assuring the binational complementarity of the two national components.

The duties of this person will be:

- To direct and coordinate the national activities of the project in Bolivia and Perú, ensuring harmony with the conceptual and operational perspective specified in the Project Document, and the decisions taken by the Management Committee.
- To coordinate the activities of the project with those administrated by the ALT and other institutions related to biodiversity conservation and sustainable development.
- To elaborate, together with the National Managers of the project and the ALT, the annual operational workplans in accordance with the decisions taken by the Management Committee. The National Managers, based on the referred plans, will formulate the corresponding financial allocations, which will be submitted to the local UNDP Offices in Bolivia and Perú with the approval of the Executive President of the ALT as the Director of the project.
- To supervise and evaluate the National Managers of the project.
- To prepare the progress reports to be presented to the Management Committee, as well as the reports to be presented to the Consultative Committee.
- To prepare the agenda and issues to be discussed in the Management Committee and the Consultative Committee meetings.
- To coordinate the preparation of the internal and external evaluations.
- To coordinate the activities related to the diffusion of the achievements and best practices of the project.
- To represent the project in official events.
- To prepare the technical and consolidated financial reports.
- To participate in the process of selection of consultants and institutions with which sub-contracts and agreements will be signed.

The National Managers of the project

They will coordinate the activities of the project under their jurisdiction. There will be two National Managers, one for Bolivia and another for Perú. For project effects, they will functionally depend on the Executive President of the ALT as the Director of the project, and will coordinate with each of the UNDP Country Offices in relation with financial disbursements. Under the supervision of the Executive President of the ALT as the Director of the project, they will be in charge of conducting and executing the foreseen activities in the operational plans within each national scope. They will also coordinate with the Executive President of the ALT as the Director of the project the actions and activities of a binational nature.

The National Managers will have the following duties:

- To manage the national activities that will be executed in Bolivia and Perú, in each one of the Project Operational Units, under the direction of the Executive President of the ALT as the Director of the project.
- To supervise the national execution of the activities of the project.
- To implement the quarterly operational plans established with the Executive President of the ALT as the Director of the project.
- To prepare, based on the action plan, the financial requests and expenses reports that will be submitted to the UNDP.
- To administrate the process of selection of consultants and institutions with which sub-contracts and agreements will be signed. To sign the subcontracts and agreements, and monitor their execution under the conduction of the ALT.
- To sign the payment requests and submit them to the ALT for their approval.

The Consultative Committee

The purpose of this Committee is to discuss and assess the results and the global impacts of the project as well as to give their opinion regarding the relevant factors that could contribute to the project's objectives long-term sustainability. This Committee will meet once a year, or when necessary, to analyze the evaluations of the project and its progress reports.

The Consultative Committee will be composed of a wide variety of participants from both countries, including representatives of the key sectors of the TDPS development, such as grassroots organizations, community and local authorities, NGO's, commercial sectors, representatives of the private sector, and governmental institutions. Many of these institutions have already been identified during the formulation of the project (see sections A.4.5. and B.3.). However, new members could be incorporated each year, which would be proposed by the Executive President of the ALT as the Director of the project, or by other members of the Board of Directors.

The members of the Consultative Committee will have their first meeting during the first quarter of the execution of the project.

The Executive President of the ALT, as the Director of the project, will be the Technical Secretary of this Committee, and will organize the meetings and distribute the necessary reports two weeks before a meeting is held.

Coordination with On-Going Projects and Relevant Institutions

Throughout the execution of the project, close coordination with the relevant projects already in execution and with the institutions involved will be maintained. In particular, it will be necessary to follow the recommendations of the UNEP-OAS project, specially regarding the protected areas, the global plan for environmental management and the water quality control of Lake Titicaca. Additionally, the project will coordinate with important institutions such as the National Fund for Environment (FONAMA) in Bolivia and the National Fund for Natural Protected Areas of the State (PROFONANPE) in Perú, as well as with the local and regional governments, and sectoral organizations such as the National Secretariat for Tourism in Bolivia and the Fund for Tourism Promotion in Perú.

Project Pre-Implementation Workshop

Finally, to maximize the coordination efforts between national institutions in both countries and other projects in execution, a pre-implementation workshop will be held as soon as the National Managers of the project are contracted.

This “start-up” workshop will count with the participation of the institutions directly involved in the execution of the project as well as with representatives of local communities, local and national institutions, representatives from relevant projects in execution, and members of the Board of Directors.

The objectives, results and activities of the project related and reflecting the conclusions made at the broad consultative workshop held in Puno, will be presented once again at this workshop to adjust operative details of the project. The detailed project work plan will also be discussed, and this will also include the definition of the relation of these actions with the activities to be executed by the various institutions and organizations, and the final establishment of specific mechanisms of coordination between all the parties involved in the project execution.

5 Rationale for GEF Funding and Incremental costs (see Annex 3)

The project will cover the incremental costs of designing and implementing a programme to conserve and sustainable use globally outstanding biodiversity in the TDPS of the Andean altiplano. This will include activities designed to secure long term biodiversity protection in the form of strengthening the management of protected areas, creating participatory schemes for natural resource management by local communities, indigenous groups and other sectors of society, and reintroducing key native species into specific localities in the Basin. It will also promote the sustainable use of the region's biodiversity through pilot projects that will demonstrate a range of alternative livelihoods to communities consistent with biodiversity conservation. These include the rearing of native species of birds, frogs, and alpaca and the sustainable harvesting of totora water reeds for fodder and craft material, thola for wood and peat-bog for livestock rearing. It will be undertaken through an innovative implementing arrangement that involves a wide range of government, NGO, private sector and community stakeholders in all stages of the project execution and evaluation.

In this sense, these activities fall within the priorities outlined in the *GEF Operational Strategy* and within those defined for the Mountain Marine and Freshwater Operational Programme.

Incremental Cost Matrix for TDPS

	Baseline (B) (BSP)	Alternative (A) (BSP + biodiversity conservation measures)	Increment (A-B)
Global Benefits	<ul style="list-style-type: none"> no specific conservation measures to target endangered and threatened endemic species 	<ul style="list-style-type: none"> specific conservation measures to restore and rehabilitate endangered and threatened endemic species promotion of sustainable use of biological diversity 	<ul style="list-style-type: none"> enhanced biodiversity conservation in TDPS
Domestic Benefits	<ul style="list-style-type: none"> control and prevention of flooding irrigation hydrobiological management program environmental program 	<ul style="list-style-type: none"> control and prevention of flooding irrigation hydrobiological management program environmental program sustainable harvest of biological resources associated with the rehabilitation of specific biodiversity 	<ul style="list-style-type: none"> improved levels of biological stock to allow for sustainable use
Costs	<ul style="list-style-type: none"> Flooding and irrigation components (S 324.3 m) Hydrobiological management program <ul style="list-style-type: none"> fisheries development (\$ 5.2 million) aquatic vegetation management studies (\$ 0.8 million) Environmental program <ul style="list-style-type: none"> control of soil erosion and soil conservation control of water pollution control of river sedimentation component for the creation or protected areas (still being worked out) 	<ul style="list-style-type: none"> Flooding and irrigation components (S 324.3 million) Hydrobiological management program <ul style="list-style-type: none"> Fisheries development (\$ 5.2 million) Aquatic vegetation management studies (\$ 0.8 million) Environmental program <ul style="list-style-type: none"> Control of soil erosion and soil conservation Control of water pollution Control of river sedimentation Component for the creation or protected areas (still being worked out) <i>Sustainable management plans for three key habitats that will be adopted by the rural inhabitants of the TDPS.</i> <ul style="list-style-type: none"> A community management programme for totora-reed habitats US\$ 520.000 Sustainable management techniques for thola-bush habitats defined US\$ 310.000 The economic value of bofedal peat-bogs demonstrated. US\$ 333.000 <i>Manage native species according to technical basis and commercialize them following sustainable harvesting plans.</i> <ul style="list-style-type: none"> Techniques for the rearing and sustainable commercial exploitation of three threatened endemic native species demonstrated US\$ 345.000 Artisan fishing capacity-building programme US\$ 270.000 	

Incremental Cost Matrix for TDPS (Cont..)

	Baseline (B) (BSP)	Alternative (A) (BSP + biodiversity conservation measures)	Increment (A-B)
Domestic costs to secure global benefits (Cont.)		<ul style="list-style-type: none"> • <i>Framework for the planning, monitoring and evaluation of activities established and future investments within the TDPS, from an ecosystem perspective, and for the strengthening of local capacities.</i> • Participatory management of the TDPS protected areas strengthened US\$ 270,000 • Biodiversity conservation measures for the basin incorporated into the ALT-Strategic Binational Plan. US\$ 122,000 • The technical and managerial capacities of local governments strengthened for developing environmental norms and enforcement systems US\$ 210,000 • Habitat and endemic species management programmes evaluated and replicated US\$ 520,000 	
Total costs	(\$ 330.2 million)	IV. <i>Project Management and evaluation</i> US\$ 984,295 (\$ 334,200,000)	(\$ 4,000,000)
Co-finance	(\$ 0)	(\$ 890,000)	(\$ 890,000)
GEF contribution			(\$ 3,110,000)

6. Counterpart support capacity

The TDPS Binational Autonomous Authority (ALT) will contribute to the execution of the project with its Executive President, who will act as the Director of the project during the five years of project implementation. It will also assist project implementation by providing with infrastructure and office equipment for the national managers. The ALT will also provide general administrative assistance for the appropriate execution of the project.

C. DEVELOPMENT OBJECTIVE

The conservation of globally important biodiversity in the TDPS will be achieved by the wide-scale application of sustainable practices for water and biological resource use.

D. IMMEDIATE OBJECTIVES, OUTPUTS AND ACTIVITIES

IMMEDIATE OBJECTIVE 1

To develop sustainable management plans for three key habitats (totora-reed, thola-bush, bofedal peat-bog) that will be adopted by the rural inhabitants of the TDPS.

Output 1.1

A community-based management programme for totora-reed habitats defined and implemented including projects for craft-use, integrated water decontamination and livestock fodder use, and reproduction sites for native fish species.

Activities for output 1.1

- 1.1.1 Determine appropriate totora harvesting techniques that permit sustainable management including when, where, and how to cut, optimal size of plant, quantities, prices and participatory control of harvesting, both in Perú and Bolivia.
- 1.1.2 Evaluate the distribution of the totora habitats and the existence of potencial areas for totora growth, as a baseline for the establishment of a monitoring programme.
- 1.1.3 Train rural lakeside inhabitants in sustainable cutting and planting methods of totora reed and in management programmes for different uses as the results of pilot-projects become available.
- 1.1.4 Evaluate community planting and management of totora reed for multi-use purposes in an ethnotourism context by implementing pilot projects in the Suriki, Takiri, Taquile and Uros islands.
- 1.1.5 Assess the potential of totora reed habitats in rearing/release and controlled fishing programmes of native fish species from the endemic genus *Orestias* by implementing a pilot project that will include (i) the production of eggs in laboratory, (ii) rearing of juveniles in totora reed habitat enclosed with nets that do not permit predator fish to enter, (iii) release of adults and monitoring of populations in nearby areas; (iv) an evaluation of the results as a technique for re-introduction of threatened species in areas of low populations and potential source of income under controlled fishing schemes and (v) make recommendations for wide-scale adoption in the TDPS.
- 1.1.6 Test and demonstrate the integrated-use of totora reeds habitat for decontaminating domestic effluents and providing livestock fodder by implementing pilot plants in small lakeside communities. Selected communities will be collectively large enough to represent a threat to water quality but too small to justify more traditional and costly treatment plants as currently being applied in the baseline. Based on the results of the pilot plants, make recommendations for the widespread adoption of these practices focusing on efficiencies for different sewage loads and social acceptance using the results of the monitoring programme and the participatory evaluations (output 3.4).

