



**Biodiversidad, Conservación y Desarrollo Sostenible**

"POLICIES ON CAMELID PASTORALISM IN THE  
ANDEAN HIGHLANDS OF BOLIVIA"

*Elaborated within the Framework of the:*

*"The World Initiative for Sustainable Pastoralism Project"*  
WISP - UICN

*THE FIRST PROVISIONAL REPORT*



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# **POLICIES ON CAMELID PASTORALISM IN THE ANDEAN HIGHLANDS OF BOLIVIA**

## **INTRODUCTION**

### ***Background of study***

*This is a provisional report prepared in the context of the SAVIA process within the framework of “The global initiative for sustainable pastoralism’ WISP*

*This is one of the five worldwide case studies from Bolivia.*

*The information given here is intended to be the basis for the analysis and diagnosis of problems related to the management of local Camelids reared mainly in the high Andean humid lands normally referred to as Bofedales or plains.*

### ***Methodology***

*SAVIA has prepared this document by compiling and revising different sources of secondary information that was expanded after an intense amount of field work carried out by the SAVIA inter-disciplinary technical team in a collaborative manner as well as with the participation of the communities that keep the Llamas in the South Western district of Potosi and more specifically, in the local areas of Alota, Sora, Turuncha and Quetena Grande as well as in the Alpaca rearing communities who live in the interior of the Area of Integrated Management of Apolobamba in the Northern district of La Paz. Both regions constitute geographical areas where SAVIA has already been carrying out its activities for some years*

*The elaboration of policies for sustainable pastoralism presented in this document has been done from a collective reflection carried out by the SAVIA team and the local indigenous community actors who keep Camelids that are native to the two areas of the mentioned study. This was done with the occasion of five community workshops that were held between January and April of this year.*

## 1. DIAGNOSTICS

### 1.1. The history and origins of pastoralism in the high Andean regions

*Camelid livestock farming just like other kinds of pastoral activities is based on a particularly interesting domestication process which occurred in the South American Andes several thousands of years ago.*

*The domestication of wild species is an ecological and cultural process which developed among different human groups from the prehistoric times, by means of which the successful selection of new species from parental or original species was achieved. The process was undoubtedly closely related to systematic and repeated experimentation. The domestication efforts were carried out with the aim of obtaining goods, principally foodstuffs (grain, fruit, meat, milk, eggs etc.) but also for obtaining goods for other uses such as fibres, medicinal and hallucinogenic substances, wool, hide or beasts of burden etc. In the case of animals such as the Llamas the process may have been as follows: - the nomadic hunting or transhumance and the gradual increase in knowledge of the social and territorial behaviour of the animals initially predominated (guanacos and vicunas in the case of the Camelid of the Andes), in addition to this the increased human control over the areas inhabited by the animals and the eventual capture of young animals, man gets to know the benefits that proceed from them (meat, wool, milk, hide) and the captive animals feed on vegetables that he does not need to use.*

*It can be presumed that some groups of the proto-Llamas (split from the Guanacos) or the proto-Alpacas (split from the Vicunas), were benefited from the proximity to man since they were not hunted as often as they used to by other hunters or by the Puma and that encouraged them to remain close to the domesticating human groups since they found some degree of protection. This new closer relationship that was reached between the two groups made the "predator-domesticator" cease to hunt the herds that roamed nearby. Thus, breeding in captivity started and semi-domesticated groups were developed and which led to a progressive selection of preferred characteristics which produced the goods required (beasts of burden, wool, meat and tame animals).*

*Some have subscribed to the hypothesis that the beginning of the agricultural phase provided an "oasis" to certain animal species, an element of enticement or a point of contact between these species and humans, and in some cases man would have been more interested in getting to know them or in enticing them to friendship rather than hunting.*

*In this sense, the domesticated Camelids of the highlands are the **Llama** (*Lama glama*) and the **Alpaca** (*Lama pacos*). A particularly important feature is the finding of sites of ancient hunters in several regions of Peru, Ecuador, Chile and Bolivia with remains of Guanacos and Vicunas, but not of Llamas and Alpacas. This underscores the theory that the Llama was domesticated from the*

*Guanaco and the Alpaca from the Vicuna. Different ecological estimations give the impression that 8.000 or 10.000 years ago, the first groups of the ancient hunters/collectors occupied the Andean landscape and used to co-exist in this paleo-ecosystem with large Camelid flocks (Mainly Vicunas and Guanacos) According to the latest research findings, 8000 years ago the human-Camelid relationship in the Andean world, was still characterized by hunting. It is postulated that 6000 years ago the process of domestication and the formation of nomadic or itinerant groups of shepherds since settling down for agriculture had not yet taken place. It is theorized that settlement with the domestication of crops such as potatoes, cassava quinoa, cañahua and others occurred 5000 years ago. This also implied the settlement of Camelid livestock rearing and undoubtedly the improvement of domestication. It is important to note that the role of the Bofedal ecosystem is a basic element that favoured or facilitated the domestication process of the Camelids.*

*In the specific case of the Camelids, regions such as Sajama, Curahuara, Ulla Ulla, or Lipez were undoubtedly areas of domestication of Llamas and Alpacas right in the middle of the Holocene period.*

## **1.2. GENERAL ASPECTS OF CAMELID BREEDING IN THE PUNA AND HIGH ANDEAN OF BOLIVIA**

### **1.2.1. Physiographic and geomorphologic description**

*The eastern mountain range also referred to as the royal is characterized by its high mountain chains with intrusive geological characteristics and composed of batholithic granite rocks, metaphoric rocks such as litotes and sedimentary rocks such as sandstone. The extended landscapes of the eastern Andean mountain ranges are formed by:*

- a) High peaks and mountain ranges with glaciers that have snow above 5.400m, even though several mountain chains up to 30 years ago had snow, currently those same areas do not have any snow due to the melting of the snow, on account of global warming.*
- b) High table mountains, hilly mountain bases are characteristic of a Pleistocene landscape.*
- c) Wide glacial valleys and rolling semi plains formed by the fluvio-glacial phenomenon of the Pleistocene.*

*The Western mountain range region is referred to as the physiographic region or province of the Western volcanic mountain range due to its predominantly igneous-effusive geological origin.*

*There are four main types of physiographic landscape:*

- a) Volcanic mountainous chain or volcanic landscape, represented by high peaks, volcanoes and mountainous chains and hills.*

- b) *Ignimbrite plateaus that usually form extended highland plains that are basically part of the volcanic landscape*
- c) *Volcanic hills ending in cliffs that are located on the lower parts of river estuaries.*

