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*“Wetlands and water: supporting life, sustaining
livelihoods”*

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Regional Strategy for the Conservation and Sustainable Use of High Andean Wetlands

Explanatory Note by the Secretariat

1. The implementation of this Strategy is being considered for approval by COP9 as a regional initiative within the Framework of the Convention (COP9 DR 8).
2. This Strategy has been approved by Argentina, Bolivia, Chile, Colombia, Costa Rica, Ecuador, Peru and Venezuela

1. Introduction

The current “Regional Strategy for Conservation and Sustainable Use of High Andean Wetlands” was formulated within the Ramsar Convention framework, with the active participation of the countries that enclose High Andean wetlands and related areas¹.

This strategy is a guiding framework for regional cooperation among the countries involved, within a ten year projection period (2005-2015). Its purpose is the conservation and sustainable use of wetlands and wetland complexes in *páramos*, *jalca*, *puna*, and other High Andean ecosystems that include glaciers, lakes, lagoons, wet meadows, *bofedales*, *mallines*, highland *vegas*, salt pans and peatlands, rivers, water streams and other water bodies, defined as wetlands within the Ramsar Convention classification, including catchments, located at the Andean Range and other mountain systems in Latin America.

The strategy firmly recommends participation of national and local government bodies; indigenous, peasant and black communities; productive sector, NGOs, and academic and research institutions, in coordination with supranational instances such as the Ramsar Convention, *the*

¹ This regional strategy covers the countries that are crossed by the Andean Range (Argentina, Bolivia, Chile, Colombia, Ecuador, Peru and Venezuela), as well as Costa Rica, which includes a *páramo* ecosystem complex within its territory, with the same ecological characteristics of the Andean *páramos*. The possibility of incorporating Panama is being considered, because of an area of *páramo* that expands to the west of the territory bordering Costa Rica.

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Convention on Biological Diversity (CBD), the Andean Community of Nations (CAN), The Andean Development Corporation (CAF), MERCOSUR, international organizations related to the Ramsar Convention, and the technical networks that work at páramos and punas, as well as other interested actors.

To make this possible, it is necessary to count on the commitment of the governments, and an evident political will, in order to ease information exchange, build capacities devoted to favour sustainable management of the High Andean wetlands, and preserve them to continue providing essential goods and services, which derive from their water resources and biodiversity, to millions of people in this region of the world.

This document is a result of a collective construction process, promoted by the group of institutions that created the so-called Contact Group on High Andean Wetlands. It is a dynamic text that will be enriched, completed and validated with the input of numerous government and non-government interested actors as it is being implemented.

2. Background

During the II Pan-American Ramsar Convention Meeting (Guayaquil, Ecuador, July 2002) a Contact Group was established, comprising the Ramsar focal points of seven Andean countries - Argentina, Bolivia, Colombia, Chile, Ecuador, Peru and Venezuela, as well as Costa Rica, included for its *páramo* ecosystems, in order to promote actions that would benefit conservation and sustainable management of the distinctive wetlands of the High Andean mountains. International organizations related to the Convention (IUCN, WWF, Wetlands International, Birdlife International) became part of this initiative, as well as the Ramsar regional training centre (CREHO), and two active technical networks: the International Working Group on Páramos (Grupo Páramo) and the High Andean Flamingos Conservation Group (GCFA).

The Contact Group prepared a draft Resolution on High Andean wetlands, approved at Ramsar COP 8, in Valencia, Spain (November 2002), through Resolution VIII.39: *High Andean wetlands as strategic ecosystems*. This Resolution is related and supplementary to other Resolutions (i.e. VIII.5, VIII.11, VIII.12, and VIII.17) approved at the same COP. With regards to Resolution VIII.12 (*Enhancing the wise use and conservation of mountain wetlands*), the text proposed by the Contact Group is a suitable complement that focuses on the regional scope, giving special attention to the strategic value of these ecosystems in several countries in South and Central America that are under-represented in the Convention.

Since approval, the former Resolutions have resulted into several national and regional initiatives. In order to enhance and coordinate such efforts, as well as promote the implementation of Resolution VIII.39 within the context of the next COP that will take place in Uganda in November 2005, a workshop (Quito, Ecuador, March 29-30 2004) was organized by the Contact Group, the Ramsar Convention Secretariat and the IUCN Regional Office for South America, in order to agree on the guidelines and elements to compose a joint strategy for the conservation and sustainable use of the High Andean wetlands, design the base for an action plan, and create a regional platform for cooperation, information and exchange of best practices. A subsequent electronic mail discussion panel took place to refine the first draft of the strategy, which was presented and modified during the working sessions at the III Pan-American Ramsar Convention Meeting (Mérida, México, November 2004). The Contact Group prepared the final version at the strategy workshop carried out in the city of Salta (Argentina), in February 2005.

The basic structure of the strategy was defined based on the results obtained at the workshop and the valuable contributions made by the Group members. This basic structure includes a situational analysis, a conceptual framework (mission, vision, principles, scope and objectives), and several action proposals that represent the fundamental resources to create a work plan that will guide the strategy implementation.

3. General Characteristics of High Andean wetlands

The High Andean wetlands include those wetlands and wetland complexes that are part of *páramo*, *jalca* and *puna* ecosystems, as well as other High Andean and related ecosystems. Within the framework of the strategy, the wetlands are not considered or treated as isolated water bodies, but as complexes or systems, and as a consequence, their micro catchments are included. In this same regard, the strategy encompasses the functional interrelationships – environmental, social, cultural and economic – of the High Andean wetlands, making use of satellite or related systems in other altitude levels.

The Patagonian riparian habitats (*mallines* or wet prairies) form a well defined landscape unit based on its geomorphology and vegetation, but they are fundamentally related to the hydrologic mechanism that is analogous in all of them. *Mallines* are found in the high mountain range as well as the Patagonian extra-Andean plateau. In many cases *mallines* may lead to the formation of peat bogs.

3.1 Ecological importance of High Andean Wetlands

High Andean wetlands play a vital role in the development of the Andean basins, as well as other hydrographical systems, since their streams flow to the Amazonian watersheds and to the Pacific and Caribbean coasts.

The wetlands and wetland complexes maintain a unique biological diversity and are characterized by a high level of plant and animal endemism. They are also shelters and breeding zones for a great number of species with conservation problems, particularly migratory bird species, such as *Phoenicopterus andinus*, *Ph. jamesi*, *Netta erythrophthalma*, *Theristicus melanopsis*, *Gallinula melanops*, and fish and amphibians such as *Atelopus muisca*. In addition, they are a fundamental component of the habitat for highly economic and ecological important species like vicuna, guanaco or chinchilla.

Likewise, the Ramsar Convention has considered them fragile ecosystems. Their high level of fragility is related to natural causes (i.e., extensive draughts at *punas*), as well as anthropic causes (i.e., unsustainable agriculture, livestock overgrazing, and unsustainable mining at the *páramo* and *puna*). Many are being lost rapidly, mainly because of bad management and lack of knowledge of their economic and ecologic importance.

3.2 Types and origins of High Andean wetland

The High Andean wetlands are located mainly at the *páramo*, *jalca* and *puna* ecosystems, besides other High Andean ecosystems. They form systems with a great variety of environments that may include, according to their type and origin: freshwater lakes and lagoons (glacier, volcanic and tectonic), salt pans (old seas evaporating), saline lagoons (old seas with low fresh water supply), brakish lagoons (old seas with more freshwater diluted), *bofedales* and peat logs (flooding or underground sources), thermal waters and geysers (volcanic activity close to water sources), *mallines* or wet prairies (with surface or underground supply that gives them the category of oasis in

arid zones). Likewise, according to the kind of vegetation, it is possible to find several formations including *totorales* (dense flooded or semi-flooded sedge formations, close to lakes and lagoons), *vegas* (dense or very dense herb formations, integrated by temporary surface draining associated with saline streams or soils), *chuscales* (dense formations of Chusquea associated with humid soils), and many others.

3.3 Bio-regions that include High Andean wetlands

3.3.1 Páramos

Páramos constitute a bioregion of the high tropical mountains (Los Andes and the High Central American mountains), characterized by low temperatures, severe climate variations during the day, and year-round relative humidity over 80%.

The soil in *páramos* is usually rich in organic matter, with a high flood storage capacity. The vegetal core is usually coarse straw, on which several relatively complex plant communities develop, such as rosettes, shrubs, bamboos, as well as waterlogged moss or vascular plant patches.

Most of the *páramo* extension is related to high humidity. *Páramos* are characteristic for their great diversity of freshwater sources, coming from glaciers, rivers, lakes and other streams that emerge from the underground. This high humidity concentration makes this biome almost totally formed by humid grazing and swamps, except for *páramos* that are somehow dryer due to microclimates.

3.3.2 Jalca

The *Jalca* corresponds to a transitional bioregion between the *páramo* and the *puna*. It is located on the north mountain range of Peru. It has many structural and functional similarities with the *páramo*, presenting high relative humidity and considerable precipitation ranges, as well as severe daily climate fluctuations such as in the *puna*, and noticeable, but not severe seasonal changes.