Output 1.2

Sustainable management techniques for thola-bush habitats defined and disseminated in rural communities and local governments.

Activities for output 1.2

- 1.2.1 Determine the carrying capacity of thola bush complexes for sheep rearing using the fenced in-sample areas of the Ecology Institute (UMSA) as a baseline for natural regeneration rates, and areas with different intensities of sheep as comparative sample areas.
- 1.2.2 Determine the carrying capacity of thola bushes for native camelid species through pilot projects to replace sheep rearing with alpaca and llama rearing in four selected communities.
- 1.2.3 Develop guidelines for the sustainable management of thola habitat centered on carrying capacity of livestock rearing with native species.
- 1.2.4 Disseminate these guidelines in rural communities and local governments.
- 1.2.5 Train small-scale livestock producers in thola management techniques with native species.

Output 1.3

The economic value of bofedal peat-bogs demonstrated through pilot management projects and awareness campaigns for small-scale producers and local decision-makers.

Activities for output 1.3

- 1.3.1 Determine the carrying capacity of peat-bogs for livestock rearing with alpaca, and the economic return that different livestock densities could produce, by evaluating existing management experiences in the Peruvian part of the basin.
- 1.3.2 Evaluate the characteristics and distribution of the peat-bogs in the TDPS basin.
- 1.3.3 Implement community alpaca rearing management demonstration projects in the peat-bog areas of the Ulla Ulla Reserve to test and fine-tune the Peruvian-based carrying-capacities evaluations.
- 1.3.4 Replicate peat-bog alpaca rearing projects in other communities selected through the participatory mid-term evaluation (output 3.4)
- 1.3.5 Determine the economic value of peat-bogs in terms of their critical role in primary production and water storage.
- 1.3.6 Incorporate the results of the carrying-capacity projects and economic valuation studies in the capacity-building programmes for local governments (output 3.4)
- 1.3.7 Promote peat-bog management with alpaca rearing as an alternative source of income for local communities in the Titicaca basin through awareness campaigns for rural inhabitants and by incorporation into management plans for protected areas

IMMEDIATE OBJECTIVE 2

To manage native species (suri, pisaca, giant lake frog and native fish) according to technical basis and commercialize them following sustainable harvesting plans.

Output 2.1

Techniques for the rearing and sustainable commercial exploitation of three threatened endemic native species (suri, pisaca and giant lake frog) demonstrated through pilot projects in protected areas.

Activities for output 2.1

- 2.1.1 Evaluate the information available on the biology, ecology and on the state of conservation of these species.
- 2.1.2 Implement community demonstration projects for the rearing and commercial exploitation of the suri in the new frontier protected area in Perú, evaluate them to make recommendations for management in captivity, semi-captivity or ranching, and make recommendations to be tested in other protected areas of the basin through output 3.4.
- 2.1.3 Implement community demonstration projects for the rearing and commercial exploitation of the pisaca in the new frontier protected area in Bolivia, and evaluate them to make recommendations for management in captivity, semi-captivity or ranching, and extensively to be tested the other protected areas of the basin through output 3.4.
- 2.1.4 Determine the most suitable conditions for harvesting the giant-frog from the wild, from semi-captivity or from captivity, including infrastructure, equipment, community management, market analysis for intermediate and final products and evaluation of socio-economic returns for communities.
- 2.1.5 Evaluate the populations of the giant lake frog *Telmatobius culeus* in selected sites and implement demonstration projects for harvesting programmes in semi-captivity and in the wild, to alleviate pressures on native populations of this threatened endemic species and provide an alternative source of income for rural inhabitants that would in turn reduce the use of other presently over-exploited biological resources such as native fish. At the end of the third year of the project evaluate this experience and design a programme for frog rearing in other parts of the basin.

Output 2.2

Artisan fishing capacity-building programme defined and implemented to strengthen the conservation of native fish species

Activities for output 2.2

- 2.2.1 Implement the first part of a capacity-building programme in artisan fishing communities to promote fishing practices that are compatible with biodiversity conservation. This will include training in:
 - the identification between native species in their different life stages especially between juvenile *Orestias pentlandi* (boga) and adult *O. ispi* (ispi).

- the breeding sites and habits of the main native species to regulate fishing localities.
- the use of close-seasons in reproductive periods and the different seasons for each species.
- the estimation of fishing quotas for different localities, seasons and capture.
- exchange of expertise between fishing communities to recover traditional fishing techniques including community-control systems and tradition net-making methods to restore ethnocultural identities and serve as potential tourist attractions.

2.2.2 Assess the potential of promoting the over-fishing of the introduced species pejerrey as part of a recovery programme for native fish species. This will be achieved by population dynamics assessments in Lake Arapa to clarify specific aspects of the competition between the native species boga (*Orestias pentlandii*) and pejerrey (*Basilichthys bonaerensis*). These assessments will be undertaken through indirect monitoring activities working with local fishermen.

2.2.3 Implement the second part of the fishing capacity-building programme that will include the dissemination of the results of pilot projects undertaken in different levels of this project to provide alternative income to artisan fishermen especially in close seasons. For example, the giant lake frog rearing project and totora-reed management reproduction of native species in semi-captivity. Depending on the results of the assessment undertaken in activity 7.2, this part of the programme will include the concept of promoting the over-fishing of pejerrey as a means of relieving pressure on native species.

IMMEDIATE OBJECTIVE 3

To establish a framework for the planning, monitoring and evaluation of activities and future investments within the TDPS, from an ecosystem perspective, and for the strengthening of local capacities.

Output 3.1

Participatory management of the TDPS protected areas strengthened through the exchange of management experiences and joint planning exercises and the implementation and operation of the frontier reserves (Aymara Lupaca y Titicaca Mauri).

Activities for output 3.1

3.1.1 Co-ordinate and strengthen the management of protected areas in the TDPS by holding annual workshop with managers and representatives from communities that live in these areas. These events will train participants in participatory management and planning techniques as well as exchange information on experiences and undertake joint planning activities based on the results of information from the monitoring programme (output 3.4) and the biodiversity management plan (output 3.2).

3.1.2 Draw-up a proposal for the new boundaries of Titicaca Reserve that will protect a larger extension of the totora reed habitat. Expedite its approval by submission of the proposal to INRENA with all the required technical support information including community approval gained through consultations

held under this project. Following this, develop a management plan for the Titicaca Reserve.

- 3.1.3 Prepare the final proposal for the Bolivian Managed Reserve Titicaca Mauri through consultations with local communities using the preliminary proposal prepared under the UNEP-OAS project and expedite its official approval coordinating respective Bolivian authorities.
- 3.1.4 Develop management plans for the new frontier areas (*Titicaca Mauri* and *Aymara Lupaca*) using methods that ensure the participation of local communities and stakeholders in the definition and monitoring of activities. The plan should be based on the initial proposal resultant from the UNEP-OAS project and include the definition of (i) final boundaries; (ii) restricted land-use zones and areas that will permit the sustainable management techniques developed through this project; (iii) participatory processes that assure community participation in the management and monitoring of activities; (iv) conflict-resolution strategies; (v) the identification and implementation of priority actions.
- 3.1.5 Mobilize complementary and additional resources for management plan implementation for the National Reserves Titicaca and Ulla Ulla., “Area de Manejo Integrado Titicaca Mauri” y “Area de Manejo Integrado Aymara Lupaca”.

Output 3.2

Biodiversity conservation measures for the basin incorporated into the ALT-Strategic Binational Plan through participatory processes with local stakeholders.

Activities for output 3.2

- 3.2.1 Evaluate key issues related to biodiversity conservation in the TDPS and, through participatory workshops with local stakeholders, formulate a Biodiversity Management Plan (BMP) for the medium and long-term conservation of the biodiversity in the system. This will include guidelines for sectoral investments and a framework to determine their sustainability from an ecosystem perspective. The preparation will include analyses of existing biodiversity-related information and an assessment of the capacity of the main stakeholders (ALT, local governments, NGO's and communities) for biodiversity conservation and management. Information from this assessment will feed into the capacity building programmes of outputs 3.2 and 3.3.
- 3.2.2 Formulate an action plan for the implementation BMP and a strategy to mobilize complementary funds for its execution. The action plan will include the design mechanisms to ensure the permanent up-dating of the plan as information from the pilot projects undertaken at other levels of this project become available and as key baseline initiatives are completed.
- 3.2.3 Revise the Binational Strategic Plan incorporating biodiversity conservation measures from the BMP and establish procedures and pauta for the incorporation of the BMP guidelines into ALT activities and into the overall Binational Strategic Plan (BSP).

- 3.2.4 Strengthen the capacity of ALT for biodiversity conservation within the context of its mandate⁶, by (i) training existing ALT personnel to monitor the implementation of these biodiversity conservation measures in the BSP implementation activities; and (ii) draw -up agreements with relevant biodiversity related institutions to undertake biodiversity conservation activities within the BSP where necessary as the main function of ALT is coordination rather than execution.

Output 3.3

The technical and managerial capacities of local governments strengthened for developing environmental norms and enforcement systems for the conservation and sustainable use of TDSP biodiversity within the framework of national legislation.

Activities for output 3.3

- 3.3.1 Evaluate biodiversity related regulatory frameworks in both countries to detect inconsistencies that will effect the implementation of management programmes defined in this project.
- 3.3.2 Identify possible socio-ethnic barriers to new biodiversity conservation regulations in the TDPS by assessing the present level of income derived from hunting, fishing and gathering practices in traditional communities and the cultural values and perception that are attributed to key species of native fauna
- 3.3.3 Implement a capacity building programme that will strengthen local governments in the development and enforcement of regulations and norms necessary to promote the adoption of habitat and species management techniques and practices defined in this project. This capacity building programme will be based on the capacity assessment undertaken in activity 6.1 and the evaluations in activities 8.1. and 8.2. It will be based on modular courses that incorporate the results of the pilot projects and make use of practical local know-how as far as possible. The courses will include:
- developing local regulatory frameworks and recommendations for the conservation and sustainable-use of TDPS biodiversity within the context of region's socio-economic and cultural conditions and relevant existing national frameworks. This will cover conceptual aspects of regulatory development but will also culminate in specific recommendations for new legal, fiscal and economic measures to strengthen the management of biodiversity at local levels
 - dissemination of the results of the pilot-projects on species and habitat management and implications in terms of regulatory requirements and enforcement systems
 - strengthening enforcement tools, for example, environmental audits and community-control systems
 - strengthening planning and decision-making tools to incorporate biodiversity conservation issues, for example including information on the economic value of peat-bog management in cost-benefit analysis and ToR of EIAs

⁶ Outlined in article 5 of ALT mandate, this includes responsibilities such as setting-up and monitoring water quality standards, promoting technologies for the rational use of natural resources, supporting and promoting the preservation, recuperation, protection and conservation of natural ecosystems.