*The Puna regions that are below 4.200m, are mainly wide silted plains mostly as a consequence of quaternary lake and river deposits in the glacial valleys, that range from the surrounding zone to the Lake Titicaca up to the Lipez region in the central part of Potosí. Although the topography is strikingly flat, for which reason it is generally referred to as the highland plains, it has many mountainous enclaves and smaller mountain chains. Two outstanding physiographic and landscape characteristics of the Puna region of Bolivia are Lake Titicaca to the North and Salar de Uyuni (the largest in the world) to the south.*

### **1.2.2. Climate**

*The high Andean eco-region is found in the altitudinal range of 4.200 and 5000m above sea level, surrounding the high or volcanic eastern and western chains. The eco-regions of Puna or rather the plateaus are generally below 4.200 meters and even as low as 3.600 m above sea level. It is in these inhospitable regions that Camelid breeding has been carried out for over 6000 years.*

*The climate of the Puna and high Andean region varies from cold to extremely cold or oligothermic with average temperatures of below 6°C often reaching even below 0°C almost every day, but with a great diurnal variations. The extreme lowest temperatures can reach between -15°C and -30°C mainly in the months of May and June.*

*The patterns of humidity vary from sub-humid with an average rainfall of 700mm in the Northern mountain range region, to extremely dry to the south which is also desert, and where the average annual rainfall is below 150mm annually ( to 60mm per year), mainly in the months of December and February.*

*From the climatic point of view it is a high risk region, with periods of extreme drought in some years when it practically does not rain, or periods of catastrophic snowstorms like the one of 2002 which caused many deaths among the rural Camelid flock. The other two climatic features of the region are the persistent winds most of the year round, low oxygen concentration and the high incidence of ultraviolet radiation.*

*It is important to take into account the fact that the climate in recent years shows signs of being affected by the rise in average temperature occasioned by global warming. In the Puna regions, some varieties of potato that normally did not occur above 4000m, began to show signs of greater resistance to the high altitudes on account of the more favourable summer temperatures (Zoomers*

2002). However, this will imply a gradual increase in aridity on account of evapo-transpiration, which may in future lead to a catastrophic lack of water.

### **1.2.3. General hydrological aspects**

*Bolivia has a closed water basin with 1600 millions of cubic meters of water. The total river length is 57.000 Km, the total surface area of lakes and lagoons is 11.193 square Km, and there is 2.184 square Km of snow fields. (Their size is rapidly decreasing) 13.000 square Km of open land and 2147 square Km of Bofedales or high mountain wetlands.*

*The eastern mountain chain of the Andes is still the principal water source both for the warm eastern side as well as for the western part which includes the Punas or high planes that have been previously mentioned, in which we find big cities such as La Paz and El Alto in Bolivia and Puno in Peru. The recession of the glaciers in the last 20-30 years has become a major threat to water security and a danger to the ecosystem by causing degradation, these resources are basic to those who practice traditional Camelid breeding.*

*The entire Puna region and most of the high Andean region belong to the endorreccian high plane or the highland, whose main drainage is the Salar de Uyun River.*

*Most of the rivers are predominantly seasonal activity, according to Navarro (2002), many of them do not have outlets to the sea, several are seasonal and many form isolated bodies of water. Navarro and Maldonado (2002) indicate the prevalence of more or less brackish waters, especially in the western volcanic mountainous chain.*

### **1.2.4. Ecosystem structure and distribution**

*The first thing about his whole region is the scarcity of vegetation cover which only amounts 20% coverage. The vegetation coverage is rare and sporadic, areas without any vegetation are predominant and these consist mainly of bare rocky or clay and sandy soil. Vegetation in the highlands is reduced to certain specific places (in the case of the wet grasslands, brush and little forests in rocky areas).*

*The highlands are characterized by the following types of vegetation: Thorales (tiny leafed shrubs with grassland features), extensive scrubland and very sandy and xeromorphic, little forests of tiny leafed rose like plants endemic in the Andean region called Quenua (Polylepis genus) which are limited to a small number of rocky and hilly micro-climates. Other characteristic vegetation formation of the highlands are the high Andean and Bofedal tubers which are found in the lower and more plain parts which have a less drainage.*



*The ecosystems of greater relevance not just for current development but also for the cultural and historical evolution of the Camelid pastoralism were precisely the Bofedales and grasslands but the former in a very special way because they have nearly 70% of what could be referred to as prize forage for Camelids.*

*The Bofedal is a type of vegetation which grows in the periphery of stagnant or slow flowing waters that occupy the lagoon borders and the slow flowing streams that form a dense cushion of compact vegetation. Seirbet (...) who basically refers to them as Andean tubers. Although the Bofedales are closely related to the tuber growing areas on account of its physiognomy and ecological dynamics (such as “cushion peat bogs”), the nature of its vegetation does not however correspond to the classic definition of the tuber growing areas. De la Barra and Bilbao (2003) make reference to the tuber growing areas that forms in the Bofedales and which have a strong odour of organic matter on the surface, such as methane and sulphur dioxide gases, its colour is dark brown colour 7.7YR 3/2 according to the Munsell colours table.*

*In general terms ‘Bofedales’ are aquatic ecosystems (classified as wetlands) of the Andean and Puna regions (high planes) characterized by the presence of temporary or permanent flooding and soil saturation, which are characteristically hydromorphic, and with a specific type of vegetation and flora, typically having a feather like structure, thick and highly adapted to the flooding conditions. The vegetation of the Bofedales forms a dense carpet with predominance of the pigmy rhizomes or reedlike species in addition to the pigmy dicotyledonous plants. From among the typical reedlike plants those of the *Distichia* and *Oxychloe* genus are outstanding.*

*Other studies have described the ‘Bofedales’ as archipelagos with plant cover surrounded or flooded by a network of streams and currents of a depth ranging between 10 to 70 cm of slow flowing water, a number of important rivers cross the ‘Bofedales’ and there are also temporary lagoons. The influx of water is constant and is the result of melting glaciers and springs, from the high water table and also underground waters.*

*The Bofedales and fertile plains are like oasis or enclaves found in the regions which occupy a small surface area as compared to the rest of the ecoregion that surround them.*

*Some essential ecological and socio-environmental characteristics of the Bofedales are as follows:*

- 1. The regulation of flow and fluid dynamics by its “sponge effect” on account of the feather like vegetation and the wet soils. This is probably the most relevant environmental and ecosystematic service that it offers.*