3.3.3 Puna

The *Puna* is a bioregion associated with the Andean highlands characterized by intense cold, aridity and daily temperature fluctuations. Because of its latitude, it is subject to drastic seasonal climate changes. The vegetation of this bioregion is characterized by small scattered coarse straw patches and minute trees and bushes. There are numerous basins, mostly endorheic, with patches of azonal vegetation at their base level, with the aspect of an oasis in a predominantly deserted zone. The typical wetlands in the *puna* are salt pans, *bofedales* and *vegas*.

3.3.4 Andean Patagonia

Several types of wetlands are found here, including lakes, streams, river valleys (many used for irrigation) and *mallines* (wet prairies, also known as high *vegas*). *Mallines* are a type of wetland of generally limited dimensions, located at a geologic formation consisting of a nearby phreatic aquifer, which humidifies the ground by means of capillary ascent that is facilitated by the characteristics of the aquifer, usually containing a high level of volcanic ashes (andosols). The ground humidity allows sustaining a dense and diverse vegetal community, capable of supporting a high livestock load during certain periods of the year. These formations stretch from the high Patagonian mountain range to the low altitude extra-Andean plateau, forming the water system that flows to the great rivers and affects their water quality. They are fragile systems because they

are prone to natural or anthropic degradation (desiccation and salification) resulting in impact on the whole hydrologic system. Within the remarkable extension and dryness of the extra-Andean Patagonia, *mallines* constitute the only humidity concentration spots. As a consequence, they are the preferred shepherding places for cattle and sheep, and they make up the base of livelihoods for the local indigenous communities and cattle raising settlements, frequently over-exploited and degraded.

3.4 Ecosystem services from High Andean wetlands

The main good provided by the High Andean wetlands is water, as well as some of the most relevant ecosystem functions and environmental services related to water resources (including water storage, flow regulation, hydroelectric generation, and others). Actually, one of the most important services is a permanent supply of drinking water for human use, fresh water for agricultural land irrigation, and hydroelectric generation. In fact, many cities depend on the High Andean wetlands due to these fundamental services.

Other environmental services that should be included are: ground stability, landslide and alluvion prevention, maintaining environmental balance to allow the survival of unique flora and fauna species; carbon fixation, atmosphere purification and climate stabilization.

It is important to mention that the services and goods provided by the High Andean wetlands are not unlimited, and that degradation of these ecosystems brings about the loss not only of essential water resources, but also of many other benefits that such an environment offers. Therefore if we are to continue taking advantage of them, we must preserve them, and their utilization should not exceed a critical threshold beyond which their deterioration becomes irreversible.

According to the Millennium Ecosystem Assessment, the environmental ecosystem services are the benefits that people get from the ecosystems. These include supply, regulation and cultural services that directly affect people, in addition to the services that are necessary to sustain ecological processes (support).

Table 1: Ecosystem Services.²

Service Supply Products obtained from Ecosystems	Service Regulation Benefits obtained from the regulation processes in the ecosystems	Cultural Services Non-material benefits obtained from the ecosystems
<ul style="list-style-type: none"> •Food •Drinking water •Fuel •Vegetal fiber •Biochemicals •Genetic Resources 	<ul style="list-style-type: none"> •Climate regulation •Disease control •Water regulation •Water purification •Pollination 	<ul style="list-style-type: none"> •Spiritual and religious •Leisure and tourism •Aesthetic •Inspirational •Educational •Sense of identity •Cultural Inheritance

² Source: Ecosistemas del Milenio. Island Press, 2005.

Support Services

Necessary services to produce all other ecosystem services
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Ground Formation Nutrients Cycling Primary Production

3.5 Economic Importance

The High Andean wetlands are an important component of the regional economy. To a great extent, they provide the fresh water consumed by millions of inhabitants in the Andean capital cities (Bogotá, Lima, Quito, and Sucre), as well as other highly inhabited cities like Mérida, San Cristobal, Medellín, Cali, Cuenca, Trujillo, Arequipa, Cusco, El Alto, Arica, Iquique, Antofagsta, La Paz and Cochabamba.

Similarly, a substantial part of the agricultural production of the region depends on the High Andean watersheds, including the wetland systems, as a basic source of water³.

Productive activities at the High Andean wetlands are related to the altitude level in which they are located. In the *puna*, *jaca* and *páramo* zones the predominant activities are mining, raising cattle, sheep and camelidae, fishing and forest industry. It is also important to mention that extraction of plants and peat log for use as fuel is a livelihood, because a great number of rural people in many areas depend on firewood to cook.

At a lower altitude, several crops are grown, mostly potato, other tubers and Andean cereals. Extensive cattle farming is favoured at the High Andean wetlands with the generation of fodder for wild and domestic species such as alpaca, llama, goats, sheep and cattle.

Many Andean communities of people depend on wetlands for survival. Some of the animals that live in the wetlands, such as water birds and fish, are important protein supplements for peasants. In addition, employment and genuine income opportunities for the communities living in these areas are provided by activities such as fishing, leather and wool trade, as well as other products manufactured from vegetal fiber like bulrush, sedge and bamboo from the *páramo*. The fiber from vicuna is one of the best in the world, and alpaca has very good qualities; therefore raising camelidae is becoming very important for the economy of people in the *puna*, and it represents a sustainable economic alternative.

The High Andean wetlands are sites of great beauty and unique landscapes that gather a high number of endemic species and a very valuable cultural diversity that represents an enormous attraction for ecotourism and scientific tourism. In this regard, visits, recreational activities and nature-oriented tourism are already generating considerable income to High Andean sites in almost all the countries in the subregion, and should contribute to the development of the quality of life of indigenous and local communities, reinforce and educate people on the value of these ecosystems, and preserve their natural and cultural heritage.

3.6 Cultural Importance

³ For example, in Ecuador and Peru nearly 85% of fresh water is used for irrigation; the rest is for human consumption and electricity.

The High Andean mountains have long been inhabited by a great variety of native cultures, the most remarkable of which is the Inca. Nowadays cultures include Quichua in Ecuador; Quechua in Peru and Bolivia; Aymará in Argentina, Chile, Peru and Bolivia; Coyas and Atacameños in Chile and Argentina; and the Mapuches in the Patagonian region; as well as the Paeces and Guanabianos in Colombia. Today, the Uru, who live in the Titicaca and Poopó lakes, with their millennial aquatic culture, have become very scarce in population; one of the reasons for this is the deterioration of the wetlands, which has considerably reduced the resources that these people have traditionally used.

Different Andean cultures have managed these ecosystems in a sustainable manner and have created, for example, artificial peatlands to stimulate the presence of vicuna and to breed alpaca and llamas; they have also made freshwater reservoirs, irrigation channels and *sukakollos*, which in spite of being built several centuries ago are still functioning in some regions. Nevertheless, water management and the hydro technology of these cultures has gradually disappeared since the time of colonization, but it has been well documented by anthropologists specialized in Andean ecology.

Indigenous peoples have used the water in wet prairie *mallines* in a very particular way (a tradition that is disappearing), and have also introduced *mallines* into dry land. This has provided understanding of the basic hydrological functioning of *mallines*, and has made it possible to propose it as a sustainable method, opposed to the classic technique of implementing traditional irrigation systems over *mallines*, with a high risk of disruption and very high costs.

The High Andean wetlands are currently essential for the survival of many traditional and indigenous communities who inhabit the surrounding areas and make use of a broad range of goods such as food (fish, water birds, eggs, algae, and salt), fibers, fuel, fertilizers and minerals.

The considerable amount of goods and services provided by the wetlands to many indigenous peoples and other traditional communities is probably the reason why a religious mythic meaning has been ascribed to them, particularly to lakes, which are considered sacred and have a series of community regulations for their respectful utilization. It is important to understand the rich conceptions about water that Andean peoples have traditionally had, and to incorporate the native population into its management and conservation.

For all the previous reasons, this strategy foresees to undergo participation and consultation processes with local communities, in order to collect their perception and vision, as well as traditional wetland management practices, because without the participation of local actors it is not likely that wetland preservation will be successful in the long run. Therefore, the frameworks will be based on the guidelines from the Resolutions approved by the Ramsar Convention, such as Resolution VII.8 *Guidelines for establishing and strengthening local communities' and indigenous people's participation in the management of wetlands*, Resolution VIII.38 *Participatory Environmental Management (PEM) as a tool for management and wise use of wetlands*, Resolution VIII.36 which refers to the wetland cultural values, and other resolutions.

In the same regard, considering population pressure and altitude expansion of the agricultural boundary, it is desirable to promote dialogue among traditional and scientific knowledge, focusing on conservation and sustainable use of these strategic and fragile natural systems.