- mechanisms for the long-term funding of biodiversity conservation activities

Output 3.4

Habitat and endemic species management programmes evaluated and fine-tuned through participatory processes, replication of pilot-projects in different communities and the establishment of monitoring programmes in areas of outstanding and/or highly vulnerable biodiversity.

Activities for output 3.4

- 3.4.1 Undertake a participatory mid-term evaluation of the results of pilot projects for habitat and species management in a workshop with community representatives, project executors and local governments. During this workshop communities and projects will be selected for replication to test, evaluate and fine-tune techniques before recommendations are made for the wide-scale adoption of programmes.
- 3.4.2 Replicate the pilot-projects selected to test and fine-tune management recommendations using community protagonists and horizontal exchange as the most cost-effective and culturally sensitive means of transferring expertise.
- 3.4.3 Set-up a monitoring programme for the three key habitats and species targeted in this project to provide vital information for the evaluation of management techniques proposed through the pilot studies, and as a verification source for performance indicators. This will include the monitoring of water-quality by ALT in areas of extreme vulnerability. The monitoring activities will take into account the evaluation of environmental laboratory capacities and norms for water quality monitoring from the World Bank project in Boliva as well as the environmental protection regulatory frameworks that are being strengthened through the USAID project in Perú and the IDB-MDSMA project in Bolivia.
- 3.4.4 In the last semester of the project design and undertake a sample survey of lakeside and rural communities to evaluate the success of project activities using performance indicators defined in the project planning matrix.

E. INPUTS.

1 Country inputs (Peru-Bolivia)

<i>I. Binational Contribution in kind (Governments of Bolivia and Peru)</i>	
1. Personnel	
• ALT Environment President	US\$ 120,000
• Experts	US\$ 52,000
• Support personnel	US\$ 9,000
2. Operatives expenses and office	
• Office and maintenance	US\$ 24,000
• Operational expenses	US\$ 29,400
3. Administrative expenses	
• Administrative expenses	US\$ 42,000
•	
<i>SUB-TOTAL ALT</i>	<i>US\$ 276,400</i>
<i>II. Contribution in kind from the Government of Peru</i>	
PELT	
1. Personnel	
• PELT Director	US\$ 48,000
• Experts	US\$ 106,000
• Support personnel	US\$ 9,000
2. Operational expenses and office	
• Office and maintenance	US\$ 110,000
• Operational expenses	US\$ 25,000
3. Administrative expenses	
• Administrative expenses	US\$ 42,000
Instituto Nacional de Recursos Naturales (INRENA)	
• Equipment and supplies	US\$ 20,000
• Experts	US\$ 20,000
<i>SUB-TOTAL PERU</i>	<i>US\$ 380,000</i>
<i>III. Contribution in kind from the Government of Bolivia</i>	
ALT Operational Unit in La Paz	
• Unit Chief	US\$ 40,000
Dirección Nacional de Conservación de la Biodiversidad (DNCB)	
• Equipment and supplies	US\$ 100,000

Centro de Investigación y Desarrollo Pesquero del Altiplano (CIDPA)	
• Equipment and supplies	US\$ 200,000
• Experts	US\$ 5,000
SUB-TOTAL BOLIVIA	US\$ 370,000
TOTAL GOVERNMENT'S (BOLIVIA AND PERU)	US\$ 1,026,400
IV. Contribution in kind form the Universities and NGOs	
<u>BOLIVIA</u>	
Instituto de Ecología, Universidad Mayor de San Andrés	
• Laboratory, equipment and supplies	US\$ 140,000
• Experts	US\$ 18,000
Programa de Bosques Nativos Andinos (PROBONA)	
• Equipment and supplies	US\$ 20,000
• Experts	US\$ 5,000
Asociación Boliviana para la Conservación (TROPICO)	
• Equipment and supplies	US\$ 24,000
• Experts	US\$ 12,000
SUB-TOTAL	US\$ 219,000
<u>PERU</u>	
Universidad Nacional del Altiplano	
• Equipment and supplies	US\$ 120,000
• Experts	US\$ 15,000
Asociación Peruana para la Conservación de la Naturaleza (APECO)	
• Equipment and supplies	US\$ 10,000
• Experts	US\$ 24,000
Centro de Datos para la Conservación (CDC-Peru)	
• Equipment and supplies	US\$ 20,000
• Experts	US\$ 5,000
Consejo Andino de Manejo Ecológico (CAME)	
• Equipment and supplies	US\$ 10,000
• Experts	US\$ 5,000
SUB-TOTAL	US\$ 209,000
TOTAL	
UNIVERSITIES AND NGO's (BOLIVIA AND PERU)	US\$ 428,000

2. GEF/UNDP inputs⁷

<i>I. Sustainable management plans for three key habitats that will be adopted by the rural inhabitants of the TDPS.</i>	
<ul style="list-style-type: none"> • A community management programme for totora-reed habitats defined and implemented including projects for craft-use, integrated water decontamination and livestock fodder use, and reproduction sites for native fish species. 	US\$ 520.000
<ul style="list-style-type: none"> • Sustainable management techniques for thola-bush habitats defined and disseminated in rural communities and local governments. 	US\$ 310.000
<ul style="list-style-type: none"> • The economic value of bofedal peat-bogs demonstrated through pilot management projects and awareness campaigns for small-scale producers and local decision-makers. 	US\$ 333.000
<i>II. Manage native species according to technical basis and commercialize them following sustainable harvesting plans.</i>	
<ul style="list-style-type: none"> • Techniques for the rearing and sustainable commercial exploitation of three threatened endemic native species (suri, pisaca and giant lake frog) demonstrated through pilot projects in protected areas. 	US\$ 345.000
<ul style="list-style-type: none"> • Artisan fishing capacity-building programme defined and implemented to strengthen the conservation of native fish species 	US\$ 270.000
<i>III. Framework for the planning, monitoring and evaluation of activities established and future investments within the TDPS, from an ecosystem perspective, and for the strengthening of local capacities.</i>	
<ul style="list-style-type: none"> • Participatory management of the TDPS protected areas strengthened through the exchange of management experiences and joint planning exercises and the implementation and operation of the frontier reserves (Aymara Lupaca y Titicaca Mauri). 	US\$ 270.000
<ul style="list-style-type: none"> • Biodiversity conservation measures for the basin incorporated into the ALT-Strategic Binational Plan through participatory processes with local stakeholders. 	US\$ 122.000
<ul style="list-style-type: none"> • The technical and managerial capacities of local governments strengthened for developing environmental norms and enforcement systems for the conservation and sustainable use of TDSP biodiversity within the framework of national legislation. 	US\$ 210.000
<ul style="list-style-type: none"> • Habitat and endemic species management programmes evaluated and fine-tuned through participatory processes, replication of pilot-projects in different communities and the establishment of monitoring programmes in areas of outstanding and/or highly vulnerable biodiversity. 	US\$ 520.000
<i>IV. Project Management and evaluation</i>	US\$ 984.295

⁷ From the total budget of US\$ 4 million, the GEF inputs correspond to US\$ 3.11 million.

F. RISKS

1 Project implementation modality

The project will be implemented through subcontracts/agreements with different governmental and non-governmental institutions. This modality will undoubtedly impart benefits to the project, however, it may also present a degree of risk to implementation in two aspects. The first is associated with the institutional capacity of the entities that will execute specific activities through sub-contracts. If the capacity to fully execute the respective contract is lacking, overall project implementation will be affected. This risk will be minimized by undertaking an extensive analysis of the capacity of each institution as a prerequisite to signing any sub-contract/agreement. This evaluation will include the institutional record of the previous five years noting projects undertaken, the evaluations of these, amounts of resources involved, actual resources under execution, staff-profile, infrastructure and equipment. The second is associated with the technical and administrative monitoring of sub-contracts (expected to be at least 16) in different locations and covering a variety of activities. Effective monitoring will require strong co-ordination by highly qualified project coordinators as well as clear ToRs for each sub-contract. The already strong coordination role played by ALT (see implementing arrangements) will facilitate this task. In addition, a pre-implementation workshop will be held at the start of the project to review project activities with implementing institutions and stakeholders and to define and finalize specific co-ordination and communication mechanisms.

2. Establishment of proposed protected areas

The project will undertake the technical studies and consultations necessary to support the formation of the proposed protected areas on the Bolivia-Perú frontier that will constitute a Binational Reserve. However, while the project will support the process of making this Reserve official, the final declaration falls under the responsibility of the respective national authorities and goes beyond the scope of the project. If there are any changes or delays in the official declaration of the reserve for diverse reasons, such as modifications in national priorities and policies and conflicting sectoral interests, some of the objectives of the project may be adversely effected. This risk will be minimized by the fact that the project's Management Committee will have as members the institutions responsible for national policies for biodiversity conservation, and it will closely follow the development of the proposals and the results of the project as a whole.

3. Creating unrealistic expectations

The execution of internationally funded projects can create expectations in the inhabitants of the project area that are not always realistic, for example, the expectation of subsidies and payment for social work. In view of this, the project should avoid offering benefits, subsidies or incentives that cannot be fulfilled, or undertaking activities that do not strictly fall under the project objectives or are incompatible with them. Once again, the proposed project pre-implementation workshop will ensure that no false expectations are raised and corroborate previous agreements reached during the project's numerous preparatory consultations.

G. PRIOR OBLIGATIONS AND PREREQUISITES

The present document establishes the actions that will be undertaken both by the government and the executing entities. There are no previous obligations or prerequisites that impedes UNDP from signing the project document and offering project assistance. During the first months of project operation, the administrative structure of responsibility and authority should be fully defined and sent by ALT to UNDP for the corresponding registration of signatures.

H. PROJECT REVIEWS, REPORTING AND EVALUATION

The project will be subject to an annual tripartite evaluation in which representatives of the government, the national executing agencies, and UNDP will participate. The director of the project shall submit a project progress report for this evaluation. During the execution of the project the parties can request other technical and progress reports as considered necessary. In addition, periodic monitoring by UNDP-GEF will be undertaken as well as an external evaluation at the end of the third year of execution. At the end of the project, the project co-ordinator shall prepare a final project report for the final tripartite evaluation. The draft of this report should be prepared at least three months before the tripartite meeting to allow the parties time to examine and adjust technical aspects.

The national executing agencies indicated on the cover page of this document have been delegated by the government coordinating authority to undertake this project and consequently follow the United Nations procedures for financial and accounting reports (see United Nations Programme and Project Manual (PPM) section 30503.5), and auditing requirements (see PPM section 30503.6).

At the end of the third and fifth year, evaluation workshops will be undertaken with the participation of all the stakeholders involved in the TDPS, in order to modify the different activities if necessary.

The project will be submitted to an audit following UNDP norms, the first trimester of the following year. For this, the project should keep detailed accounts, according to the UNDP financial execution manual, and present a report with the financial reports of the implementing agencies and other elements of the project.

At the end of the project a general external audit based on UNDP norms will be undertaken.