2. *Micro-mesoclimatic regulators because of their humidity, on account of the humidification effect it has in the very dry area as well as on account of the heat accumulated in the diurnal water radiates this heat at night and this helps maintain a more favourable temperature in this region of extreme weather.*
3. *The particularly fragile ecosystems mainly function on strict reliance on precise and determined flow, volume and flooding patterns.*
4. *The ecosystems have become a base for the construction of the millenium process and Camelid breeding and for the organization of the traditional pastoral cultures that endure with relative success up to our days.*
5. *In relation to the foregoing, hundreds of families of Camelid breeders speciality consitute the essential base of the productive and socio-economic process in regions with extreme conditions where agriculture is non-existent (or is very incipient) in addition to the scarce possibilities of diversification.*
6. *They constitute ecosystems of great productivity and productive efficiency (because of the permanent availability of water, micro-climatic conditions and abundance of minerals) they are typical "oasis" in the extremely cold and desert region.*
7. *In addition to its funcation as an "oasis", the Bofedales, they are accumulators of biodiversity, as far as species of flora and fauna are concerned, some of them (particularly fauna) are endangered species and therefore need conservation.*
8. *They present a scenery and landscape of a high quality, which gives them great potential for impact in ecotourism activities and wildlife observation.*
9. *For reasons earlier explained, they are ecosystems which experienced a great pressure to be productive in Camelid breeding (especially Alpacas) they therefore run the risk of degradation by overgrazing.*
10. *They are highly vulnerable due to their close dependence on the flow and volume of water, which to a large extent comes from subterranean water (given the negative water balance a result of precipitation and evapo-transpiration) this resources are highly valued by large scale mining interests.*
11. *The potential effects are also vulnerable resulting from global climatic change and atmospheric warming, effects that could already be showing.*

### **1.2.5. Efficiency and productivity of the Bofedales**

One essential characteristic of the Bofedales is that they constitute highly productive ecosystems as far as vegetation is concerned, this is one of the basic reasons why they are highly suitable for the breeding of Camelids especially of the Alpacas and to a lesser extent the Llamas.

According to Alzerreca (1992) and on the basis of several studies carried out in the northern regions of the Bolivian highlands, basically in the District of La Paz, the production of forage vegetation in the form of dry matter, varies in the waterlogged 'Bofedales' the lowest production quoted is 850Kg of dry matter per acre and the highest value is 3.636 Kg of dry matter per acre, (the average being 2.540) while in the plateau or seasonal 'Bofedales' (in the planes) it varies between 750 Kg of dry matter per acre and 2.399 Kg of dry matter per acre (the average being 1.950 Kg of dry matter per acre). However, there is a great divergence in the different values of production given by different authors, and this implies a high degree of uncertainty about the validity of the researches done because some of the values presented are even contradictory. Prieto et al. (2003) for example, repeats the values of forage vegetation production in the 'Bofedales' in Kg of dry matter per acre, originating from other studies and which differ greatly from previous ones, the average here being 4.536 Kg of dry matter per acre with values ranging from 1.197 to 20.716 Kg of dry matter per acre, the values proceeding from the waterlogged 'Bofedales' (the average being 5.855 Kg of dry matter per acre) are the highest while the plateau and plane 'Bofedales' produce the lowest. (the average being 3.630 Kg of dry matter per acre). Alzerreca (1999, 2001) quotes the following values, current output (measured in the field) and real output (having adjusted for the estimated percentage consumed), the maximum values for the wetland 'Bofedales': 15.537 – 20.716 Kg of dry matter per acre, he points out the difference between the averages which is very much higher than those given by the studies. (Alzerreca (1999) reports a value of 3.636. Kg of dry matter per acre for a plot isolated for one year. According to Luna et al. (2003) the production values for 'Bofedales' in the planes are found within the range of 3.969 to 4.343 Kg of dry matter per acre.

### **1.2.6. Loading capacities of the Bofedales**

The carrying capacity is calculated in Alpaca Animal Units for most of the different types of 'Bofedales' range between 0.2 and 2.2 loading capacity (Alzerreca, 2001, 1999, 1992) some that are more productive achieve the excepcional values of between 2.8 and 3.6 loading capacity in the region of Cosapa of Oruro, the carrying capacity in the plains 'Bofedales' was 2.15 and 3.65 loading capacity per acre.

*We have at this point data quoted by Céspedes (2003) for Alzerreca et al. (1999), in the plains Bofedales with a loading capacity that varies from 2.83 to 3.39 per year in much of the high Bofedales the capacity varies from 1.72 to 2.7 per year. On his part Cardoso (2003) considers that the best 'Bofedales' can support up to 4 Alpacas per hectare.*

*Luna et al. (2003) and all state that in Bolivia an Alpaca Unit has an average loading capacity of 47 Kg, they have a daily consumption of 2.5% of their weight (1.18 Kg. per day) and a requirement of 429 Kg per year, (Cardoso 2003), establishes that the daily consumption is 1.24 Kg per day and the annual consumption is 452 Kg.*

*The animal load in most of the regions tends to exceed the loading capacity of the 'Bofedales' especially in the dry season, and the effect is more drastic for the plateau or the seasonal 'Bofedales' (the plains) the waterlogged 'Bofedales' that maintain a flow even though smaller in the dry season. This observation has also been made for the Sajama region (Espinoza; 2001, Al zerreca, 2001).*

### ***1.2.7. Strategies and rationale for land occupation.***

*The rationale for territorial occupation in the Andean World is usually based on related family and communal strategies of access to the ecosystem and resources. The Calla report (1995), demonstrates that since the productive systems of the region are based mainly in Camelid livestock, the strategy for land occupation seeks to improve the different grazing zones in order to ensure the production of grazing material and cultural resources all of which are concentrated in the bofedales, the areas of greatest productivity In one extremely arid and almost semi-desert region, the access to water and permanent forage zones nearly all year long is crucial and has to be the main guiding principle for organizing the occupation processes of the land and space.*

*The ranches are located on the river banks or near a Bofedal, and that the number of families in each ranch depends on the size of the Bofedal and this in turn has a direct influence on the size of the flock of the Llamas that each family can rear.*

*Space occupation has to do with the pattern of population density, the homesteads in the region are scattered, each one of which is formed by one to four nuclear or extended families. In some cases the families have up to 2 farm houses, one in the wet grazing area near the river banks and the Bofedales where they spent the wet season and another in the hills far away from the rivers where they spent the dry and colder seasons when there is frost in the Bofedales.*

*Most of the families have houses in the towns and also in their ranches, which are located far away and scattered from the town, but they do not always live in*