4. Situation Assessment

Every country involved in this Regional Strategy submitted a situation assessment of their national High Andean wetlands, from the end of 2004 to the middle of 2005⁴. The general content of such documents is the following:

- General data
- Situation, Trends and Pressures (Ecosystem dimension and human dimension)
- Responses: Strengths and Opportunities for Conservation and Sustainable Management
 - Governance
 - Research, Conservation and Sustainable Management Initiatives
 - Economic Assessment Initiatives
 - Sustainable use with community benefit

In some cases, preliminary inventories of the High Andean wetlands and related species were included. This is secondary information based on numerous research studies, compiled by the Ramsar Convention technical focal points. Nevertheless, the data referring to the number of High Andean wetlands and their extension by country are not comparable among them because the methodologies used for estimations have been generally different in terms of scales, and definitions of High Andean wetlands, wetland complex and wetland system. One of the challenges of this strategy will in fact be strengthening exchange and cooperation in terms of information and research.

This is valuable information that will serve as a base to better understand the context and natural dimension within which the activities of this Strategy and its Action Plan will take place. With the same purpose, a reflection on the social, cultural and economic conditions related to High Andean wetlands has also been gathered in these country analyses.

Another piece of valuable information is the information related to the institutional and legal frameworks, and the ongoing initiatives, in each country. This will help the people responsible for implementing the strategy, at the national and local scales, to better navigate within the context of the institutions and relevant actors, and to recognize existing processes that are valuable to be enhanced. (See summary in annex 1)

An overview of the regional condition, trends, and pressures affecting these wetlands by biome type is presented below. The information is based on the national situation assessment and the various discussions held during the preparation workshops for this Strategy.

4.1 Current Condition of High Andean Wetlands at a Regional Scale (Condition, Trends and Pressures)⁵

High Andean wetlands have been globally considered areas of high biological importance; however, the *Conservation Assessment of the Terrestrial Eco-regions of Latin America and the Caribbean* reports that the conservation condition of *páramo* and *puna* is critical to vulnerable (WWF and WB, 1995). The threat

⁴ The Situation Assessments of the High Andean Wetlands by country were prepared by each of the Ramsar Convention focal points, in coordination with IUCN-South. These documents are available in each country, in the corresponding institution, and may be consulted at the IUCN for South America webpage (www.sur.iucn.org) or at the Ramsar webpage (www.ramsar.org)

⁵ See information on specific condition, trends and pressures for each country in the corresponding national situation assessment.

to these ecosystems jeopardizes High Andean wetlands because they are highly vulnerable and fragile ecosystems, particularly in terms of development pressures based on unsustainable practices and climatic change (Contact Group on High Andean Wetlands and IUCN South, 2004).

Notwithstanding the High Andean wetlands constitute a resource of high biological, ecological, economic, social, cultural and recreational value, they have not received the necessary attention from the government, the private sector, and other actors; therefore they are rapidly becoming one of the most endangered natural environments.

The most relevant causes of wetland degradation are: Water extraction for mining and agricultural uses, fragmentation of water systems, intense urbanization processes, uncontrolled burning, pollution, and the construction of great works of infrastructure; high population growth; and poorly integrated and segmented development planning (Abramovitz, 1996; Rangel, 2000; Canevari et al 2001; Hofstede et al, 2003; Contact Group on High Andean wetlands and IUCN South, 2004). There is a great variety of problems affecting the High Andean wetlands, depending on their location and characteristics. Table 2 offers a separate analysis of the condition, trends and pressures related to *páramos*, *punas* and *mallines*.

Table 2. High Mountain Ecosystems at Los Andes, Costa Rica and Panama: Condition, Trends and Pressures (High Andean wetlands perspective)

North Andean <i>Páramos</i> , Costa Rica, Panama and <i>Jalca</i> in Peru		
Condition	Trends	Pressures
<ul style="list-style-type: none"> •Total Coverage: ~34,000 km² •Countries with <i>páramo</i> and <i>jalca</i>: Colombia, Costa Rica, Ecuador, Panama, Peru, and Venezuela. •Several cities are supplied with water coming from basins which include High Andean wetlands and wetland systems (i.e. Mérida, San Cristóbal, Bucaramanga, Bogotá, Cali, Medellín, Quito, Cuenca, and Cajamarca). •Floristic diversity: 4,700 vascular flora species described. •Vegetal endemism: nearly 60% of total flora. •High amphibious diversity. •High endemism of height 	<ul style="list-style-type: none"> •Rapid habitat loss and degradation due to anthropic pressures. •Decrease of biodiversity. •Expansion of herbaceous formations in degraded High Andean forest areas (much lower than habitat loss). •Expansion of the agricultural altitude boundary (extensive agriculture and livestock grazing). Conversion of wetlands into agricultural lands, particularly to grow potato. •Trend for greater fragility and degradation of peat lands and swamps, compared to lakes and lagoons. •Ecological and scientific tourism activities development. 	<p>Direct causes:</p> <ul style="list-style-type: none"> •Supply of sediments to wetlands, coming from snowmelt of glaciers that carry part of the materials contained in the glacier base. •Introduction of invasive aquatic plants, whose dissemination favours sedimentation. •Degradation of soils and <i>páramo</i> wetlands, promoted by agriculture and livestock raising activities. (Ploughing practices, application of lime and other chemical products, livestock footsteps; all of which pollute and alter the fragile ground structure as well as its water retention capacity). •Anthropic desiccation of wetlands. •Infrastructure construction, such as hydroelectric dams, irrigation systems, and road

<p>birds.</p> <ul style="list-style-type: none"> •High Andean wetlands have a great diversity, and a high level of endemism and specialization, as well as great environmental heterogeneity 	<p>Incorporation of wetlands as new tourism products such as the “Great Inca Route” whose course goes through several High Andean wetlands.</p> <ul style="list-style-type: none"> •Higher participation of indigenous and peasant communities in the decision making process with regards to territory management. •Design, planning and execution of programs and actions for local development with identity, and an emphasis on ethno-ecotourism. 	<p>construction.</p> <ul style="list-style-type: none"> •Exploitation of quarry at the micro catchments of <i>páramo</i> wetlands systems. •Anthropic burning of grazing lands <p>Underlying causes:</p> <ul style="list-style-type: none"> •Conflict of interests among the various territorial actors. •Uneven distribution of natural resources. •Insufficient (i.e. tourism policies) and /or poorly regulated and implemented legislation. •Unsuitable agricultural policies and unsuitable sector policies in general. •Governance and institutional conflicts •Institutional weakness of government agents responsible for management of <i>páramos</i>. •Unsuitable land owning systems. •Poor human development and quality of life conditions.
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Punas in the South Andean Region

Condition	Trends	Pressures
<ul style="list-style-type: none"> •Total coverage: ~600,000 km². •Countries with <i>puna</i>: Peru, Bolivia, Argentina, Chile. •Several cities are supplied with water coming from basins which include <i>puna</i> and/or High Andean wetlands and wetland systems (e.g. Arequipa, Cusco, La Paz, Arica and Antofagasta). •Population density higher than the population at <i>páramos</i> in Bolivia and South Peru. •Vegetal diversity: more than 	<ul style="list-style-type: none"> •Accelerated habitat degradation and loss due to anthropic pressure. •Desiccation, water mirror diminution and loss of wetlands. •The capacity and availability of superficial water resources at the <i>puna</i> is very variable and depends on latitude, altitude, hydro-meteorological cycles of the Andes, and oceanographic phenomena such as the Humboldt Current or “El Niño”, which affect all South American coasts. 	<p>Direct causes:</p> <ul style="list-style-type: none"> •Over-exploitation of water resources for agriculture, livestock raising and mining activities at a great scale. •Pollution of water bodies with heavy metals and pesticides, caused by mining and agriculture activities. •Demographic pressure due to increased population of human settlements. •Infrastructure works such as gas pipelines, transmission lines, irrigation systems, road construction, and non planned urbanization. •Excessive exploitation of