I. LEGAL CONTEXT

The present project document will be the instrument referred to in article 1 of the contract of the Basic Agreement of Assistance between UNDP and the Governments of Bolivia and Perú, signed on October 31st 1974 and 30 March 1956 respectively. The following types of revision to the present Project Document can be made with the signature of the Resident Representative of UNDP if it is clear that the other signatories have no objections to the proposed changes: Revisions of, or additions to, any of the project annexes: Revisions that do not imply significant changes to the immediate objectives, the outputs or activities of the project but are a result of an agreed redistribution of inputs or increase in spending as a result of inflation or other causes; Annual compulsory revisions through which the agreed resources are allocated to the project or if the costs change as a result of inflation.

J. BUDGET

DESCRIPTION	TOTAL		YEARS													
	1-5		1998	1999	2000	2001	2002									
	m/m	m/m	m/m	m/m	m/m	m/m	m/m	m/m	m/m	m/m	m/m					
PERSONNEL																
10 Administrative staff	60	72,000	12	14,400	12	14,400	12	14,400	12	14,400	12	14,400	12	14,400	12	14,400
13.01 Bolivian accountant	60	72,000	12	14,400	12	14,400	12	14,400	12	14,400	12	14,400	12	14,400	12	14,400
13.02 Peruvian accountant	60	30,000	12	6,000	12	6,000	12	6,000	12	6,000	12	6,000	12	6,000	12	6,000
13.03 Bolivian secretary	60	30,000	12	6,000	12	6,000	12	6,000	12	6,000	12	6,000	12	6,000	12	6,000
13.04 Peruvian secretary	60	30,000	12	6,000	12	6,000	12	6,000	12	6,000	12	6,000	12	6,000	12	6,000
13.05 Bolivian driver	60	30,000	12	6,000	12	6,000	12	6,000	12	6,000	12	6,000	12	6,000	12	6,000
13.06 Peruvian driver	60	30,000	12	6,000	12	6,000	12	6,000	12	6,000	12	6,000	12	6,000	12	6,000
15 Official trips																
15.01 Official trips		25,000		5,000		5,000		5,000		5,000		5,000		5,000		5,000
16 Missions																
16.01 External evaluation missions		20,000		0		0		0		0		0		0		0
17 National consultants																
17.01 Bolivian project manager	60	168,000	12	33,600	12	33,600	12	33,600	12	33,600	12	33,600	12	33,600	12	33,600
17.02 Peruvian project manager	60	168,000	12	33,600	12	33,600	12	33,600	12	33,600	12	33,600	12	33,600	12	33,600
17.03 To prepare a fund raising strategy for the basin protected areas	3	9,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17.04 To prepare an action plan and fund raising strategy for the BMP	3	9,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17.05 To revise the Binational Strategic Plan incorporating the concepts of the BMP	3	9,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17.06 To strengthen the capacity of the ALT for biodiversity conservation	10	30,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17.07 To evaluate biodiversity related regulatory frameworks in both countries	10	30,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17.08 To identify possible social barriers to new biodiversity conservation regulations	10	30,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17.09 Audits	10	25,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL PERSONNEL		787,000		130,000		130,000		130,000		130,000		130,000		130,000		130,000
SUBCONTRACTING																
20 Subcontract																
21.01 Subcontract for totora/reed evaluation in Bolivia		10,000		10,000		0		0		0		0		0		0
21.02 Subcontract for totora/reed evaluation in Peru		10,000		10,000		0		0		0		0		0		0
21.03 Subcontract for totora harvesting techniques		120,000		60,000		60,000		0		0		0		0		0
21.04 Subcontract for totora community planting		100,000		0		0		0		0		0		0		0
21.05 Subcontract for fishing programmes in totora-reeds		100,000		0		0		0		0		0		0		0
21.06 Subcontract to test totora-reed for decontaminating		120,000		0		0		0		0		0		0		0
21.07 Sc to study thola bush carrying capacity for sheep		100,000		25,000		50,000		50,000		25,000		0		0		0
21.08 Sc to study thola bush carrying capacity for camelids		100,000		25,000		50,000		50,000		25,000		0		0		0
21.09 Sc to develop guidelines for thola management		26,666		0		0		0		0		0		0		0
21.10 Sc to disseminate thola management guidelines		30,000		0		0		0		0		0		0		0
21.11 Sc to study peat bogs carrying capacity		50,000		50,000		0		0		0		0		0		0
21.12 Sc for peat bogs characterisation		75,000		75,000		0		0		0		0		0		0
21.13 Sc for demonstration projects of alpaca rearing in peat bog areas		50,000		12,500		37,500		0		0		0		0		0
21.14 Sc to replicate alpaca rearing projects		60,000		0		0		0		0		0		0		0
21.15 Sc to determine the economic value of peat bogs		20,000		0		0		0		0		0		0		0
21.16 Sc to incorporate peat bog results in local programmes		48,000		0		0		0		0		0		0		0
21.17 Sc to promote peat bog management with alpaca rearing		30,000		0		0		0		0		0		0		0
21.18 Sc to evaluate the information available on the suri, pisaca and giant lake frog		10,000		10,000		0		0		0		0		0		0
21.19 Sc for demonstration projects of suri rearing in Peru		70,000		20,000		43,000		43,000		20,000		0		0		0
21.20 Sc for demonstration projects of pisaca rearing in Bolivia		70,000		20,000		43,000		43,000		20,000		0		0		0
21.22 Sc for the evaluation of giant frog populations		100,000		50,000		50,000		50,000		50,000		0		0		0
TOTAL PERSONNEL		158,000		199,000		158,000		158,000		158,000		158,000		158,000		158,000
TOTAL		145,000		145,000		145,000		145,000		145,000		145,000		145,000		145,000

ANNEX 1: Workplan

IMMEDIATE OBJECTIVE OUTPUT ACTIVITY	YEAR														
	1			2			3			4			5		
	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3
1.3.3. Implement community alpaca rearing management demonstration projects in the peat-bog areas of the Ulla Ulla Reserve to test and fine-tune the Peruvian-based carrying-capacity evaluations															
1.3.4. Replicate peat-bog alpaca rearing projects in other communities selected through the participatory mid-term evaluation (output 9)															
1.3.5. Determine the economic value of peat-bogs in terms of their critical role in primary production and water storage															
1.3.6. Incorporate the results of the carrying-capacity projects and economic valuation studies in the capacity-building programme for local governments (output 8)															
1.3.7. Promote peat-bog management with alpaca rearing as an alternative source of income for local communities in the Titicaca basin through awareness campaigns for rural inhabitants and by incorporation into management plans for protected areas															
IMMEDIATE OBJECTIVE 2: Techniques for the rearing and sustainable commercial exploitation of three threatened endemic native species (suri, pisaca and giant lake frog) demonstrated through pilot projects in protected areas.															
Output 2.1															
Techniques for the rearing and sustainable commercial exploitation of three threatened endemic native species (suri, pisaca and giant lake frog) demonstrated through pilot projects in protected areas															
2.1.1 Evaluate the information available on the biology, ecology and on the state of conservation of these species															
2.1.2 Implement community demonstration projects for the rearing and commercial exploitation of the suri in Peru, evaluate them and make recommendations for management															
2.1.3 Implement community demonstration projects for the rearing and commercial exploitation of the pisaca in Bolivia, evaluate them and make recommendations for management															
2.1.4 Determine the most suitable conditions for harvesting the giant frog from the wild, from semi-captivity or from captivity															
2.1.5 Evaluate the populations of the giant lake frog in selected sites and implement demonstration projects for harvesting programmes in semi-captivity and in the wild															
Output 2.2															
Artisan fishing capacity-building programme defined and implemented to strengthen the conservation of native fish species															
2.2.1. Implement the first part of a capacity-building programme in artisan fishing communities to promote fishing practices that are compatible with biodiversity conservation															
2.2.2. Assess the potential of promoting the over-fishing of the introduced species pejerrey as part of a recovery programme for native fish species. This will be achieved by population dynamics assessments in Lake Arapa to clarify specific															
2.2.3. Implement the second part of the fishing capacity-building programme that will include the dissemination of the results of pilot projects undertaken in different levels of this project to provide alternative income to artisan fishers															

ANNEX 1: Workplan

IMMEDIATE OBJECTIVE OUTPUT ACTIVITY	YEAR																			
	1				2				3				4				5			
	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4
3.3.1. Evaluate biodiversity related regulatory frameworks in both countries to detect inconsistencies that will affect the implementation of management programmes defined in this project																				
3.3.2. Identify possible socio-ethnic barriers to new biodiversity conservation regulations in the IDPS by assessing the present level of income derived from hunting, fishing and gathering practices in traditional communities and the cultural values																				
3.3.3. Implement a capacity building programme that will strengthen local governments in the development and enforcement of regulations and norms necessary to promote the adoption of habitat and species management techniques and practices																				
Output 3.4																				
Habitat and endemic species management programmes evaluated and fine-tuned through participatory processes, replication of pilot-projects in different communities and the establishment of monitoring programmes in areas of outstanding and/or highly vane																				
3.4.1. Undertake a participatory mid-term evaluation of the results of pilot projects for habitat and species management in a workshop with community representatives, project executors and local governments.																				
3.4.2. Replicate the pilot-projects selected to test and fine-tune management recommendations using community protagonists and horizontal exchange as the most cost-effective and culturally sensitive means of transferring expertise																				
3.4.3. Set-up a monitoring programme for the three key habitats and species targeted in this project to provide vital information for the evaluation of management techniques proposed through the pilot studies.																				
3.4.4. In the last semester of the project design and undertake a sample survey of lakeside and rural communities to evaluate the success of project activities using performance indicators defined in the project planning matrix																				
PROJECT ORGANISATION AND EVALUATION																				
Organisation and contracts																				
Annual evaluations																				
Mid-term evaluation																				
Annual audits																				
Implementation workshops with stakeholders																				

ANNEX 2: Project Planning Matrix

Project Strategy	Objectively Verifiable Indicators	Verification Source	Important Assumptions
<p><u>DEVELOPMENT OBJECTIVE</u></p> <p>The conservation of globally important biodiversity in the TDPS has been achieved through the wide-scale application of sustainable practices for water and biological resource use.</p> <p><u>PROJECT PURPOSE</u></p> <p>Rural inhabitants of the TDPS Basin have adopted sustainable management techniques for three key habitats (totora-reed, thola-bush, bofedal peat-bog), and three threatened endemic species (Suri, pisaca and the giant lake frog), and a framework exists for evaluating the future investments from an ecosystem perspective.</p>	<ol style="list-style-type: none"> At the end of the project 20% of peat-bogs are under sustainable management and the total area covered by these bogs is not less than at the start of the project. 20% of rural inhabitants have adopted new management techniques for key habitats and threatened species 100% of ToR of E.I.A. include aspects relating to biodiversity conservation and the value of key habitats. 	<ol style="list-style-type: none"> Report of the monitoring programme to be set up in this project (output 9) Sample survey of rural inhabitants ToR of EIA in relevant institutions 	<ol style="list-style-type: none"> The population size of threatened species and areas of critical habitats are viable for sustainable management Key projects described in baseline activities have been implemented, especially sewage treatment in the main lakeside urban centres and national programmes to strengthen environmental management in both countries EIA of Lake Titicaca water regulation works have been finished and approved