*the town, but instead they spent more time in the farms. This modus operandi can be quickly changed (reversed) with the advent of tourism, trade and working opportunities.*

### **1.2.8. Livestock as the basis for productive systems.**

*The western Andean mountain range regions are exclusively used for pasturing Camelid livestock, agriculture is practically inexistent or very marginal. In this way Camelid livestock has a preferential position in the production systems as will be shown later in this study. In the Puna, regions on the other hand, livestock forms an important but not exclusive part of the production systems, agriculture generally having a greater relevance in the survival strategies of the people.*

*The success of Camelid pastoralism is based on the use of the ecosystems of the Bofedales and other dependent or adjacent wetlands and to a lesser extent the grazing lands. In the case of Llamas, this situation is not as definitive, since unlike the Alpaca which is preferred and which need the Bofedales, the Llama can also successfully thrive in more arid areas such as the tall grass slopes. In any case, some varieties or breeds of the Llamas do better in the Bofedales than other varieties.*

*According to Barra and Bilbao (2003), pastoralism is concentrated in the Bofedales in the months of October and May, from June and September both the slopes and Bofedales while in June and August the Bofedal is not used so much because it tends to be frozen for several days or weeks. Céspedes (2003) relates that there is transhumance pastoralism between the Bofedales in the dry season and the grasslands in the wet season.*

*The Llamas are used for different purposes such as providing fibre, meat or sun dried meat (specialty of Charque) it is sold as livestock, used for breeding, as beasts of burden, and their dung is sold to the agricultural regions of the valleys.*

*Fibre can be considered to be the most important product of the Camelid. The Alpaca has fibre whose diameter is between 21 and 29 microns, while that of the Llama ranges between 32 and 35 microns, however certain industrial treatments of the fibre from the Llama such as the thinning reduces the diameter to less than 21 microns thus rendering it of very high quality and making it very attractive to the national and international markets. In addition to the hair composition, other characteristics such as the length of fibre, the diameter and strength of the product determine the quality of fibre that is to be used for textile production. The Llama wool originating in the South of Bolivia is famous for its high quality fibre. The spinning of the wool and the making of related products are important complimentary activities in the production systems that are carried out almost exclusively by women. In the recent years the exportation of wool from domesticated Camelids has increased greatly*

*especially that of the Alpaca, however the commercial volume of processed high quality wool ( including form and fibre thickness) are small compared to the current levels of production. The skilled manufacture of wool and fabric has also increased considerably with the influx of tourism.*

*On the other hand Camelid meat constitutes a basic resource for diet and food security for the inhabitants of the region. For them Llama meat mainly as dried meat is the main food which is also stored and traded, it is also used in barter trade and in this way it is a source of substantial income. Although Llama meat is of high quality and has low cholesterol content as compared to other red meats it is not consumed much outside the producing regions it can be said that, in the cities and even in some of the larger towns it is not preferred as there is a tendency to resist or reject it. This happens due to socio-cultural prejudice against this type of meat since it is considered to be of low value and low quality, it has a strong flavour and may even contain parasites such as sarcocystosis (Sarcocystis, Coccidios-esporozoa) in the muscular tissue, is frequently confused with trichina often found in pigs. Another source of income is the sale of livestock mostly in Argentina, however the use of the Llama for transportation has decreased their sale.*

*Herd ownership is culturally important for a person's identity, as far as social status within the communities is concerned. The breeding is extensive and access to the pastoral land is communal, especially in the Bofedales. The right to use communal pastoral land is given by common agreement of the families that live around it. It is the basis for subsistence and also the main market good for the families. For all the high Andean families, keeping of livestock is a basic means of subsistence and survival, while in the Puna regions it is a complimentary activity which in some cases has little importance due to the increase of agricultural activities. The herd is in all cases a form of saving of capital or capital that can be of immediate use by the family in cases of emergency or scarcity, in these cases the animals themselves or animal products are sold. Ownership of livestock sometimes holds a traditional cultural value associated with different ancestral rites, besides being a symbol of social status within the local communities.*

*Llama herds can be divided into several types, for example females and calves, studs, younger adults and castrated males. In part the management of the herd involves: a) the process of separation of adult males and females during the mating season. b) Controlled mating to favour for selective breeding. c) The separation of the more mature young to separate and distribute them among the castrated or the reproducing male herds. There is a limited and sporadic use of external inputs such as treatment against parasites and mange, as they more often prefer to visit traditional healers (ethno- veterinarians). In any case the levels of disease and death due to different ailments are very high and the level of reproduction low among the livestock.*

*There are several factors which influence the nutritional state of the herd and these factors are reflected both in the low productivity and quality of fibre and meat, as well as in that of the livestock itself. One is the decrease in quality of foraging especially in the dry period and another a most important factors is constituted by the rigours of the climate itself, the main cause of death and disease due to poor resistance to conditions of low temperature.*

*There is no data regarding this however, it is thought that the spending on heating during the night especially produced in winter is very high. Other factors that make productivity difficult are the: a) the sarcocystoci sparaites (Sarcocystis, Coccideos-esporozoa) that affect the herd as its intermediary host as the wait to inhabit dogs their usual final b) The parasitism by mange (Sarcoptes ) which stresses and weakens the herd. c) Deceases like enterotoxemia. In several regions the domestic herd mortality is due to wild animals such as pumas and foxes this situation worsens for lack of control and attention to the herd.*

### **1.2.9. The Bofedal as a cultural dynamic landscape.**

*Often the bofedales and plains have been described in differentl articles and studies as natural ecosystems of the high Andean ecoregion used by pastoralists specifically for Camelid breeding. In a strict sense, the high Andean bofedales are not so much an ecosystem, they are rather a type of landscape that includes different ecosystemssuch as the rocky areas, the shrubs and the grassland found in the geological landscape surrounding the bofedales. The bofedales are found in the lower parts of the valleys next to the lagoons.*

*In any case, as far as ecosystem go, the bofedal could be considered and described as an agro-ecosystem, this depends on the degree of manipulation to which the local population has subjected it.*

*The bofedales have been undoubtedly managed for centuries if not for millennia regardless of the generations that have lived there; they all were breeders and pastoralists of Llamas and Alpacas. In its most extreme form its management dates back to more than 10.000 when the paleo and proto-andean pastoralists began to domesticate the Andean herd and to breed the first herd of the Llamas and Alpacas, taking advantage of the bofedales ecosystem that is suited to the activity. This simply means that the accumulation of knowledge and practice of bofedal management essentially began in the Andean prehistory.*