<p>2000 species described.</p> <ul style="list-style-type: none"> •In general, the High Andean wetlands are located in deserted plateaus above 3500 mosl, with some exceptions (e.g. Salares de Atacama and Punta Negra in Chile, located at about 2300 mosl). •In general, High Andean wetlands have low diversity and an extremely high level of endemism and specialization, as well as high environmental heterogeneity. •However, the High Andean wetlands, including lakes, lagoons, salt pans, formations of <i>vegas</i> and peat lands, constitute concentration centres of fauna and flora within the extreme aridity that characterizes the <i>puna</i>. •These wetlands are important winter habitats for key species in the High Andean ecosystems, such as the Andean flamingo and the James flamingo. They also sustain migratory birds and major vertebrates like ostrich, vicuna and other camelidae, and vizcacha. •The wet steppes of <i>vegas</i> and peat lands constitute the vegetal associations with the greatest relative diversity of species of flora and the highest primary productivity. They are the feeding base for many wild species and domestic camelidae. •In some systems, the water of the High Andean salt pans and lagoons is brackish and/or saline, with a content of boron and arsenic that limits its use for human and animal 	<ul style="list-style-type: none"> •Desertification. •Biodiversity reduction. •Altitudinal expansion of the agricultural boundary (extensive agriculture and livestock grazing). Conversion of wetlands for agricultural use. Imposition of agriculture and domestic livestock raising schemes without considering the ecological and environmental limitations, and frequently, without taking into account the cultural guidelines of local communities. •Growing fragmentation processes due to roads and pipelines (oil, gas and transmission lines). •Increased ecotourism and cultural tourism activities. Incorporation of wetlands as new tourism products such as the “Great Inca Route”, whose course goes through several High Andean wetlands. •Increased participation of indigenous and peasant communities in the decision making process regarding territorial management, design, planning and execution of programs and actions for local development with identity, and an emphasis on ethno-ecotourism. 	<p>fishing, animal and vegetal life resources, that leads to decrease or extinction of certain local wild species.</p> <ul style="list-style-type: none"> •Over-grazing, particularly in more humid places. •Excessive flamingo egg collecting. •Introduction of exotic species such as the trout fish and <i>pejerrey</i> which feed from local fish. •Seasonal burning. •Global warming, which causes the continued retreat of glaciers from the mountain range, reducing the glacier water input to the High Andean wetlands. <p>Underlying causes:</p> <ul style="list-style-type: none"> •Conflict of interests among the various territorial actors. •Unsuitable land owning systems. •Unsuitable agricultural and mining policies, and unsuitable sector policies in general. •Uneven distribution of natural resources •Lack of tourism policies and regulations in fragile highland environments. •Governance and institutional conflicts. <p>Institutional inefficiency due to:</p> <ul style="list-style-type: none"> •Lack of connection between the central / province government and the municipalities. •Insufficient control. •Insufficient planning. •Insufficient and /or poorly regulated and implemented legislation. •Lack of integrated management in trans-boundary wetland systems. •Non regulated urbanization •Poor human development and quality of life conditions.
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consumption.		
<ul style="list-style-type: none"> •Some religious-symbolic areas of cultural importance include wetlands. 		
<i>Mallines of the Andean Patagonia</i>		
Condition	Trends	Pressures
<ul style="list-style-type: none"> •Countries with <i>Mallines</i>: Argentina and Chile. •The largest grazing reserve in the pre-mountain range. •Many of them are wetlands surrounded by an arid environment. •They are sources of water for various uses, with important underground storage. •Flora and fauna In general, <i>mallines</i> have low diversity and extremely high levels of endemism and specialization. •These wetlands are important as a habitat for migratory bird species, as well as for major vertebrates, which use the place for feeding, breeding and / or resting. •The wet steppes of <i>vegas</i> and <i>mallines</i> constitute the vegetal associations with the greatest relative diversity of species of hydrophyte flora, and the highest primary productivity, being the staple diet for many wild species. •Some religious-symbolic areas of cultural importance include wetlands. •They feature scenic qualities that make them attractive for ecologic or alternative tourism. 	<ul style="list-style-type: none"> •Desertification due to changes in hydrologic parameters •Biodiversity reduction. •Desiccation due to central river-bed deepening •Salification due to changes in the rainfall-runoff coefficient •Expansion of areas due to introduction of <i>mallines</i> in dry lands (<i>amallinamiento</i>) •Soil degradation •Loss of quality of water downstream •Increasing fragmentation processes due to road and pipeline works (oil, gas and electro pipelines). 	<p>Direct causes:</p> <ul style="list-style-type: none"> •Over grazing. •Climate change. •Inter-annual climate variability. •Land owning. •Shepherd migration •Lack of integrated and planed management. •Steppe expansion in the Patagonia •Insufficient legislation with regards to water usage permits. •Erosion caused by ovine cattle •Uneven distribution of natural resources. •Lack of tourism policies and regulations in fragile environments.

The previous table, prepared by IUCN-South, summarizes and reveals regional similarities in trends and problems of the High Andean wetlands. This was achieved using the situation assessment of each country and the information provided by the technical networks (Grupo Páramo and GCFA), WWF and IUCN, and other specialized sources. The individual country assessments and the consolidated analysis (Contact Group and IUCN-South, 2004) are an integral part of this Strategy.

4.2 Condition of the High Andean Wetlands per Country

The following are preliminary data from the High Andean wetlands inventory, developed as part of the High Andean Wetlands project carried out by Grupo Páramo and a network of organizations in the seven Andean countries and Costa Rica. The preliminary number of wetlands obtained from the project was 2703 wetlands and 191 wetland complexes, corresponding to more than 58 basins in the entire region.

The countries that have High Andean wetlands declared as Ramsar sites up to date are:

Table 3. High Andean Ramsar Sites (as of July 2005)

Country	High Andean Ramsar Sites	Altitude (MOSL)	Area (has)
Argentina	Laguna de los Pozuelos	3500	16,224
	Lagunas de Vilama	4500	157,000
	Reserva Provincial Laguna Brava	2500-4500	405,000
Bolivia	Laguna Colorada	4232	51,318
	Lago Titicaca (Bolivian Zone)	3809-4200	800,000
	Cuenca de Tazara	3700-4100	5,500
	Lagos Poopó y Uru Uru	3686	967,607
Chile	Salar de Surire	4200	15,858
	Salar de Huasco	3500	6,000
	Salar de Tara	4400	5,443
	Sistema Hidrológico de Soncor	2300	5016
	Laguna del Negro Francisco y Laguna Sta. Rosa	3715-4000	62,460
Colombia	Laguna de la Cocha	2700-3500	39,000
Ecuador	Sistema Lagunar del Parque Nacional El Cajas	3160-4445	29,477
Peru	Lago Titicaca (Peruvian zone)	3810	460,000
	Lago Junín	4080-4125	53,000
	Laguna del Indio y Dique de los Españoles	4440	502
	Bofedales y Laguna de Salinas	4300	17,657
North limit of the life region in the <i>páramo</i> :			
Costa Rica	Turberas de Talamanca	2600-3290	192,520

4.3 International Agreements

All the countries in the region are signatories to the Ramsar Convention and to other international agreements that directly or indirectly involve the High Andean wetlands (Biological Diversity-CBD, Desertification, Climate Change, and others). For example, in the case of CBD, biodiversity

policies and strategies that include wetlands have been developed as a step to fulfil the Convention at the national level.

The Ramsar Convention provides a binding tool for conservation of wetlands of international importance. According to this tool, member countries have the responsibility of maintaining the ecological character of wetlands, developing actions for their conservation and sustainable use, and giving special attention to a selection of designated wetlands in the List of Wetlands of International Importance (Ramsar sites).⁶

A relevant group of High Andean wetlands with high ecological value has been designated part of the Ramsar sites (table 3) and, as one of the commitments established in the Convention, sustainable development management plans have been developed in some of them.

Nevertheless, there is still a long way to go to achieve an effective, synergistic and integrated implementation of the mentioned conventions at the regional and national levels.

Regional tools such as the Subregional Action Programme for Sustainable Development of the American Puna, which is part of the Convention to Combat Desertification, CAN, and MERCOSUR, will also be implemented through this strategy.

4.4 Legislation and National Policies related to High Andean Wetlands⁷

Significant progress has been achieved in the region in terms of institutionalization of environmental management. There are environment ministries or related institutions in all countries, which have jurisdiction over the conservation and management of water resources and biodiversity. These offices are in charge of the policies related to wetlands and the fulfilment of the mandates from the Convention on Biological Diversity, the Ramsar Convention, and other conventions.

The most common strategy to provide legal protection to wetlands is by incorporating them into a category of protected area within a National System of Protected Areas. In some cases the High Andean wetlands have been protected under strict categories that have been instituted (e.g., Natural Monument). Additionally, as part of their national environmental policies, and under the Ramsar Convention, some countries have developed policies, strategies and/or action plans for the conservation and sustainable use of wetlands. This is the case of Chile, Colombia, Costa Rica, Ecuador, Peru and Venezuela.

Many countries have also incorporated integrated water resources management (IWRM) into their regulations, but the plans for land use or the territorial re-ordering plans do not usually or only insufficiently consider the goal of keeping the integrity of water systems.

⁶ Likewise, the countries commit to the following: a) designate wetlands to be included in the List of Wetlands of International Importance, b) conservation of wetlands in the list, and wise use of all wetlands in their territories, c) conservation of wetlands and water birds, whether in the list or not, by creating natural reserves, and adopting measures for their custody, d) hold mutual consultation among States about the fulfilment of the obligations derived from the Convention.

⁷ For more details on policies and legislation in each country, refer to the High Andean Wetlands Situation Assessment, prepared by each Ramsar national focal point.

An important aspect to take into consideration is that in most Andean countries natural resources are owned or controlled by the State. For example in Colombia wetlands are public goods and have been legally considered as “area of special ecological importance”; therefore it is a duty of the state and private individuals to preserve these areas through actions such as establishing protected areas and undertaking actions that allow conservation and sustainable use. In recent years, there has been a growing tendency to privatize natural and water resources in some countries. In Chile, for example, concessionary water companies have to be paid for the use of water in the rural areas, which has created conflicts with peasant communities that are not able to pay for this resource. In Costa Rica, high wetlands are mainly protected by some category of wildlife area management, such as National Parks or Forest Reserves. In addition, their protection and conservation is properly regulated by the Organic Environmental Law.