Project Strategy	Objectively Verifiable Indicators	Verification Source	Important Assumptions
<p>IMMEDIATE OBJECTIVE 1 To develop sustainable management plans for three key habitats (totora-reed, thola-bush, bofedal peat-bog) that will be adopted by the rural inhabitants of the TDPS.</p> <p>OUTPUTS</p> <p>1.1 A community management programme for totora reed habitats defined and implemented including projects for craft-use, integrated use in water decontamination/livestock fodder use, and reproduction sites for native fish species.</p> <p>1.2 Sustainable management techniques for thola bush habitats defined and disseminated in rural communities and in local governments</p>	<p>1.1.1 At the end of the project the area of totora reed habitat is at the same level as, or greater than, at start of project</p> <p>1.1.2 By the end of the project, at least 10% of lakeside communities have adopted sustainable practices for totora management</p> <p>1.2.1 At the end of the fourth year the carrying capacity of thola bush habitats has been calculated for selected introduced and native species</p> <p>1.2.2 At the end of the fourth year 80% of radio stations with rural programmes have disseminated information on management techniques of thola with native livestock species.</p>	<p>1.1.1 Report on initial levels of totora reed habitat and final report of monitoring</p> <p>1.1.2 Survey of lake side communities</p> <p>1.1.3 Intermediate monitoring reports and project reports</p> <p>1.2.1 Project progress reports</p> <p>1.2.2 programme schedules and reports from local radio channels</p> <p>1.2.3 Survey of rural trainers</p>	<p>a) National policies in biodiversity conservation remain within the framework of international agreements and conventions.</p> <p>b) Ministries responsible for agriculture and livestock programmes in Peru and Bolivia do not adopt new measures that stimulate practices contrary to biodiversity conservation</p> <p>c) Funds for recurrent costs of administration and control remains available in the protected areas in which the project undertakes direct action</p> <p>d) Bilateral relations of Bolivia and Peru for the joint management of the Lake Titicaca continue as strong and positive as at the start of the project</p>

Project Strategy	Objectively Verifiable Indicators	Verification Source	Important Assumptions
<p>1.3 The economic value of bofedal peat-bogs demonstrated through pilot management projects and awareness campaigns for small-scale producers and local decision makers</p>	<p>1.2.3 At the end of the project 60 % of the production extension workers that work with NGOs in the basin have been informed on the techniques and potential of native livestock species management in thola habitats.</p> <p>1.3.1 At the end of the project the number of peat-bogs under management with alpaca has increased by at least 10%</p> <p>1.3.2 Estimates of the economic value of peat-bogs are being incorporated in cost-benefit analysis and EIA for infrastructure and irrigation projects in areas that include bog habitats.</p>	<p>1.3.1 Relevant Ministerial reports</p> <p>1.3.2 Information from the departments charged with the evaluation of EIA and ToRs of de EIAs</p>	

Project Strategy	Objectively Verifiable Indicators	Verification Source	Important Assumptions
<p>IMMEDIATE OBJECTIVE 2 To manage native species (suri, pisaca, giant lake frog and native fish) according to technical basis and commercialise them following sustainable harvesting plans.</p>			
<p>OUTPUTS 2.1 Techniques for the rearing and sustainable commercial exploitation of three threatened endemic native species (suri, pisaca and giant lake frog) demonstrated through pilot projects in protected areas.</p>	<p>2.1.1 Management projects of suri, pisaca and frog have been implemented in at least two protected areas by the end of the third year of the project.</p>	<p>2.1.1 Project reports</p>	
<p>2.2 Artisan fishing capacity-building programme defined and implemented to strengthen the conservation of native fish species</p>	<p>2.1.2 At the end of the project 40% of fishers know how to differentiate between native fish species including juvenile forms and understand the concepts and periods of close seasons.</p>	<p>2.1.2 Survey of fishing communities (part of lakeside community survey)</p>	

Project Strategy	Objectively Verifiable Indicators	Verification Source	Important Assumptions
<p>IMMEDIATE OBJECTIVE 3 To establish a framework for the planning, monitoring and evaluation of activities and future investments within the TDPS, from an ecosystem perspective, and for the strengthening of local capacities.</p> <p>OUTPUTS</p> <p>3.1 Participatory management of the TDPS protected areas strengthened through the exchange of management experiences and joint planning exercises and the implementation and operation of the frontier reserves (Aymara Lupaca y Titicaca Mauri)</p> <p>3.2 Biodiversity conservation measures for the basin incorporated into the ALT-Strategic Binacional Plan through participatory processes with local stakeholders.</p>	<p>3.1.1 At the end of the project all the protected areas in the TDPS have management committees with representatives from local communities, governments and NGOs</p> <p>3.1.2 By the end of the second year of the project all protected areas operational plans include activities for co-ordination with the other protected areas of the basin</p> <p>3.2.1 At the end of the third year of the project the environmental authorities of both countries have adopted a Biodiversity Management Plan for conservation of critical habitats and species and sectoral activities.</p>	<p>3.1.1 Protected areas legal and operational documents and reports.</p> <p>3.2.1 Biodiversity Management Plan Document and letters of approval</p> <p>3.2.2 Participation lists of planning and formulation workshops for the BMP</p> <p>3.2.3 Operational plans for the implementation of the new version of the Strategic Binacional Plan</p>	

Project Strategy	Objectively Verifiable Indicators	Verification Source	Important Assumptions
<p>3.3 Local governments capacity for developing environmental norms and enforcement systems strengthened for the conservation and sustainable use of biodiversity within the framework of national legislation.</p>	<p>3.2.1 80 % of those invited have participated in the first workshop for formulation of the BMP and 60% of these have continued to participate in subsequent workshops.</p> <p>3.2.1 From the end of the fourth year all implementation activities of the Binacional Strategic Plan include measures for the biodiversity conservation based on the BMP</p> <p>3.3.1 30% of Local governments have adopted new norms or set up enforcement systems for conservation of biodiversity</p> <p>3.3.2 At the end of the project 20% of the reports of damages to key habitats have had action taken by local governments.</p> <p>3.3.3 At the end of the project 80 % of participants in training activities consider that these will strengthen municipal capacities for developing regulations and enforcement systems for biodiversity conservation</p>	<p>3.3.1 Official register of local government norms and reports on capacity building programmes submitted by the local governments</p> <p>3.3.2 Local government reports</p> <p>3.3.3 Evaluations of training activities and seminars.</p>	

Project Strategy	Objectively Verifiable Indicators	Verification Source	Important Assumptions
<p>3.4 Habitat and endemic species management programmes evaluated and fine-tuned through participatory processes, replication of pilot-projects in different communities and the establishment of monitoring programmes.</p>	<p>3.4.1 At the end of the third year criteria for the selection of projects and communities for replication of management programmes have been defined through participatory workshops.</p> <p>3.4.2 .At the end of the project at least 4 projects will have been replicated through the basin.</p> <p>3.4.3 Specific recommendations for wide-scale adoption of management programmes throughout the basin will be made.</p>	<p>3.4.1 Report of participatory evaluation workshop</p> <p>3.4.2 Project reports</p> <p>3.4.3 Project reports</p>	

ANNEX 3

BIODIVERSITY CONSERVATION OF THE TITICACA-DESAGUADERO-POOPO-SALAR DE COIPASA (TDPS) WATERBASIN

Incremental Costs Analysis

A. PROJECT BACKGROUND

The Titicaca-Desaguadero-Poopo-Salar de Coipasa Water Basin (TDPS) sits astride the Andean altiplano of two countries: Bolivia and Peru. This unique endorheic system houses outstanding aquatic and terrestrial biodiversity with numerous endemic species as well as globally threatened and endangered species including the well known condor, vicuna and guanaco. The aquatic biodiversity is under threat from introduction of exotic species and overfishing, suffers from water pollution especially from untreated sewage at specific locations of the TDPS, and sedimentation resulting from near and upland economic activities. The montane terrestrial biodiversity is pressured by inappropriate land-use practices, and overgrazing.

The governments of Peru and Bolivia have developed a Binational Strategic Plan (BSP) to provide for the control, conservation and adequate use of the various resources of the TDPS, in view of the joint and individual use of such resources by the two countries. The focus of the BSP is very much in line with national and binational priorities, especially to address the problem of extreme climatological events associated with droughts and floods through improved management of hydrological resources in the TDPS, without negatively affecting the ecology of the lakes. The Plan provides for flood prevention and provision of irrigation facilities to improve agriculture and livestock production and has hydrobiological, social and environmental programs. However, the Plan does not seek explicitly to rehabilitate and restore the unique biological resources of the Basin.

The aim of the project here is to help save and conserve the unique and threatened freshwater and montane biodiversity at the TDPS by facilitating the inclusion of specific biodiversity conservation measures as well as supporting a regulatory framework and complement measures towards the installation of institutional capacities which are presently either insufficient or conflicting.

The incremental costs of this project are \$ 4.0 million, the GEF grant requested is for \$ 3.11 million. The remainder is to be co-financed.

B. INCREMENTAL COST ANALYSIS

1. Broad Development Goals

1.1 Since 1990 Bolivia and Peru have formalized their commitment towards biodiversity conservation and Protected Area management. In 1990, Bolivia created the National Environment Fund and in 1992 an Environmental Law was enacted following which the Ministry of Sustainable Development and Natural Resources, Environment Secretariat and the National Biodiversity Conservation Directorate were also installed. A Biodiversity Conservation law that would provide a stronger and clearer legal framework for the management and control of the National System of Protected Areas is currently under review. Presently there are six protected areas within the TDPS, of which only two are legally established and operational.

1.2 Likewise in Peru, conservation has taken an increasingly important position in government priorities. In 1990, the Environmental Statute was enacted, and there is presently a proposal for a Forestry and Wildlife Law. Institutionally, the main responsibility for biodiversity conservation falls upon the National Institute for Natural Resources. Despite these advances many of the protected areas remain

insufficiently funded at the operational level. Within the TDPS of Peru, there is only one Protected Area, and another newly declared one.

1.3 Beyond the system of protected areas, a major initiative by the two governments within the TDPS region is that of the formulation of the Binational Strategic Plan (BSP). The final plan, entitled "Binational Strategic Plan for Flood Protection and Prevention and Exploitation of TDPS Resources" was completed in 1995 and approved by the two governments. This Plan is to provide a comprehensive framework for future development of the region.

2. Global Biodiversity Objective

2.1 The biodiversity significance of the TDPS is described in the project document (Section B.1 and B.2). Here we provide a brief overview and highlight the issues of importance.

2.2 By world standards, TDPS is not a region of extremely high levels of biological diversity. However, it is important because of its environmental uniqueness, its binational location and its importance to the Andean mountain culture and ecosystem. In a conservation assessment of the terrestrial ecoregions of Latin America and the Caribbean, this ecoregion of montane grasslands, termed the Central Andean puna, was accorded a Level I rating. This implies that it should be accorded the highest priority at a regional scale. This unique system houses globally outstanding terrestrial and endangered species including the well-known Andean condor (*Vultur gryphus*), vicuna (*Vicugna vicugna*) and guanaco (*Lama guanicoe*).