*The cultural landscape of the bofedales is an ecosystem used for production, the surrounding ecosystems (thorales and bofedales), the water courses as well as the water management infrastructures (Canals, dams) and of course the domesticated Camelid herds, the Llamas. The landscape also has other features such as housing (estancias) and other buildings such as corralles and*

*mountain refuges. This set presents the cultural landscape which is organized mainly by human action of the local people.*

*One important part or component of the cultural landscape of the plains and bofedales are the "puiyos" which have some ritual use and are sources of springs of water. The cultural landscape as a whole is considered sacred but currently those cultural practices and values related to the sacredness of these areas have been disappearing.*

*The use of the bofedal by the Andean people as a cultural dynamic landscape, is mainly based on the management of the water economy, mainly by the construction of dams, dykes and artificial lagoons, pools or swamps, which implies managing to retain as much water as possible and to avoid its loss through the different flows that there are in the bofedales.*

*At the same time the management and maintenance of the bofedal implies the frequent irrigation, by the construction of canals, diversion of river courses and the management of the dams to water the drier areas through out the year (outside the rainy season) and even expanding the Bofedales using water from the seasonally flooded grazinglands. Thus the Andean camelid pastoralist seeks to prevent the drying up of the bofedales by saving water and irrigation. The pastoralist therefore prolongs the life of the bofedales by delaying or interrupting process that would lead to dryland ecosystems*

*Zones that do not receive regular and periodic of irrigation, dry gradually and change their structure and floral composition towards in the drier seasonal stages, they eventually get all dried up by livestock. A bofedal that is not irrigated is less productive and has forage though less than that of areas more frequently irrigated, when subjected to a high animal load these areas erode more rapidly and are more vulnerable than the areas of greater productivity and greater vegetation cover.*

*Fertile plains and bofedales depend on to a greater or lesser degree on communal work for maintenance and continuity, especially by means of irrigation and flow control, the productivity of the forage and vegetable cover reduces when this work is decreased or is not carried out continuously.*

*In any case intensive pastoralist activity and regular control of water management are elements that determine the modification paths for the floral structure and composition of these meadows.*

*This has direct implication over the factor of interaction of ecological and social demands on the wetland (bofedal and fertile plain). Theoretically speaking, the social demand and productivity of a wetland must not exceed the ecological*



*demand, if it is desirable. The maintenance of the wetland will depend on the flow and natural feeders, but also on the artificial feeders (for example, irrigation) such as in the case of the bofedales. It is possible that ecological demand in the hypothetical case of a 'natural' bofedal without any human intervention can be actually be lower than what is actually detected. In the Bofedales and fertile plains which are under the active management of pastoralists, the ecological demand is determined by the social need which ensures the production of forage and thus livestock breeding, both requirements are inter-related but the ecological demand is superior even though it is subjected to and controlled by the socio-cultural needs.*

*The case of the wetlands (e.g. lakes) that are used by mainly for use of agricultural irrigation or for human consumption is different, where the water is mainly taken out from the system and is normally not returned. In the case of the bofedales, the water is made good use of 'in situ', for example, by irrigating its own wetland, maintenance, ensuring the production of the natural forage and breeding of the livestock, the ecological need is connected to the social needs, they are interdependent. It is possible that the activity of the wetlands and the proper breeding of the livestock does not greatly interfere with the maintenance of other managing stocks of biodiversity, as in the case of the birds such as ducks, or in the case of native fish (one or two species). In this sense it is foreseeable that the actions to economize of water such as building dams and ponds or regularly maintaining the irrigation facilities and water saturated bofedales encourages to a large extent the presence and reproduction of a great number of wild species.*

*It is important to make a deeper analysis and discuss the interdependence of needs taking into account the fact that the bofedales are essentially cultural dynamic landscapes and are associated an accumulation, from ancestral times of knowhow related to management and control.*

### **1.3. The development and evolution of Camelid pastoralism**

*It can be certainly affirmed that the pastoralism of the native Camelids has been on the decline and in some cases and regions, not only in Bolivia but also in Peru, Chile and Argentina, the situation is critical.*

*In general terms the local livestock keeping has been declining from the colonial times, at the same time as the of loss of practices and traditional knowledge and to the transformation of the productive systems. Possibly, most of the changes in the region of Puna or high planes essentially occurred when other types of domestic animals were introduced to America from Europe: Bovines, Horses but especially Sheep and Donkeys.*

*It is therefore important to emphasize the replacement of the Camelid herds by Sheep flocks in extensive sectors of the North and Central High plane (Mainly*

*La Paz), this change was gradual. According to the annals even until the republican period although large herds of Llamas still existed and numerous herds were still seen frequently up to the early decades of the 20<sup>th</sup> Century. In the subsequent decades sheep rearing became more prevalent.*

*'Ovinizacion' is a technical term used to refer to the process of expansion and increase of Sheep breeding in the regions of the High plane, a phenomenon that began in the early colonial times. This is one of the foreign agents that cause pressure in the said ecoregion and has identified more than once as the cause of the collapse of the Puna system. The breeding of sheep has gradually replaced Camelid breeding, especially of the Llama it has almost completely replaced it in the high planes region. Overgrazing by the increasing sheep flocks and their way of feeding by plucking vegetation from their roots, not only caused a drastic reduction of the overall vegetation cover, but also caused changes of the vegetation composition in wide areas bolstering the advancing and proliferation of less palatable species (for example the reduction of pasture cover and the rise of thicket or thorny plants ) Their hooves harm vegetation by cutting (the camelid hooves are padded and do not cause the damage). The average weight of the sheep is in the vicinity of 25Kg; this is 40% less than the required weight due to overgrazing and dwindling food resources.*

*In any case sheep herding currently is an important and necessary component of the productive systems in the Puna, sheep are like a family "savings account" and currency for many peasant communities. Undoubtedly sheep rearing has some comparative advantages for the Andean people , some of the comparative advantages favoured the substitution of the camelid herd probably due to its shorter gestation period ( and a higher reproduction rate), their faster growth , less food needs, these were and are still comparative advantages. Overgrazing of the sheep flock currently has adverse effects on the sustainability of the Puna ecosystems. An example is the case of the Puna in Tajazara in the higher part of the Sama Reserve (Tarija) where more than 40.000 sheep form part of the productive systems, the Llama is known to have been bred in the Puna region in pre-Colombian times.*

*It is estimated that there are around 8 million sheep in the highlands of the country; these numbers tend to remain stable although in some regions the flocks tend to increase.*