In some countries, wetlands are, in practice, under private control, and even when these concessions are generally established in contracts with conditions such as a management plan, these do not always assure the sustainable use of the resource.

Another important element for wetland conservation is the mechanism for environmental impact assessment (EIA) that has been incorporated to the legislation of all the countries in the region. However, its implementation is weak because in many cases it is merely reduced to an administrative formality. Alternative development projects and a comparison of the impact for each alternative are not required to be submitted. Therefore, impact evaluations almost never admit alternative zero, that is, no intervention – they are limited to proposing compensation and mitigation measures and very rarely incorporate environmental impact reduction measures. Furthermore, mechanisms for community participation are not always made effective, and conservation of wetlands is not given the necessary importance. In this respect, it would be important to incorporate a policy requiring that any project that might present risk to wetlands to include an Environmental Impact Assessment before its execution.

There is a trend towards developing policies, strategies and action plans for the High Andean wetlands. As part of it, Chile has developed a national plan on this matter.

4.5 Perspectives

The preceding information shows that the High Andean wetlands should be considered strategic for the development of the Andean countries, and therefore the activities devoted to their conservation and sustainable use should receive priority attention from governments.

Maintaining the ecological integrity of High Andean wetlands and the goods and environmental services that they provide is crucial for the development of the region and each country involved, particularly to ensure a continued supply of water to the main Andean cities, especially in the north and central part of the Andes. Therefore efforts should be made to meet the needs of a growing population while not exceeding the sustainable limits of these ecosystems. To succeed in these endeavours, it is of great importance to obtain support from the governments and international cooperation agencies, as well as the involvement of local communities.

It is necessary to make efforts in order to create plans for catchments and major basins; therefore, it is necessary to integrate water resource management to the conservation of the wetlands.

It is important to highlight the fundamental role of understanding the hydrological functioning of wetlands, since the existence and availability of water controls all other aspects of the ecosystem:

primary production, usage, habitat, and degradation risk. It is thus recommended to sponsor research projects on this topic, and exchange of best practices in different types of wetlands such as *mallines* and peat lands, which seem to function under the same hydrological principles.

It is also important to mention the need to develop management techniques suitable to the socioeconomic reality of local communities, since external technological packages will not necessarily be appropriate for the indigenous communities and/or to keep the ecological conditions of these systems.

Conservation of the biodiversity and geological uniqueness of the high Andean environment, for its intrinsic worth and its instrumental values, is a responsibility of all the countries involved in this Strategy. In this respect, the related high mountain ecosystems and wetlands are part of the action field of important international treaties such as the Convention on Biological Diversity, the United Nations Framework Convention on Climate Change, the Convention to Combat Desertification, the Convention on Migratory Species, the Convention Concerning the Protection of World Cultural and Natural Heritage, the UNESCO Man and the Biosphere Programme, and others. Hence, it is very important to reach synergies between these instruments to effectively correct the existing problems. This Strategy also has the potential to contribute to the implementation of the United Nations Millennium Development Goals and the Plan of Implementation of the World Summit on Sustainable Development – Johannesburg 2002.

Over the years, due to the significance of the High Andean wetlands, important technical networks related to the High Andean wetland ecosystems have developed, including the International Working Group on *Páramos* (Grupo Páramo) and the High Andean Flamingos Conservation Group (GCFA). The first one involves government organizations, NGOs, research centres and representatives of the private sector from countries that enclose *páramos* and other countries with similar ecosystems. On the other hand, the Flamingos Group network (GCFA), which includes Argentina, Bolivia, Chile and Peru, is integrated by government institutions, NGOs and universities from the four countries, and has planned joint actions that include important aspects of the Flamingos and their habitat conservation as part of the Ramsar Convention and the Convention on Migratory Species. Therefore their participation in this strategy is considered significant. Likewise, substantial input is expected from international organizations related to the Ramsar Convention.

At the national level, it has been planned to link the Strategy to the policies and national /province/ local development plans, emphasizing the matters related to Biodiversity (National Biodiversity Strategies), Water Resources (National Water Plans), Water Basins, Agriculture, Tourism, Culture, and others, from the beginning of its implementation.

It is also important to consider that this Strategy must take into account the high levels of poverty in the High Andean region, which is the result of a historical process of geographical and social inequality. Therefore, measures that help mitigate poverty must be incorporated, based on conservation and sustainable use projects, in order to increase employment options and income for the local peoples and improve basic services. This should include planning the expansion of the drinking water service for these peoples in a way that will not deteriorate wetlands.

The growing needs of these communities and the lack of planning are generating an increased competitiveness for the use of resources, especially water, resulting in numerous conflicts. For that reason it is necessary to organize the use of wetland resources with the participation of local peoples and achieve a more equal access and distribution at a local, national and regional scale. It

is important to consider that if the local populations do not obtain economic benefit from the wetlands, it will be very difficult to preserve them.

5. Strategic Framework

5.1 Mission

To preserve and wisely use wetlands and wetland complexes that are part of the *páramo*, *jalca* and *puna* ecosystems, which are functionally associated, as well as other High Andean formations, in order to reinforce the regional processes that lead to maintaining biodiversity and assuring the supply of environmental goods and services offered by these environments to the local communities and to the public in general.

5.2 Vision

Within the next ten years countries that are part of this strategy will develop an integrative and regional management system of High Andean wetlands that will contribute to the supply of environmental goods and services and the conservation of biodiversity related to them.

5.3 Strategic Scope

This strategy considers actions oriented to the sustainable use and conservation of the High Andean wetlands and wetland complexes that are part of the *páramo*, *jalca* and *puna* ecosystems and other High Andean formations, as well as ecosystems functionally related to them.

For its development and execution, this strategy is targeted to local, rural and urban beneficiary communities, local and national government entities, NGOs, productive sector (e.g., industry, trade, tourism, agriculture, mining, etc.) and academic and research institutions related to the conservation and wise use of High Andean wetlands.

Even though the Strategy will be a framework tool of suggested actions on a regional basis, it will also serve as a foundation to prepare and/or update the Action Plans for High Andean wetlands in each country, which will be the instruments to articulate conservation and wise management actions in every nation.

General Objective

Promote sustainable use and conservation of the High Andean wetlands through the implementation of a long-term regional management process among the involved countries, in order to maintain the goods and services provided by the wetlands and reduce the existing impacts and threats.

Specific Objectives

Objective 1. Develop a shared vision of the High Andean wetlands through coordination mechanisms and strengthening of regional capacities.

Objective 2. Complete and improve the scientific and technical knowledge on High Andean wetlands and other functionally related ecosystems, in order to support their sustainable use and conservation.

Objective 3. Promote conservation, management and sustainable use of natural and cultural resources of High Andean wetlands, and the goods and services related to them, through appropriate management.

Objective 4. Strengthen education and communication processes to increase public awareness on the importance and value of High Andean wetlands.

Objective 5. Achieve articulation of wetland conservation policies among the countries in the region.

Objective 6. Design and implement a follow-up and assessment system for the wetlands strategy, in order to guarantee sustainability in the mid and long terms, at a regional, national and local level.

5.6 Principles

The principles established in the Ramsar Convention, the Convention on Biological Diversity and all other related international conventions will be taken into account. These should enclose a long-term vision aimed to maintain the functions, values and services, dynamics of the ecosystems, ecological and evolutionary processes, diversity patterns, the policies that assure equal distribution of services and goods, and the feasibility of development processes. Special reference is made to the following principles:

Ecosystem Approach

The strategy will be implemented under an ecosystem approach to maintain or restore the High Andean wetlands, their functions and values, to promote their conservation and sustainable use in a fair and equitable manner, through integration of ecological, economic and social factors, within a geographical framework mainly defined by ecological limits. (Convention on Biological Diversity).

Sustainability

Coordinated, articulated and responsible participation of government and non-government sectors, local communities, indigenous peoples, private and academic sectors will promote wise use and conservation of the High Andean wetlands as strategic ecosystems within the hydrological cycle that support economic, social, environmental and cultural activities.

Participation

Due to their ecological characteristics and the benefits they provide, the High Andean wetlands are ecosystems that integrate several interests of society; therefore their conservation, restoration, management and wise use must be a joint task, coordinated among the state, the communities, social organizations and private sector. The participation, including decision-making, of people who live in the wetlands is key to achieving conservation and assuring that the different utilization modes are sustainable. Promoting participative processes should also include enough and appropriate distribution of information, according to the participants' characteristics.

Knowledge and respect for cultural diversity

Cultural diversity is considered part of biodiversity. The rich heritage of the Andean cultures, particularly in regards to the use of natural resources and traditional knowledge related to them, technologies, and perceptions of water and the environment in which they live, must be valued when implementing projects or carrying out interventions. Institutions must recognize the rights of indigenous, peasant and/or traditional communities and their autonomous ways of organization.

Integrated vision

Due to the value of the High Andean wetlands as strategic and vital ecosystems for the current and future development of the countries in the region, their management, wise use and conservation require an integral vision to ensure their sustainability, considering ecological, social and environmental criteria.