2.3 The above terrestrial assessment, however, did not take water bodies into consideration. The lakes and lagoons of the TDPS form a unique endorheic waterbasin encompassing 143,900 km² in the Andean altiplano. The specialized and unique conditions of Lake Titicaca with their low water temperatures and oxygen content, high radiation and daily range of temperature has resulted in a high degree of endemism. The area of highest aquatic biodiversity is Lake Titicaca itself. One hundred percent of the sponges, 91% of the amphipods, 88% of the fish, 62% of the molluscs, 32% of the aquatic insects and 29% of the amphibians associated with the lake are endemic. Specifically, the deep waters of the more than one million years old Lake Titicaca harbor two endemic genera of fish *Orestes* (boga and karachi) and *Trichomycterus* (mauri and suche), and the famous giant lake frog, huankela (*Telmatobius culeus*) which are especially threatened. There are forty species of birds, fifteen of which are endemic to TDPS, and there also are a variety of migratory species which use the lake as a critical feeding and resting point in their migratory routes. Among the threatened or endangered species are two species of flamenco (*Flamenco jamesi* and *F. andino*), suri (*Pterocnemia pennata*), the Lake Titicaca short-winged-duck (*Rollandia microptera*) and the Andean condor.

2.4 In terms of flora, three macrophytes are endemic to the lake ecosystem (*Elodea potamogeton*, *Myriophyllum elatinoides* and *Lilaeopsis andina*). The emergent water reed "totora" (*Schoenoplectus tatora*), is dominant in the shallow waters of the lake, and plays a critical role within the lake's ecosystem, providing food and breeding habitat at some point of their life cycle for many native fish and birds. It also protects the shoreline from the action of destructive waves. This reed has held a key position in traditional communities for centuries and is still used in the area by traditional and local communities for livestock fodder, handicrafts, boats, fuel and general domestic use.

2.5 This unique biodiversity at the TDPS is increasingly under threat, and these threats are described in a fair amount of detail in the Project document (Section B, 2). Table 1 summarizes the main threats to this biodiversity, and classifies the threats as proximate, intermediate and causal. In general, terrestrial biodiversity is pressurized by inappropriate land-use practices, and overgrazing by introduced species (cattle and sheep) resulting in loss of vegetation cover and soil erosion. Aquatic biodiversity is being lost as a result of the introduction of exotic species of fish into lakes and rivers, overfishing, and overharvest of some critical aquatic vegetation (such as the totora and llachu).

2.6 Water pollution is not yet a widespread problem. However, untreated sewage and sediments from soil erosion in near-shore and upland areas threaten specific areas along the lakeside (e.g. Puno). This has

the effect of upsetting the biological balance and also increases the danger of pathogen and parasite transmissions, though the fish, aquatic vegetation and water which may be abstracted from this part of the lake. The subsequent eutrophication of this part of the lake would have adverse impacts on the ecology of the lake. Other areas, such as Lake Poopo and Uru-uru suffer from physical and chemical pollution (from mining etc.) which must be addressed through the BSP.

2.7 Although information on the flora-fauna (plankton, benthos, fish) relationships in the Lake is not known to the same level of detail as the physical operation of the Lake (sedimentation, primary productivity), it has been pointed out that the reduction in the extent of totora, *llachu*, and cattail (main vegetal associations in the lake) have had adverse impacts on the fish and avifauna. The reed banks on the Peruvian side have shrank from about 60,000 ha to 40,000 ha between 1970 and 1992. All of these pressures operating through the various threats are exacerbated by weak institutional capacities for biodiversity conservation and management in the countries and insufficient or conflicting regulatory frameworks.

2.8 The initiatives to conserve biodiversity or to give it importance, in both Peru and Bolivia, are fairly recent (as described under the 'broad development goals'), whilst the threats to biodiversity and the environment in general have been ongoing over the years. Unless these threats, and the trends of these threats are contained and reversed, some of the unique biodiversity will be irretrievably lost. This will be a loss to the global community. It will also represent a lost opportunity for the locals, because quite a few of these species could be sustainably used and managed once the species' are restored to stable biological levels.

3. Baseline

3.1 Agriculture and livestock rearing are the principal sources of income within the TDPS. Cattle and sheep rearing use the aquatic 'totora' reed for fattening: this is a principle economic activity. Fishing constitutes a less important economic activity in the TDPS. It is mainly based on small-scale fishing previously using traditional capture techniques but increasingly relying on more predatory methods such as drag nets. The impact of traditional fishing as currently practiced is destructive because it is largely confined to the near shore 'totora beds' which are important nursery and feeding habitat for the young fry.

3.2 The productive activities of the TDPS are severely limited by the harsh climatic conditions: the dry cyclones, floods and frost impose a seasonal characteristic on agricultural activities. These events put a great toll on the harvest of natural resources. It is important, however, to bear in mind that although the droughts and floods are linked to the natural rainfall and water-flow patterns, they are considerably exacerbated by imbalances caused by the diminished regulating capacity of the basins resulting from bad land use and the inappropriate location of productive activities and infrastructure over time. Recognizing these constraints, the governments of Peru and Bolivia developed the BSP with an emphasis on the management of the hydrological resources in the Titicaca Basin. The BSP is critical in defining the baseline situation in the TDPS, as it provides important information on the state of affairs at the moment.

3.3 One of the principal conclusions of the Plan is that *only 20m³/sec of water from Lake Titicaca can be exploited for economic-productive uses, if the long term balance and ecology of the lake systems is to be assured*. Preliminary studies have revealed that the potential water demand is four times greater than the available water, suggesting an important and urgent need for long-term planning of all hydrologically related projects. Thus the principal limit on the exploitation of the water resources will not be a lack of water in the basin *per se*, but the restriction imposed by this limit.

3.4 The BSP sets out a framework for sectoral development in the region and includes a broad portfolio of projects and programs focuses on the basin's hydrological resources for flood prevention and irrigation as well as infrastructure development, environmental, social and hydrobiological programs. The environment program is currently being detailed through a UNEP-OAS study which is addressing the following components: (i) erosion and soil conservation, (ii) control of water pollution, (iii) control of river

sedimentation and (iv) creation of protected areas. The investment needs of this program have not yet been estimated.

3.5 The hydrobiological management program of the BSP has two main components: (i) program for sustainable development of fishing (including the extraction, evaluation of biomass, protection, protection of reproduction phases) and (ii) program for aquatic vegetation management. The BSP as it stands now does not include specific initiatives to conserve and sustainably use the unique and globally threatened biodiversity, since this is not viewed as a national/binational priority.

4. The Proposed Alternative

4.1 The proposed alternative includes a series of conservation measures designed to promote the long-term conservation of biodiversity and the demonstration of sustainable use of biodiversity as alternative sources of livelihood for inhabitants of the Basin. These conservation measures in the proposed alternative are actions which are 'additional' to the baseline. These additional actions will complement existing and planned activities consistent with national development plans and priorities as set out in the BSP. In view of the understanding that biodiversity conservation, water quality and quantity, and land-use practices are intimately linked, especially in the TDPS which is an endorheic system, there is a need for the BSP to be expanded to address the special concerns of the endangered and threatened biodiversity.

4.2 Specifically the additional activities are designed to reintroduce key native species into specific localities in the Basin, and to secure long term biodiversity protection in the form of strengthening the management of protected areas, creating participatory schemes for natural resource management by local communities, indigenous groups and other sectors of society. It will also promote the sustainable use of the regions biodiversity through pilot projects to demonstrate a range of alternative livelihoods to communities consistent with biodiversity conservation including the rearing of native species of birds, frogs, and alpaca and the sustainable harvesting of totora reeds for fodder and craft material and thola for wood.

4.3 These actions would involve a wide range of government, NGO, private sector and community stakeholders in all stages of the project execution and evaluation. Present land tenure systems operating as a consequence of Agricultural Reforms and Regulations in both countries means that unless these communities are involved throughout the process through consultation, and subsequently in the management of the biodiversity and biological resources, none of the ventures are likely to succeed.

4.4 Incorporation of these components into the BSP will ensure the conservation of globally unique biodiversity by integrating biodiversity protection into sectoral development plans and activities throughout the basin. In the long term this would ensure the restoration of these important biodiversity to sufficient stock levels allowing some of these species to be managed for sustainable harvests.

4.5 There is a need to make a distinction between biological resources and biodiversity. When a species is at critically low levels, biodiversity in itself is threatened; but as the species is restored over time and lends itself to sustainable use and harvest, it needs to be managed as a biological resource (or bio-resource). In the former situation, there would be a need for full-costs to be estimated. In this project, for example, the native fish are presently threatened and need to be restored and rehabilitated, and the full incremental costs of doing so are estimated. However, as the resource gets restored to stable levels and is amenable to sustainable harvest it would be necessary to put mechanisms in place which ensure that the fish do not get 'mined'/ degraded (again). The removal of any barriers which would jeopardize the long term management of the resource would need to be costed.

4.6 The main program and activities which constitute the proposed alternative include:

1. *Sustainable management plans for three key habitats that will be adopted by the rural inhabitants of the TDPS.*
 - A community management programme for totora-reed habitats

- Sustainable management techniques for thola-bush habitats defined
 - The economic value of bofedal peat-bogs demonstrated.
2. *Manage native species according to technical basis and commercialize them following sustainable harvesting plans.*
- Techniques for the rearing and sustainable commercial exploitation of three threatened endemic native species demonstrated
 - Artisan fishing capacity-building programme
3. *Framework for the planning, monitoring and evaluation of activities established and future investments within the TDPS, from an ecosystem perspective, and for the strengthening of local capacities.*
- Participatory management of the TDPS protected areas strengthened
 - Biodiversity conservation measures for the basin incorporated into the ALT-Strategic Binational Plan.
 - The technical and managerial capacities of local governments strengthened for developing environmental norms and enforcement systems
 - Habitat and endemic species management programmes evaluated and replicated

The details for each of these program activities are in the Project document (Section B).

4.7 As mentioned above, the overall threats to the biodiversity of the TDPS are summarized in Table 1. The Table also provides an overview as to how these threats will be addressed: through the baseline (as part of the BSP, and/or some other initiative) or the proposed alternative (as a GEF project).

4.8 The assurance that the projects and activities associated with the baseline are in the pipeline (or underway) is very important because unless the most important of these threats are tackled, any move to introduce the alternative strategy is not likely to have the desired outcome. Especially critical is that the abstraction of water from the lake does not exceed the recommendation of the BSP, as that could alter adversely the ecology of the lake. If that is so then the alternative recommendation for rehabilitating the fish stock would be counter-productive. Also the improved water management and improved irrigation associated with the baseline should reduce the pressure of overgrazing and improve the land use patterns, which in turn would reduce pressure on the protected area management. This should have positive effects on the terrestrial biodiversity, and the investments through the alternative strategy to improve management of these protected areas are more likely to succeed.

5. Scope of Analysis

5.1 Because the TDPS is an endorheic system, it defines quite naturally the scope of analysis. The range of the various components of the project may extend over different parts of the TDPS, and hence national or binational territory, and the implications of these may need to be monitored closely. Also some components may need to be phased. For example, in terms of the restoration of endangered native fish in the lakes, it may be prudent to begin these activities at Lake Titicaca which is less prone to the increasing salinisation that has afflicted Lake Poopo and the Salar de Coipasa due to various anthropic activities. Any rehabilitation of native fish at these sites may be more tricky and uncertain. But even at Lake Titicaca, the problems of urban pollution and sewage at Puno need to be addressed as part of the baseline.