*In the high Andean regions, far from the commercial centers and in difficult places to reach the transformation processes in the production systems were less evident and in some cases the degree of retention of the cultural practices was higher in the highlands. .*

*Another important factor to take into account in the high Andean regions above 4.200m such as the plateau of Ulla Ulla, the slopes of the Illampu ranges, Sajama area or the South Lipez region, was the absence or impossibility of carrying out agricultural activities due to the climate. It is different in the case of*

*the productive systems in the regions where it is possible to grow the tubers and pseudo-cereals such as quinoa and where livestock keeping.*

#### **I.4. The current state of Camelid production in the country; (impacts and threats, advantages and potentialities, etc).**

*According to data from UNEPCA (National Union of Camelid Producers) of 2000 there are in Bolivia about 2.815.560 Camelids, of which 2.398.600 are Llamas and 416.969 are Alpacas*

*There is a noticeable increase in the number of Alpacas from South to North (that is from Lípez to Apolobamba) the contrary is true for the Llamas (from North to South). This means that the Llama herds are fewer than Alpacas however towards the south the Llamas are more numerous than the Alpacas. In the region of the Sajama National Park one can find some sort of balance on equal numbers of Alpacas and Llamas. According to data from UNPECA, in the case of Apolobamba (Franz Tamayo and Bautista Saavedra Provinces) it is known to have 12.500 Llamas and 83.971 Alpacas. The data shows that Sajama (Province) has 191.477 Llamas and 88.533 Alpacas while Lípez South has 568 Llamas and only 246 Alpacas*

*Scarce grazing resources, limited to the wetter regions in regions that range from sub-humid to desert as in the South East of the country, where the best meadows are found in the wetlands and constitute essentially isolated oasis. To this condition of limited forage resources one must add the process of degradation of these areas as a result of the effects of climate change, as well as overgrazing and the decrease in cultural management.*

*There are low levels of productivity and reproduction related to genetic degradation, associated to the loss of the practices and traditional knowledge among breeders. This situation has brought about a common phenomenon in the countries that comprise the Andean region, the thickening of the Camelid fiber (Llama and Alpaca) which influences the demand for these products with added value in the international markets of fine fiber.*

##### **I.4.1. Ecological problems of Camelid breeding**

*It is undeniable that Camelid breeding faces various problems with regard to its dynamic products, the organization of the products and in terms of transformation and commercialization of the derived products However besides facing a complex problem with regard to the landscapes and ecosystems of pastoralism.*

*There is evidence in the entire high Andean region of damage to part of extensive areas for pastoral use degraded both its vegetation and in soils*

*Large areas of have suffered the effects of degradation are very unproductive and hardly retain vegetation cover.*

*There are generalized reports from the region of a gradual decrease in the water; this coincides with the reduction or disappearance of the snow and ice fields in the last two decades.*

*Another factor that aggravates the degradation of the Bofedales and wet lands is the progressive decline in the availability of water. The existence of the Bofedales zones that are drying up confirms is a draining process and this confirms generalized reports from the region of a gradual decrease in the water content, coinciding with the reduction or disappearance of the snow and ice fields in the last two decades and very sparse.*

*Obviously the process is closely associated to the global warming phenomenon, that has been induced in the last 20 years mainly the melting of ice and snow in the mountains, as well as climate changes manifest in the reduction of the amount of rain and its unpredictability irregularity. The mountain regions and Puna zones of the South of Bolivia have been the most affected.*

*The most serious effect on the Bofedales and Fertile plains was the disappearance of a permanent source of water. The snow and ice fields nourished them with water almost all year round. The plains and especially the Bofedales were like water filled 'sponges' and were therefore highly productive, they produced a lot of forage. The Bofedales are very sensitive ecosystems easily affected by changes in humidity; this is reflected in changes of productivity and flora. With the reduction of the quality of water, the production of forage also began to decrease, the Bofedales thus they decreased their capacity to sustain the herd.*

*The degradation processes related to Camelid breeding mainly derive from overgrazing and anima overload. Generally in the last 50 years the Llama and Alpaca herds have increased by between 70 and 200% in the entire high Andean region. The multiplier effect of the impact is the result of overloading from the Bofedal with a large number of animals in a region that faces a general reduction in the quantity and availability of water. These fertile plains and Bofedales with less inflow of water and lower productivity, when they are subject to increased grazing pressure are more susceptible to overgrazing and degradation in a short time. Breeding 100 Llamas in a flooding and productive Bofedal is not the same thing as 200 Llamas in a drier and less productive Bofedal. The effects are seen in the destruction of the ecosystem and the decline of their pastoral practice.*

*An obvious event that occurred in the last 50 years is that most of the high Andean breeders and breeders from Puna, did not know how to adapt to the change in reduction of water and the productivity of the Bofedales, of which every time caused less support from the animal weight. As earlier mentioned*

*they have not only maintained the same animal load as did their fore fathers (when water and forage was abundant) but have also considerably increased the size of the herd. This has been a bad management practice by breeders occasioning the decrease in their native grazing lands. Possibly a reasonable solution to adaptation of production to the climatic phenomenon should have been reducing the size of the herd in accordance with the reduction of the capacity of the Bofedal and removing major benefits from the processes of transformation and of value from the breeding products. As long as the producer continues insisting on deriving greater economic benefit by owning more heads of livestock (which also brings greater social prestige) the Bofedal, and in the long run pastoralism will end up being the losers.*

*The Bofedal can be managed as a cultural landscape, it can be maintained by regular irrigation by means of the construction of canals, the rerouting of rivers and the reconstruction of dams to irrigate the drier areas all year round outside the rainy season this may cause the expansion of the Bofedales to the detriment of the grasslands. The main action of management of the Andean settler Camelid breeder to avoid or slow down the drying up of the bofedales and to achieve this he saves water and uses irrigation. The foregoing means that the breeding extends the life of the Bofedales, basically slowing down or in some cases interrupting all related ecosystem processes. At least these practices were carried out for centuries until some decades ago.*

*In many regions besides the decrease in water and the animal overload, pastoralist management has become lax and has even been abandoned, this resulted in the decline of the communal management system that had been developed in previous decades, all this led to the individualization of the Bofedal management and its division into sectors causing the effective disappearance of the communal consensus method of reaching agreements. This reduction of community efforts (including family efforts) for the management of the fertile plains and the Bofedales, especially for irrigation and flow control, has direct repercussions on forage productivity. These fertile plains and Bofedales with less influx of water and reduced productivity when subject to grazing pressure are very susceptible to overgrazing and degradation within a short period of time. Paradoxically, the breeders tend to have an excessive number of animals in the Bofedales which become progressively less productive due to the reduction of the amount of water and the invasion of sediments and salts which increase the degradation.*