Prevention

Given that any change in the characteristics of the components of the High Andean wetlands directly and globally impacts the functioning of these and other adjacent ecosystems, all activities must be responsibly and completely analysed, especially in situations in which uncertainty of the precise cause-effect relationship prevails. For this purpose, when uncertainty exists about such interactions, the preventive approach must be applied.

ACTION PLAN

STRATEGY ACTION PLAN FOR HIGH ANDEAN WETLANDS	
OBJECTIVE 1: Develop a shared vision of the High Andean wetlands through coordination mechanisms and strengthening of regional capacities	
Expected Result	Activity
1.1 Governments, multilateral and bilateral bodies, regional bodies, international organizations related to the Convention, specialized networks, social groups, base organizations, NGOs and other involved actors support and participate in the High Andean wetlands strategy implementation.	Obtain commitment from the Contracting Parties in the subregion, through their Ramsar Administrative Authorities, to officially adopt this Strategy
	1.1.1 Establish a coordination mechanism among the participant countries of the High Andean wetlands initiative
	1.1.2 Develop participation mechanisms for other public and private organizations, social groups and interested actors in the Strategy implementation.
	1.1.3 Make information exchange on the High Andean wetlands effective, between the Ramsar focal points and other interested actors.
	1.1.4 Technical and scientific assistance for High Andean wetlands management to the signatory countries, from international organizations related to the Ramsar Convention (Wetlands International, IUCN, WWF and Birdlife International), specialized technical networks (High Andean Flamingo Conservation Group and Grupo Páramo) and other relevant agents.
	1.1.5 Implement articulation mechanisms with Conventions, including Biodiversity, Desertification, Migratory Species, Climate Change and CITES.
	1.1.6 Implement articulation mechanisms with regional integration organizations (ALCA, MERCOSUR, CAN, ACTO, etc.).
	1.1.7 Establish articulation mechanisms and agreements for the management and conservation of regional wetland networks, wetland corridors, shared and/or transboundary wetlands.
1.2 Active participation of all relevant actors has been achieved in the regional action plan implementation.	1.2.1 Socialize the strategy through the national wetlands committee (Ramsar).
	1.2.2 Integrate main priority activities of the Strategy into the wetlands committee work plan
	1.2.3 Systematize and promote exchange of participative environmental management experiences.
	1.2.4 Integrate a border control strategy for traffic of flora and fauna connected to the wetlands.

1.3 The signatory countries have adopted the regional ecosystem vision for an efficient and integrative management of the High Andean wetlands.	1.3.1 Develop, adapt and validate instruments and guidelines for the application of the ecosystem approach in the management of High Andean wetlands
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OBJECTIVE 2: Complete and improve scientific and technical knowledge on High Andean wetlands, and other functionally related ecosystems, in order to support their sustainable use and conservation	
Expected Result	Activity
2.1 Biophysical and social characteristics of the High Andean wetlands have been diagnosed, evaluated and assessed.	2.1.1 Identify and prioritize national and transboundary wetlands and/or wetland networks that share species
	2.1.2 Develop integrated regional and national assessments of High Andean wetland conditions and their related resources.
	2.1.3 Evaluate and assess water resource conditions related to High Andean wetlands.
	2.1.4 Reinforce and develop research on appropriate alternative technologies required for the sustainable management of High Andean wetlands.
	2.1.5 Retrieve, systematize and assess the knowledge related to best traditional management and conservation practices of the High Andean wetlands that can be replicated
2.2 There is a system for environmental, economical and social monitoring and assessment of High Andean wetlands, articulated to research centres and universities.	2.2.1 Establish a system to monitor the environment and development activities (tourism, mining, infrastructure, traditional use, etc.) in High Andean wetlands, in order to look after the environmental quality of their resources (natural, cultural and landscape).
	2.2.2 Determine common parameters to carry out social, economic and environmental baseline studies of the High Andean wetlands, linked to a monitoring system.
	2.2.3 Integrate a shared regional information system, using the established platforms.
	2.2.4 Prepare a homologated glossary of terms related to the High Andean wetlands.
	2.2.5 Prepare and integrate a directory of organizations and specialists who work in High Andean wetlands.

OBJECTIVE 3: Promote conservation, management and sustainable use of natural and cultural resources of High Andean wetlands and the goods and services related to them.	
Expected Result	Activity
3.1 Conservation strategies have been defined and areas have been designed	3.1.1 Identify and designate new Ramsar sites, shared species corridors, wetland networks

for conservation of priority wetlands and/or important historic and cultural sites located in High Andean ecosystems.	and/or other conservation figures (national and/or transboundary).
	3.1.2 Identify and prioritize threats to the High Andean wetlands, as well as their mitigation alternatives.
	3.1.3 Effectively apply conservation strategies for the historic-cultural sites located in the High Andean wetlands.
	3.1.4 Identify wetlands that must be restored for their importance as habitats for biodiversity and supply of environmental goods and services.
	3.1.5 Develop and apply technical tools for the conservation of the habitat, species, genetic resources and historic-cultural resources of High Andean wetlands, particularly for those under serious threat.
	3.1.6 Implement mechanisms for local population participation in planning and execution of conservation projects.
3.2 High Andean wetlands are being sustainably used.	3.2.1 Support demonstrative projects on sustainable use of wetlands that may be applied in other places.
	3.2.2 Promote sustainable activities in wetlands where possible.
	3.2.3 Adapt and validate the sustainable use principles from Addis Ababa, and other applicable principles, to the High Andean wetlands
	3.2.4 Support the transfer of clean technologies and the recovery of traditional knowledge, especially in those cases that can be replicated.
3.3 Guidelines and directives for the integrated management of the High Andean wetlands and related basins are in place.	3.3.1 Promote the use of mechanisms for conflict resolution related to territorial ordering (land property, urban development, etc.) and water use.
	3.3.2 Generate strategic guidelines and directions to orient the preparation of territorial ordering plans, related to High Andean wetlands.
	3.3.3 Prepare and implement management plans for Ramsar sites and other priority wetlands.
	3.3.4 Promote economic assessment exercises of environmental services from the wetlands.

OBJECTIVE 4: Strengthen education and communication processes to increase public awareness on the importance and value of High Andean wetlands.	
Expected Result	Activity
4.1 Managers, decision-makers and local communities have been trained in all the signatory countries to the Convention that participate in the High Andean Wetlands Strategy.	4.1.1 Develop an integrative training plan in scope and content on High Andean wetlands, with the support of the Ramsar regional training centre (CREHO), addressed to the actors involved in participating at the sector level and establishing alliances with subregional existing programs, linked to the current strategy
	4.1.2 Establish and/or reinforce Environmental Interpretation Centres as well as other educational mechanisms on High Andean wetlands.

	4.1.3 Incorporate High Andean wetlands conservation subjects to the education curricula of schools in the High Andean areas, and prepare educational materials to develop these curricular components.
4.2 The importance and value of the High Andean wetlands has been spread in all countries	4.2.1 Prepare educational manuals and materials on best practices and sustainable use of High Andean wetlands for tourists, visitors, local communities, education centres and other interested actors.
	4.2.2 Network and promote sustainable activities in High Andean wetlands with emphasis on tourism.
	4.2.3 Inform government officers, authorities, decision-makers and communities on the importance of High Andean wetlands.
	4.2.4 Design and publish communication campaigns at several levels to increase citizenship awareness on the conservation of wetlands
	4.2.5 Develop exchange activities and publications on successful experiences and lessons learned on integrated and sustainable management of the High Andean wetlands.

OBJECTIVE 5: Achieve articulation of High Andean wetland conservation policies among the countries in the region	
Expected Results	Activity
5.1 Political instruments and mechanisms applied to promote the conservation of High Andean wetlands.	5.1.1 Promote regional policy instruments for the conservation and sustainable use of the High Andean wetlands.
	5.1.2 Prepare a guide of procedures to assess the environmental impact of activities developed, or to be developed, in the High Andean Wetlands, including Environment Impact Study, Strategic Environmental Assessment, and Environmental Audit.
	5.1.3 Permanent information exchange on case studies of environmental assessment in projects executed in High Andean wetlands and/or their areas of influence.
	5.1.4 Define common management regulations for economic sustainable activities, with emphasis on tourism, and include even distribution of benefits to the local peoples.
	5.1.5 Promote the inclusion of analysis of alternatives within all categories of environmental impact assessment, to reduce negative impacts.
	5.1.6 Develop criteria to assess environmental damage and risk in High Andean wetlands, in order to promote appropriate corrective measures.
	5.1.7 Encourage organizations and networks related to Ramsar in every country, and other key organizations, to include specific activities to implement the strategy as part of their action plans.
5.2 Mechanisms implemented to mitigate or compensate environmental impact derived from the use of High Andean wetlands.	5.2.1 Apply mitigation or compensation mechanisms for environmental impacts in High Andean wetlands, in countries executing the Strategy.