6. Costs and the Incremental Cost Matrix

6.1 The full complement of programs in the BSP, UNEP-OAS and other related commitments by the two governments constitutes the baseline of necessary actions on which to build a conservation strategy. The additional activities targeted specifically to alleviate the threats on the unique but threatened biodiversity within the TDPS together with the baseline comprise the alternative strategy. The incremental

cost matrix for TDPS is presented in Table 2, showing the main cost and benefit components associated with the baseline and alternative strategies.

6.2 With regard to the global benefit, shifting from the baseline to the alternative strategy will provide for enhanced biodiversity conservation in the TDPS, especially of the species which are currently threatened. The baseline domestic benefits will also benefit from the rehabilitation of biodiversity, and its subsequent sustainable use could be incorporated into the local livelihood strategies to further alleviate poverty in the region.

6.3 The baseline costs are estimated for the key programs which will be undertaken through the BSP (and the UNEP-OAS) study (Table 2). It is important that the flooding and irrigation program is underway first because this would have the overall effect of restoring the ecosystem of the TDPS basin. The observance of the recommended limit for the abstraction of water from the lake is critical to ensure also that the ecology of the lake is not disturbed. The total cost of the baseline course of action is estimated at \$ 330.2 million and is being financed by a wide range of sources which are described in the project document.

6.4 The improved management and use of the hydrological resources is the same as that required under the baseline situation, as their compliance is crucial for success of the alternative strategy. The 'additional' program of the alternative strategy focuses on strengthening biodiversity conservation in the Titicaca basin, both at the aquatic and terrestrial fronts. The program will go beyond the general concerns that will be addressed through the hydrobiological and environment programs of the baseline to incorporate specific action for the endangered and threatened aquatic biodiversity at the TDPS. The improved management of specific Protected Areas in the TDPS is critical especially for terrestrial biodiversity. Again, this would only be effective if the baseline actions are in place. For example, the improved water management and improved irrigation associated with the baseline would improve the land-use practices and reduce the pressure of overgrazing. These measures should have positive effects on the terrestrial biodiversity and reduce pressure on protected areas, and the investments towards improved management of these protected areas, as defined under the alternative strategy, would be cost-effective. The pressures on biodiversity are exacerbated by weak institutional capacities at the local, regional and national levels which are presently either insufficient or conflicting. Capacity strengthening, would concentrate on these aspects, including biodiversity management plans and information campaigns. This program has to be innovative to deal with changes and challenges. The total cost of this component is estimated at \$ 3.02 million.

6.5 Costs for project management, implementation workshops, and the administration costs have been estimated to be \$ 0.98 million. The total costs of the alternative strategy are estimated at \$ 334.2 million.

6.6 All costs, both for the baseline and alternative strategy, are presented as total costs for each program.

7. Results

7.1 The total cost of the baseline strategy is \$ 330.2 million compared to that of the alternative strategy of \$ 334.2 million. The incremental costs to pursue the alternative strategy are \$ 4.0 million.

7.2 The complementarity of the baseline and the alternative is of the essence. As mentioned above, the alternative strategy will include the actions of the baseline, but will be targeted to ensure that specific actions are taken to address the threats to the endangered and endemic biodiversity of the TDPS. However, unless the programs in the baseline are well executed, the alternative strategy will be ineffective. It is for this reason that the programs and costs of the baseline are also represented in the alternative option (Table 2).

7.3 The increment of \$ 4.0 million represents just over 1% of the total costs, the remaining being the baseline costs. Despite the 'small' increment in terms of total project costs, it represents a strategic contribution, and it is important to ensure in that the defined aims are not simply lost. Any neglect or

omission may undermine the long term management of critical biodiversity resources, and which could in turn have impacts on the wider project.

7.4 The GEF grant requested is for \$ 3.11 million as the two governments have received co-financing for the project for \$ 890,000.

8. Positive Lessons from the TDPS Incremental Cost Analysis

8.1 This case study provides an excellent example of a situation which demonstrates that a well constructed root cause analysis helps towards good project design and subsequently the assessment of incremental costs. The need for the removal of these threats to achieve defined biodiversity benefits then allows a corresponding identification of those actions which would be conducted through the baseline (i.e. in national/domestic interests, and in line with the broad development goals) and those which are additional (would benefit the global community). This information would feed into the incremental cost matrix and allow for an assessment of the costs.

8.2 The case study also demonstrates a good example of the complementarity of the actions in the baseline and the alternative. Although the actions recommended under the proposed alternative are 'additional' to the baseline, the root cause analysis demonstrates that achievement of the baseline as critical towards achieving the objectives of the proposed alternative (e.g. the limit on the abstraction of water from the lake). Specifically, this requires a phasing of the actions

TABLE 1: BIODIVERSITY THREAT ANALYSIS AT LAKE TITICACA: AS ADDRESSED BY THE BASELINE AND/OR PROPOSED GEF ALTERNATIVE.

Threat type	Sphere of Influence	Threat	Baseline ¹		Alternative
			BSP	Other ²	
Proximate	Aquatic biodiversity	• introduction of exotic fish			
		• overfishing	x		x
		• overharvest of aquatic vegetation	x		x
		• water pollution	x		x
		• land-use practices	x		x
		• flooding	x		
• lack of irrigation water	x				
Intermediate	Terrestrial biodiversity	• land-use pattern	x		
	Overall	• overgrazing	x		
		• institutional weaknesses	x		
		• poor enforcement of regulatory frameworks	x		
Ultimate	Overall	• sectoral approach to planning			
		• poverty/livelihood strategies	x		x
		• extensive structural changes	x		x
		• economic crisis			

Notes:

- 1 the baseline is being funded through several initiatives (see Project Document, Section E)
- 2 other studies/plans e.g. UNEP-OAS diagnostic study currently underway.
- ◊ where both the baseline and alternative address the same threats, the emphasis is on different aspects.
- ◊ the table is compiled using information from the Project Document, the Binational Strategic Plan and the UNEP-OAS Executive Summary.

Table 2: Incremental Cost Matrix for TDPS

	Baseline (B) (BSP)	Alternative (A) (BSP + biodiversity conservation measures)	Increment (A-B)
Global Biodiversity Benefits	<ul style="list-style-type: none"> no specific conservation measures to target endangered and threatened endemic species 	<ul style="list-style-type: none"> specific conservation measures to restore and rehabilitate endangered and threatened endemic species promotion of sustainable use of biological diversity 	<ul style="list-style-type: none"> enhanced biodiversity conservation in TDPS
Domestic Benefits	<ul style="list-style-type: none"> control and prevention of flooding irrigation hydrobiological management program environmental program 	<ul style="list-style-type: none"> control and prevention of flooding irrigation hydrobiological management program environmental program sustainable harvest of biological resources associated with the rehabilitation of specific biodiversity 	<ul style="list-style-type: none"> improved levels of biological stock to allow for sustainable use
Costs	<ul style="list-style-type: none"> Flooding and irrigation components (S 324.3 million) Hydrobiological management program <ul style="list-style-type: none"> fisheries development (\$ 5.2 million) aquatic vegetation management studies (\$ 0.8 million) Environmental program <ul style="list-style-type: none"> control of soil erosion and soil conservation control of water pollution control of river sedimentation component for the creation or protected areas (still being worked out) 	<ul style="list-style-type: none"> Flooding and irrigation components (S 324.3 million) Hydrobiological management program <ul style="list-style-type: none"> fisheries development (\$ 5.2 million) aquatic vegetation management studies (\$ 0.8 million) Environmental program <ul style="list-style-type: none"> control of soil erosion and soil conservation control of water pollution control of river sedimentation component for the creation or protected areas (still being worked out) <i>Sustainable management plans for three key habitats that will be adopted by the rural inhabitants of the TDPS.</i> <ul style="list-style-type: none"> A community management programme for totora-reed habitats US\$ 520.000 Sustainable management techniques for thola-bush habitats defined US\$ 310.000 The economic value of bofedal peat-bogs demonstrated. US\$ 333.000 	<ul style="list-style-type: none"> Manage native species according to technical basis and commercialize them following sustainable harvesting plans.

		<ul style="list-style-type: none"> ◇ Techniques for the rearing and sustainable commercial exploitation of three threatened endemic native species demonstrated US\$ 345,000 ◇ Artisan fishing capacity-building programme US\$ 270,000 • <i>Framework for the planning, monitoring and evaluation of activities established and future investments within the TDPS, from an ecosystem perspective, and for the strengthening of local capacities.</i> ◇ Participatory management of the TDPS protected areas strengthened US\$ 270,000 ◇ Biodiversity conservation measures for the basin incorporated into the ALI-Strategic Binational Plan. US\$ 122,000 ◇ The technical and managerial capacities of local governments strengthened for developing environmental norms and enforcement systems US\$ 210,000 ◇ Habitat and endemic species management programmes evaluated and replicated US\$ 520,000 <p style="margin-left: 40px;"><i>IV. Project Management and evaluation</i> US\$ 984,295</p>	<p>(\\$ 4,000,000)</p>
Total costs	(\\$ 330.2 million)		
Co-finance		(\\$ 334,200,000)	(\\$ 890,000)
GEF contribution	(\\$ 0)		(\\$ 3,110,000)

ANNEX 4

FINANCIAL AND ACCOUNTING PROVISIONS

A. General Structure

1. The Bi-National Autonomous Authority of Lake Titicaca, hereinafter referred to as "ALT", in representation of the Governments of Bolivia and Peru, is accountable to the UNDP for the adequate use of UNDP funds delivered to the Implementing Entities as requested.
2. The ALT shall verify that each Implementing Entity shall keep independent accounts (including separate bank accounts) of UNDP funds. These funds will be used solely as items to be financed by the GEF as specified in the Draft Budget related to the GEF contribution.
3. UNDP payments made upon request of the Project Direction shall be governed by the Financial Regulation and Detailed Financial Regulations and guidelines applied concerning the management of funds.
4. The Project Direction shall submit to the UNDP the financial statements of the UNDP funds received and used by the Implementing Entities. These must submit their financial reports, prepared in compliance with the UNDP financial exercise (January 1 to December 31), to the Project Direction to be included in one sole report. Each financial statement shall be certified by an independent auditor as specified in the UNDP Norms, Manuals and Procedures and must be paid through the accounts of each Implementing Entity. The delivery schedule and contents of these financial statements are described further.
5. Upon submitting a report to the UNDP, any figure in US dollars will be calculated in keeping with the United Nations rate of exchange. The UNDP will communicate to the Project Direction these United Nations exchange rates and fluctuations.

B. UNDP Direct Payments

6. After having sent a request to the Project Direction, and once the UNDP has verified the pertinent documents, it shall directly pay any individual or company who supplies a service or financial good to the project. The request must be addressed to the UNDP Residing Representative who will make arrangements to effect payment directly or through the UNDP head office. The request must indicate to whom payment is due, the amount and currency requested, the reason for the request and payment instructions, as well as the bank, address and account number.