#### ***1.4.2. The problem of the Bofedales from the “tragedy of the commons” perspective.***

*The wear and degradation of the Bofedales and fertile plains can be explained in the light of cultural and social processes that can assist one better to understand the problem. One of these issues has to do with the communal access to the grazing fields and the well known theory of the tragedy of the*

commons which can now, more than ever help us to understand the current phenomenon. The theory of the 'Tragedy of the commons' was put forward by Hardin in 1968, it states that when the resources of communal use or open resources ('common-pool resources') are used by a growing number of persons in the absence of state norms and regulatory control mechanisms collective use may result in the overexploitation, degradation and eventual collapse of the resource, this situation is attributed to the fact that users are encouraged to seek maximum individual benefit. Hardin's reasoning is based on the position of held by Scott in 1995, that in fishing, communal ownership waters leads to over exploitation and economic inefficiency, as it increases excess capitalization and the number of productive units. More recently, other researchers such as Cornes and Sandler, point out the communal ownership analysis prove that over-exploitation of scarce resource takes place when the access of these resources is free and the number of large exploiters on the increase. The concept of the tragedy of the commons according to Chase y Pinedo (2002), can be expressed in words of the philosopher Whitehead: "the essence of the tragedy is not unhappiness but rather the solemnity of the unstoppable functioning of things"

In a recent publication edited by Richard Chase and D. Pinedo (Chase and Pinedo, 2002), Hardin argues and successfully deals with the problem of the tragedy of commons. The work contributes elements that can help to objectively interpret the problem of overgrazing in the plains and Bofedales in the high Andean region. Here is a literal quote of the content that refers to the issue of access and use of common grasslands.

"Let's imagine pastureland that is within the reach of everyone. It is hoped that each shepard will feed as many animals as possible in this collective pastureland. Such a common accord has worked more or less for many centuries since there are many situations that can reduce the capacity of the land to hold the animals, all of which eventually leads to the tragedy of the commons:

- a) The positive aspect is the increase in animal numbers is that, the herdsman receives all the benefits from the use or sale of the animal, the benefit is immediate.
- b) The negative aspect is the increase in overgrazing caused by the extra animal. However, such effects of this increase are shared by all herdsman; the negative use for any individual herdsman is only a fraction of 1.

On summing up the partial usefulness of both components, the wise pastoralist concludes that the only sensible thing to do is to add new animals to his herd successively. However, all have reached this conclusion and each of the pastoralists who share common grazing lands experience precisely this tragedy. Each man finds himself enclosed in a system which obliges him to continuously increase the number of his herd while living in a limited surrounding. This leads all men to the precipice of ruin, each one seeking his optimum interest in a

society that believes in the freedom of communal goods. This freedom leads everyone to ruin.”

*This line of thought has its critics and detractors even though it has a high degree of truth in it. Possibly those with the most accurate analysis were Cirancy –Wantrup and Bishop (1975) who argue that the right to common ownership of resources are not the same thing as property rights over them. Hardin himself in 1998 recognizes the difference between resources or common goods that are not managed from those that are actively managed. It is possible to find in this point the precise difference in use of goods and resources, the common resources that are managed are subject to communal laws and collective codes of conduct that are accepted by the group and are under the social control of the same community or group of people. This collective social control is contrary to the individual reasoning which seeks its own interests and the maximization of profits as it tries to get for itself a bigger share of the common resource while at the same time transferring the cost of maintenance to the other members of the community. From this perspective the main problem relating to the management of resources is ‘opportunistic behaviour’. The lack of management of common goods is a direct consequence of the failure of the community, that is, the inadequacy of the social bonds which strengthen the common moral order.*

*In spite of the controversy that has arisen up to now regarding Hardin’s thesis, everything seems to indicate that what has been happening in many of the plains and Bofedales of Lipez and especially in Alota can be explained at least in part by the concept of the ‘tragedy of the commons’. Among the elements to be considered one can mention the following: a) They are all grassland ecosystems of common use. b) There existed a sufficient and optimum availability of forage at least a few decades ago. c) they are open to use by the local peasant communities. d) there were and there still exist restrictions to the use of outsiders. e) there are some community norms that regulate their communal management even though they were never very rigid to such an extent as to completely reduce or exclude individual opportunistic initiatives while at the same time it washed over the concept of the common good.*

*For many shepherds from the high Andean regions, the concurrence of two unfavourable factors were principally responsible for the collapse of the ecosystems of the plains and the Bofedales, on the one hand a gradual decrease in the amount of water and on the other a decrease in the production of forage. These factors made any individual initiative to increase the number of their herd, a very risky venture. On the other hand, the almost total disappearance of the communal norms and organizational processes in the management of the plains and Bofedales has made it possible for individual producers to increase the size of their herd without restriction in plains that were gradually drying and which had poorer quality forage (refer to Hardin’s thesis).*

#### ***1.4.3. The deterioration of the Bofedales and high Andean grasslands and related problems.***

*A Basic element of the socio-environmental dynamics in the Puna regions situated below 4000m above sea level (where it has been possible carry out agricultural activities which is not possible in the high Andean areas) is the fact that the systems of production include the cultivation of the as an important jeans of family and community survival.*

*Fifteen to twenty years ago the production systems of the South eastern region of Bolivia (especially in Lipez), where mainly pastoralists and farmers were few and they produced quinoa for subsistence and limited sale within the region. During that time the Bofedales and the Llama herds were looked after with much dedication since they constituted the principal means of livelihood for most of the families. With the increase in market price of Quinoa in the last 10-15 years as demand increased. Then a period of change occurred when the families that were mainly pastoralists in a few years converted to the cultivation of quinoa and pastoralism was sidelined to second position. In some regions and with varying local versions the community management of the Bofedales and this has as a consequence the new phenomenon of the individualization of the management of the Bofedales.*

*The effect of the quinoa boom became more apparent in the region in the last 8-10 years. 15 years ago, the productive systems of the Alota region bore mainly pastoralists and agricultural activity was limited to the production of quinoa in small quantities for subsistence and a limited amount of trade in the region, this implied that the opportunity costs for agriculture were very high while those of pastoralism were low and very convenient. As a consequence during this time the Bofedales and the Llama herds were managed in a time and labour intensive manner. With the said boom of quinoa trade increasing demand and market prices occasioned a drastic migration from the usual productive system to the farming sub-system which was previously considered secondary and marginal. It became the basis for most of the productive systems and pastoralism took a second place. Agriculture now had low opportunity cost while the opportunity costs relating to pastoralism became high and therefore less attractive.*