5.3 Sustainable management of the High Andean wetlands respects the way of life, land use rights, and sustainable ancestral practices of indigenous groups that live in these ecosystems.	5.3.1 Recognize the life style and ancestral sustainable practices of indigenous groups that live in the wetlands in each country executing the Strategy.
5.4 A regional judicial framework in place which provides legal support to conservation and management activities of the High Andean wetlands.	

OBJECTIVE 6: Design and implement financing, follow-up, and assessment mechanisms for the wetland strategy, in order to guarantee sustainability in the medium and long terms	
Expected Result	Activity
6.1 The High Andean Wetlands Strategy has a follow-up and evaluation system.	6.1.1 Create a committee to follow up the Strategy application, and a financial mechanism that allows its effective execution.
	6.1.2 Follow up of the financial strategy implementation by the follow-up committee.
	6.1.3 Prepare annual reports of the Strategy, taking into account the status of achievement with regard to the objectives.
6.2 Financial resources have been obtained to implement the High Andean Wetlands Strategy.	6.2.1 Communicate information on the High Andean Wetland Strategy to international cooperation bodies, environmental NGOs, governments, etc.
	6.2.2 Formulate proposals and negotiate with financing entities.
	6.2.3 Prepare a project portfolio as a mechanism for fundraising.
	6.2.4. Create a permanent capitalization fund, with independent areas, to be applied in conservation projects and programs.

Annex 1

Situation analysis by country Summary

Argentina

Estimated coverage of High Andean and *puna* wetlands: around 6.000 km² (on the area between parallels 22° to 20°S)

There are two types of highland environments in the Central Andes in Argentina (in the provinces of Jujuy, Salta, La Rioja and Catamarca): High Andean and *puna*. The High Andean environments are located above 4000 mosl, while *puna* wetlands are located between 3000 and 4000 mosl.

This does not include high wetlands or similar wetlands in other latitudes such as Patagonia.

A trend of degradation and fragmentation of these wetlands has been detected. However, pressures, degradation and fragmentation processes are much more prominent in the altitude level of *puna*, compared to the High Andean level, because they have conditions that are less disadvantageous for human activities. Actually, biodiversity reduction is caused by reduction of water supply and by direct extractive actions on the flora and fauna of the *puna* wetlands.

The most affected types of habitats are *vegas* and *bofedales*, in other words, freshwater habitats, because of extraction for mining and because of over-grazing and non-sustainable local practices, such as capturing water birds (flamingos, coots, ducks, ostriches).

Non-regulated tourism exploitation affects all High Andean wetlands accessible by four wheel-drive vehicles. Degradation caused to the landscape and impact on biodiversity (extraction of flora, chasing away fauna) are particularly evident in the Catamarca Province.

Bolivia

Bolivia has a great coverage of High Andean wetlands (37.500 km²) and the Ramsar sites in this region represent 48% of this coverage. However, it is necessary to incorporate some representative ecosystems such as *bofedales* or highland *vegas*.

High Andean wetlands enclose a high biodiversity and host endangered and endemic species, northern migratory birds, and provide multiple services to local population.

There is a series of pressures and threats on High Andean wetlands, including degradation of *bofedales*, introduction of non-native livestock, pollution from mining, industry, waste waters and solid wastes, as well as degradation of soil due to intensive use and over-grazing, intensive use of vegetation as fuel (firewood) and fodder, and great works of infrastructure that result in impacts which cannot be managed appropriately.

There is a trend to lose specific areas such as *bofedales*, *totorales* and areas with archaeological remains.

There is degradation of native prairies, ligneous formations and general impoverishment of the vegetal covering, with an increase of soil erosion, increased salinity and loss of soil productivity.

Continuously increasing tourism activity must be regulated and planned to avoid pressure on these fragile ecosystems.

There is no national policy or strategy for conservation of wetlands. The legal framework for environmental matters has problems of dispersion and it is old, as in the case of water resources matters.

Not all High Andean Ramsar sites are within protected areas; therefore, they don't have an effective environmental management.

Human dimension

The highland zone occupies 27% of the total nation's surface, within which there are rural areas where approximately 1.5 million people live. Because of the characteristics of the region, only subsistence agriculture is practiced – commercial forest production is low, though some species such as *yareta*, *keñua* and *tola* are intensively exploited. Mining has a great importance in the region, with a serious impact on the environment.

Population density in the highlands of Bolivia decreases from north to south or from the semi-arid *Puna* to the hyper-arid Puna, ranging from 25 to 37 people per km² to practically unpopulated zones. There is a general decreasing trend of rural population in the highlands due to migration to urban areas and neighbouring countries.

In this region of the country, most of the population are Andean indigenous people, who mainly speak Aymara and Quechua.

Among pressures, there is poor organization in terms of land use and a problem of polluted water sources that limits water use for human consumption, irrigation, fishing, etc.; there is inappropriate disposal of solid wastes in peri-urban and rural areas adjacent to some urban centres, over-exploitation of land, and overlapping of cultural and economic systems.

The main objective of the legal framework is the economic development of the sector, but environmental conservation is given second or third place importance.

There are not enough economic resources for programs and projects with a real and effective participation of local communities aimed at conservation and sustainable use of renewable natural resources.

There is a trend to lose cultural values and traditional sustainable practices and knowledge.

Generalized poverty in the area, lack of basic services and opportunities for improvement, geographical isolation, and precarious economic conditions will very likely lead to an increase in productive pressure on the ecosystems and natural resources of the Bolivian High Andean region in the near future.

Chile

High Andean wetlands are common ecosystems in the Central Andean Region and they are located in the desert plateaus over 3,500 m of altitude, except for Salares de Atacama and Punta Negra, located at approximately 2,300 mosl. Because of their characteristics, the *Puna* eco-region, to which these ecosystems belong, has been qualified by the Biodiversity Support Program et al. (1995) and by Dinerstein et al. (1995) as vulnerable, and with highest priority for conservation.

Around 52 basins have been described in the Chilean Puna (Niemeyer, H. Y P, Cereceda, 1986), forming lacustrine systems and High Andean salt pans of various extensions, characteristics for high biodiversity, great nutrient content and high primary productivity within the extreme dryness in which they develop (see the list of High Andean wetlands in Chile in Annex N°1).

The wetlands considered High Andean wetlands are those located in the ecosystem of the *Puna*, in the Central Andean Area of northern Chile⁸, that belong to all the hydrological systems supplied by snowmelt water from the high mountains. This water generates springs, *vegas* and *bofedales*, rivers, lakes, lagoons and salt pans that sustain and facilitate concentration of the biodiversity that is representative of the *Puna*.

This vast zone involves the administrative regions of Tarapacá, Antofagasta and Atacama, geographically located between parallels 18° and 31° south latitude, in the intermountain basins, particularly over 3,500 m altitude, except for Salares de Atacama and Punta Negra, located at approximately 2,300 mosl. The area of the Chilean *Puna* has around 52 lacustrine systems and salt pans, with a variety of extensions, and a system of *vegas* and *bofedales*, which are characteristic for their high biodiversity, within a context of extreme dryness in which they develop.

High Andean wetlands have been identified in the regions of Tarapacá, Antofagasta and Atacama and their importance has been clearly established for several cities in the north of Chile, such as Arica and Antofagasta, which are beneficiary of the High Andean wetlands in terms of water supply, in addition to their value for local communities, tourism sector, and mining.

The mining boom in the north zone of the country during the last decade has been characterized by the exploitation of great mines owned by multinational companies. The mining projects are mainly located in the *puna* ecological region, and they are usually related to biological diversity centres and High Andean wetlands, as well as indigenous territories.

One of the major environmental potential impacts related to the great mining projects is significant alteration of wetlands or aquifers that they use to obtain water for their productive processes. Currently, the environmental variable has been incorporated to the strategic management of the mining companies, from the exploration to the closing stage. As a result, projects carry out rigorous environmental management programs, monitoring and impact mitigation in wetlands, the majority of which are formalized within the Environmental Impact Assessment System of the Law on the Fundamentals of the Environment, which is aimed to maintain the ecological balance of endangered lacustrine systems.

⁸ High Andean wetlands in Chile are part of the *Puna* eco-region (Dinerstein et.al. 1995), which is between 3.000 and 4.500 m over sea level, covering the South of Peru, Southwest Bolivia, Northwest Argentina and the North of Chile, between 14° and 32° S.

In regards to local wetlands, the relationship between production, ecosystem and cultural processes generates a very active public-private multisectoral interaction that gives fundamental importance to conservation for sustainable development in the north zone of the country.