7. The Residing Representative shall deliver to the ALT, statements concerning the direct payments made by the UNDP within a term no longer than 15 days after April 30, August 21 and December 31 so that this information may be included in the Progress Report of the Project, as specified in paragraph 8b) of this annex.

C. Regular Financial Statements

8. The Project Direction shall submit certified financial statements no later than 30 days after April 30, August 31, and 60 days after December 31 to the UNDP. Each statement must present the following information:
 - a) The Financial Progress Report of the Project. This report shall be submitted at each of the aforementioned periods and shall indicate the accumulative expenses of the current year classified according to the items mentioned in the approved budget of the project. It must mention the expenses paid by the project and, whenever necessary, expenses of the cooperant entity, if available;
 - b) Annual Report of the durable goods (equipment) , financed by the UNDP. The Project Direction will submit to the UNDP an annual report of the durable goods for the period ending on December 31, within a term no longer than 60 days after that date, together with the other financial statements which also must be presented on that same date. The report will cover all the durable goods financed by the UNDP and delivered to the Project over the last year. Durable goods purchased by the cooperant entity and provided to the project must also be mentioned. The report must describe each item in detail and must include the ALT identification number and manufacturer's serial number or record. It must also specify the amount of the cost calculated in US dollars at the moment of purchase according to the United Nations exchange rate on that date.
 - c) Expense statement of jointly funded projects. This concerns ALT and UNDP jointly funded activities and, whenever the case, other sources of assistance. Aside from the previously mentioned certified financial statements, a separate statement must also be included to indicate the expenses of the entire project over the same period as the certified financial statements. This expense statement must also indicate how the ALT has made the pro rata division of expenses between the UNDP contribution and other available funds.
9. Should ALT be unable to submit the financial statements as scheduled it must inform the UNDP and explain why not and mention the new date of delivery.

D. ALT Verified Annual Audited Financial Statements

10. The Project Direction shall submit to the UNDP, within a term no longer than 120 days as of the end of the last calendar year, a certified and verified annual financial statement of UNDP allocated funds delivered to the Implementing Entities as specified in paragraph 8 (a).

11. The financial statement shall be verified and certified as specified in paragraph 4.

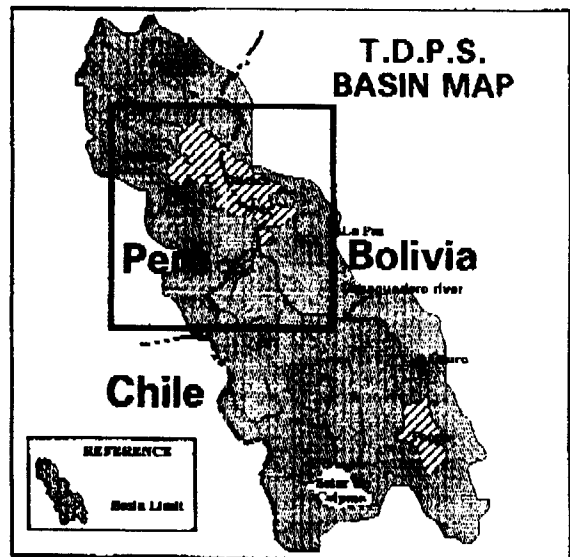
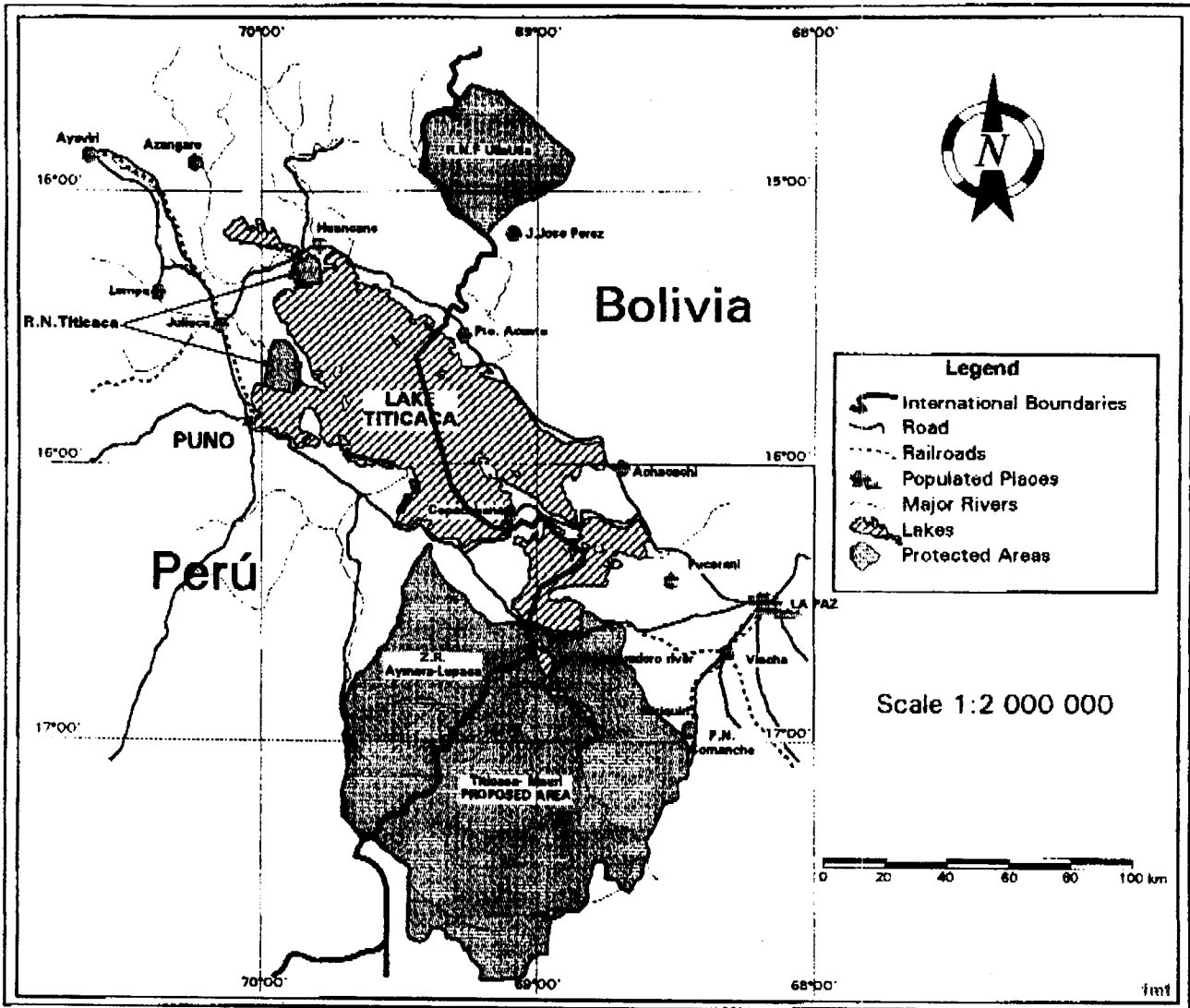
E. ALT Definite Financial Statements

12. Once the UNDP assistance has ended, and for financial purposes, the Project Direction must present the definite financial statements covering the period between January 1 and the last date on which the project shall receive funds (see paragraph 9). The financial statements shall be verified in compliance with the requirements as specified in section D. The statements shall be submitted to the UNDP within a term no longer than 120 days as of the last date on which the project received funds.

F. UNDP Auditing

13. The accounts belonging to the UNDP-GEF funds managed by the Implementing Entities must be verified by UNDP internal auditors, the United Nations Board of Auditors or a public accountant appointed by the United Nations Board of Auditors.

ANNEX 5





ANNEX 6

REPUBLICA DE BOLIVIA
Ministerio de Hacienda
SECRETARÍA NACIONAL DE
INVERSIÓN PÚBLICA Y
FINANCIAMIENTO EXTERNO

La Paz, - 5 AGO. 1997
SIPFE/SFE/NEG/2773/97

Señora
Sirkka Korpela
Representante Residente PNUD
Presente

Ref.: Proyecto de Conservación de la Biodiversidad de la Cuenca del Lago Titicaca, Río Desaguadero, Lago Poopó y Salar de Colpasa (TDPS).

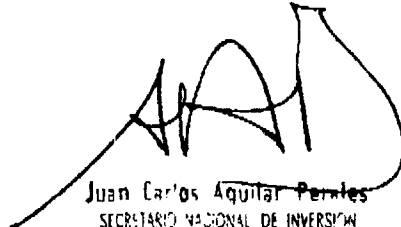
Señora Representante:

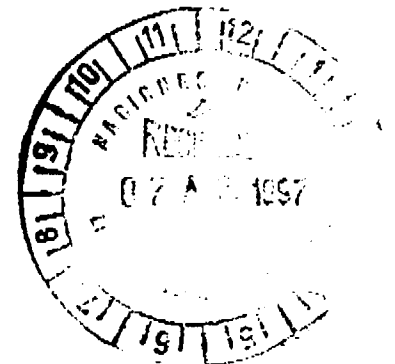
En relación al documento del proyecto de referencia, consideramos que el mismo se enmarca dentro de las prioridades nacionales en este campo y constituirá un importante avance en los esfuerzos de Bolivia para promover el desarrollo sostenible.

Por las razones expuestas y en nuestra condición de Punto Focal del Fondo Mundial para el Medio Ambiente (GEF)- Bolivia, solicitamos a usted se sirva enviar el citado documento a la Sede del PNUD en Nueva York, para que sea presentado a consideración del GEF para su financiamiento.

Con este motivo, saludamos a usted atentamente.

PNUD	
Acción	
R. R.	
D. R. P. S.	
EF	HE
Fecha 07 AGO. 1997	
Arch. RLA/95/631	


Juan Carlos Aquilar Perales
 SECRETARIO NACIONAL DE INVERSIÓN
 PÚBLICA Y FINANCIAMIENTO EXTERNO
 MINISTERIO DE HACIENDA



ANNEX 6



Carta N° 624-97-CONAM/SE
11 de julio de 1997

Señora
MARIA LUISA SILVA
Representante Residente
Programa de las Naciones Unidas
para el Desarrollo (PNUD)
Presente.-

ROUTING		INFO	ADVIS	INITIALS
RR				
DRR				
PROG. (AB)				
ADM.				
FINANZAS				
INFORMATICA				
DEGAS/VNU				

COMMENTS:

De mi consideración:

Tengo el agrado de dirigirme a usted en relación al documento del Proyecto N° RLA/95/G31/D/ "Conservación de la Biodiversidad en la Cuenca del Titicaca"-Rio Desaguadero-Lago Poopó-Salar de Copaisa-TDPS" de los Gobiernos de Bolivia y del Perú, para expresarle nuestra conformidad a su concepción y a los mecanismos de ejecución que adopta.

En nuestra condición de Punto Focal Nacional ante el Fondo para el Medio Ambiente Mundial, solicitamos formalmente al Programa de las Naciones Unidas para el Desarrollo (PNUD) en Lima, se sirva tramitarlo para su aprobación final ante el mencionado Fondo.

Agradeciendo su atención a la presente, sin otro particular, se despide,

Atentamente,


Paul Rémy
Secretario Ejecutivo