Conclusions

- High Andean wetlands are considered multifunctional strategic ecosystems and therefore their natural and cultural resources are currently valued in the country, the region and locally. This allows a certain degree of control on the threats that affect these ecosystems.
- High Andean wetlands in the north of Chile have a tendency towards desiccation due to natural and man-caused effects. An increase in pressure from water use for mining and household use has been estimated for the next few years. This situation, considered as a strategic limitation for the development of the region, has triggered a strong investment in technological development to optimize the use of water resources and to seek new sources that will not continue affecting the High Andean wetlands.
- Participation of indigenous communities and public services in the conservation management of wetlands is a determining factor that will facilitate building local governance in the High Andean territory, gradually incorporating the private tourism and mining sectors. Within this context, the Areas of Indigenous Development constitute an efficient tool to achieve these objectives.
- Eco-ethnic-tourism in the High Andean zone is seen as the articulating axis for local development, based on sustainability criteria, which will make it possible to regulate tourism, coordinate protective actions, and generate economic benefits to local communities. It may become an initiative that will gather the High Andean peoples around a vision that is part of global development frameworks that enclose objectives of common well being and territorial and cultural preservation.
- Taking into consideration the dynamics of investment and development of environmental and social policies in Chilean mining, it has been estimated that this sector will play a fundamental role in research, environmental monitoring, protection, and local development, within the context of integrated territorial management impelled by national and local governments.

Colombia

High Andean wetlands in Colombia are associated to the *páramo* and High Andean forest ecosystems in the geographical provinces of the high mountains, with an altitude greater than 3,200 mosl, and the Andean or mountainous eco-region with an altitude of 1,000-3,200 mosl.

The *páramo*, covering approximately 2% of the surface in Colombia, is recognized for its high botanical value, as well as its role in the regulation of regional hydrology.

Many lagoon environments in the eastern range, which are surrounded by land that has been occupied from time immemorial, have suffered transformations and have lost their capacity to recover. As most aquatic environments in the country, these were also subject to voluntary or involuntary introduction of animal and vegetal species, without knowledge of the possible

implications. With regard to the introduction of fish, the most outstanding for their “adaptation” were the *arco iris* trout and the herbivorous carp – the former is thought to be responsible for the extinction of native fish species and for the decrease of biodiversity; however, four species have been reported living with trout in the same environments where the conditions and quality of the habitat allows their development, in the Cundiboyacense west range highlands. The trout has also been held responsible for the “supposed” extinction of the endemic fatty fish of Lake Tota, though neither the presence nor the extinction of this fish due to the introduction of trout has been proved. On the other hand, the herbivorous diet of the carp does not make it compete for food with native species.

The Fúquene lagoon is a clear example of this problem. In this place, proliferation of aquatic plants enhanced sedimentation and accelerated the processes of soil increase in the shallowest areas of the lagoon. This in turn has facilitated the advance of the agricultural boundary over the land gained to the wetland. There is evidence that shows that this retrocession has been for the benefit of some private users. The colmatation process in the lagoon has been partially documented by researchers at the “Jorge Tadeo Lozano” University (Cortés, op.cit.), who found that the lagoon had lost 659 hectares within a period of 28 years (between 1955 and 1983), producing benefits for the owners of the neighbouring lands, who use the conquered land to grow pastures for dairy cattle.

Similar events have taken place in the remaining lakes and lagoons of the Andean zone, such as Tota and La Cocha, but due to the limnological characteristics of these ecosystems and the lower pressure and deterioration on their catchments, weeds have not grown in the same way.

A drastic effect on wetlands has been caused by the introduction of aquatic plants (“weeds”) such as elodea (*Egeria densa*) and *buchón de agua* (*Eichornia crassipes*), which proliferated in an accelerated way with the increase of nutrients in the waters where these plants were introduced.

There is a current threat for wetlands in the eastern range that could cause many of them to disappear in a short period of time, that is, the alteration of the hydric regimes and the resulting claim for physical space. The owners of land whose boundary is the body of water have managed to change the maximum flooding levels, which is the same case as in Lake Tota, where the natural outlet of the lake was altered in order to incorporate shallow lands of the wetland to agricultural practices.

In order to meet the obligations under the Ramsar Convention, as well as the functions assigned to the Ministry under Law 99 from 1993, such as regulations for conservation conditions and management of swamps, marshes, lakes, lagoons and other inland hydric ecosystems, the Ministry of the Environment (currently Ministry of Environment, Housing and Territorial Development) prepared and published the *National Policy for Inland Wetlands: Strategy for their conservation and sustainable use* in 2002. The main objective of this document is to promote conservation and sustainable use of the inland wetlands in Colombia in order to obtain and maintain ecological, economic and socio-cultural benefits as an integral part of development for the country.

Ecuador

Wetland systems are located in 11 provinces in the sierra that comprise the High Andean zone of Ecuador.

Within this group of wetlands, 36 are considered wetland systems and 23 are considered isolated wetlands, making a total of 59 High Andean wetlands and enclosing an approximate area of 661,309 hectares.

High Andean wetlands constitute an approximate total area of 661,309 Has in the country, including micro-basins.

The most outstanding pressures are:

- Burning of *páramos* by cattle owners has caused loss of vegetation and soil erosion
- There is soil degradation due to intensive agriculture; in many cases there is no control in the use of chemicals for this activity.
- There are infrastructure works like roads and dams that have caused serious impacts to the wetland systems.

Underlying causes:

- There is no system to eliminate waste waters, no sanitation services or solid waste elimination, which turns into a threat of pollution for the soil and water of rivers and watersheds.
- In general, wetlands are important for the conservation of the ecosystem due to their particular characteristics; therefore, the communities should be taught about the importance of maintaining wildlife resources and the resources of the ecosystems in general.

Peru

Peru is located in the central and western part of South America and comprises a surface of 1,285,216 km². The Andes Range crosses the country from north to south, parallel to the coast, with altitudes over 5,000m, except for the north, where there is a gap that goes down to 2,200m, called the Huancabamba depression.

Using the Andes Range as a reference, the country is divided into six physiographic regions: **The Coast**, from sea level to an altitude of 1,000m; **The Western Watershed** of Los Andes, between 1,000 and 3,500m high; **The Puna**, above 3,500m, located south of the Huancabamba depression, between the western and the eastern watersheds; **The East Watershed**, from 1,000 to 3,500m of altitude; **The Amazonian Plain**, under 1,000m; and the **Páramo or Jalca**, in the high area, north of the Huancabamba depression.

The *páramo* or *jalca* is an ecosystem that is very similar to the *páramo* in the north (Ecuador, Colombia and Venezuela). It can be considered an extension of the Andean *páramo* to the south, but with its specific particular characteristics. The *puna* can be distinguished by its wide fluctuations of weather, with frequent droughts and freezes; there is dry *puna* to the south, in the western watershed of Los Andes, and the wet *puna* towards the eastern range of Los Andes, where more humid weather generates better conditions of pastures, mainly used to raise domestic camelidae.

Venezuela

The *páramo* in Venezuela is over 3,000 mosl, even though there are some exceptions where some of these ecosystems can be found over 2,500 mosl (Monasterio 1980a, in: Hofstede *et al.* 2003). In its lower limit, it is bounded with Andean forests and jungles. They are mostly located in the states of Apure, Táchira, Mérida, Barinas, Trujillo, Lara and Zulia, the Mérida Range, mountainous areas of Tamá and Trujillo, and Sierra Perijá.

As of July 2005, Venezuela did not have Ramsar sites in High Andean Zones yet, but it was going through an active process of participation in the current Regional Strategy and other relevant initiatives (i.e., GEF Páramo Project) that will very likely result in strengthening of national management of high mountain wetlands for the next few years.

Costa Rica

The mountain wetlands are located in the Talamanca Range, distributed between Parque Nacional Chirripó, Cerro de la Muerte, Reserva Forestal Los Santos and Parque Nacional Tapantí - Macizo de la Muerte. It is quite a heterogeneous zone in terms of weather and ecosystems, which has resulted in development of a great number of vegetal associations, such as peatlands and *páramos*, typical of the Andean environments. In general, altitudes range from 700 to 3,491 mosl. However, peatlands are from 2,600 to 3,290 mosl (Chaverri, under prep.)

Parque Nacional Chirripó is located within the area, and it includes the highest mountain in the country, 3,820 meters over sea level.

The Ramsar site Turberas de Talamanca covers an extension of 192,520 hectares, and there are altitudes that usually range from 700 to 3,491 mosl. However, peatlands are found between 2,600 and 3,290 mosl (Chaverri, under prep.).

The Talamanca Range has a process of formation that is very similar to the process that originated the Andean Range (subduction tectonism with associated vulcanism). This is why some people consider it the “Central American Andes”. Lightly biased towards the Pacific watershed (because of the narrow area in the Central American isthmus), it reaches altitudes over 3,800 meters in less than 40 kilometers from the coast.

A very interesting geomorphologic discovery at Parque Nacional Chirripó consists of the varied shapes and patterns of “U”-shape glaciers, moraines, glacial terraces, lakes, and cirque glaciers that were witness of the flow of big banks of ice, with an extension that does not exceed 2 or 3 km. (Boza, 1998).

This area protects the upper basin of Río Chirripó Pacífico, which is an affluent of the great Térraba River basin, as well as the upper basin of Río Chirripó Atlántico, main affluent of the Matina River. Protecting these basins, and their countless number of streams and springs, will provide the inhabitants downstream with a high quality of water for domestic, agricultural, industrial, entertaining and hydro-electrical uses.