*Agriculture has become more intensive extending over large areas of the plains, slopes and hill, many farmers use mechanized means such as the tractor for tilling the land and for other tasks as well as for other tasks which enables them utilize even more extended areas. Each land owner can for a relatively low investment of effort and time cultivate 3 to 5Hectares. The mechanization process has lead to intensification of farming.*

*In addition to that there is the lack of special care like the cultivation of land in strips parallel to the gradient of the slope, the allowing of only short fallow periods. Cultivation of crops in very steep areas and the total removal of plant*



*cover in February and March which leaves the land open to the July- August winds. Thus the problem of erosion becomes very serious since hundreds of tonnes of soil can be moved away by the constant strong winds and the late rains that occur in March.*

*The landscape has changed, where there were extensive grasslands now there are huge areas of quinoa crop, fallow land in recovery and little vegetable cover with great areas of bare soil, the result of erosion. The plots that had grass before which helped hold the soil are now unprotected from the rains and winds which sweep sand and clay depositing them in the Bofedales thus covering the latter with soil. This situation gets aggravated annually in areas with abundant rain and storms and it is during this time that the Bofedales are covered with the most amount of soil and silt.*

*To the above we have to add that in previous years the pastoralist management made the herds rotate or move from Bofedales on the hills at different times of the year and for different reasons such as reproduction, the selection of studs, and this was especially favourable for the recovery of the Bofedales which would suffer more especially in the dry season when it produced less forage. In many regions currently however, this movement of the herd from the Bofedales to the hills does not take place on account of the quinoa at the end of winter and the beginning of spring, the Llamas are no longer moved to the slopes to avoid the risk of their invading the crops and browsing on the shoots of recently planted quinoa. So in those months many families decide to keep their herd in the Bofedales to avoid this damage to the crop. On the other hand, before there used to be more forage on the hills which was covered by grass so that over there the Llamas could find regular food. Now in addition to having crops which prevent their entry there are hundreds of acres of fallow land with little forage since these plots are in the process of recovery. The livestock therefore does not find food on the hills and therefore it descends to or permanently remains on the Bofedales. This causes overgrazing which leads to degradation and loss of productivity.*

*A very worrying aspect for the whole region are the extensive areas covered by or invaded by sediments deposited by the permanent and seasonal rivers that flow down the hills during the wet season loaded with silt. The erosion problem is therefore very acute, hundreds of tonnes of soil are blown by the winds in the dry season and washed by the rain in summer from the cultivated and fallow land. An excessive amount of soil from the slopes is washed each year into the Bofedales making it a real mud-trap, but this also brings with it different salts which implies that important physico-chemical changes are taking place in the Bofedales. This explains why while at the same time the Bofedal is being covered by silt the flora of the area is changing to species that are more adapted to soils with high salt content.*

*This has caused large areas of the Bofedales to be gradually covered in soil thus raising the soil levels, this process is accompanied by a massive increase in salinity.*

*An excessive amount of soil from the slopes is deposited each year in these areas that have been more apt for Camelid livestock, this factor has greatly affected the pastoralist activity. In many areas the composition of the species and types of plants found in the Bofedales have changed, these new species are not preferred by livestock. There is therefore a double loss suffered not only by decrease in the Bofedales and the livestock, agriculture also suffers since this practice of farming causes great loss of land fertility every year and in some cases, some communities have found that the cultivable area of their land has been reduced. In some regions the productivity of the first years (up to 30 Kg per acre) has been reduced by half on account of the loss of land fertility and shorter fallow periods.*

*There is a lack of awareness of the Bofedal-quinua crop dynamics which implies working on the production systems and seeking to mitigate the negative effects of large scale quinua farming (this should include the reduction of sediment and salt levels in the Bofedales), at the same time the recovery of the communal systems for management of the Bofedales should be given priority as well as the reduction of the animal load. Even though the challenge is great, there is positive disposition on the part of the inhabitants involved and this will help achieve a positive development in the processes of decision making and in the application of corrective measures.*

*There is another issue that has been underestimated, the close relationship and interdependence between pastoralism and quinua farming using llama manure. This implies that the success of quinua farming is dependent on the production of manure without which it would be impossible to produce quinua. Quinua producers who do not have livestock have to spend in buying it from the pastoralists which in turn increase their costs. Those farmers who combine pastoralism and quinua farming ensure the fertilization of their field with the dropping from their own livestock. This element of interaction between the two systems demonstrates the importance of achieving a balanced and stable relationship of the two sectors. Strictly speaking, quinua farming is partly dependent on pastoralism which in a sense becomes subsidiary to farming on account of fertilizers. Thus the need to re-evaluate Llama pastoralism whose value had been somewhat underestimated on account of the quinua economic boom.*

## **II. FUTURE SCENARIOS AND TRENDS**

*The following situations are considered as having great impact in the future scenarios to be found in the highlands in the coming years. It must be mentioned that some of the negative and undesirable scenarios are already*

present and they are expected to worsen. Whatever the case, this point is developed foreseeing the worst scenarios, considering that no control measure will be taken and assuming that the State and other institutions will not take any step in regard to policies for control or mitigation, nor will they take any step in regard to the reduction of the foreseeable effects.

- **Warming and reduction of water resources.** - The reduction in the water supply to pastures and other types of humid areas has already been affected by the disappearance of glaciers and ice reservoirs, as well as irregularity in the rainy seasons; they have also been affected by an increasing rate of evaporation and transpiration and the growing general desertification in the region. The weakening in the communal processes to attend to the needs related to saving water and controlling irrigation might intensify the problem and provoke the collapse in the traditional stockbreeding systems in the next 15 of 20 years. It is possible that only some areas with larger water supply and productive pastures would remain, isolated and disperse.
- **Climatic change and sedimentation of the grazing areas.** - If we add to the above-mentioned effect the torrential and short summer rain, which carry huge volume of sediment to the trenches, the situation of the grazing areas and Camelids stockbreeding would face further problems, intensifying the reduction of the humid areas.
- **Overgrazing in drying pastures.**- as was mentioned in the general assessment, drying pastures obviously produce a reduction in the quantity and quality of forage. It should be considered that the critical climatic conditions in the region require a considerable use of energy in order to maintain the body temperature. The reduction in the consumption of forage is already having an impact in the mortality and morbilidad of the Camelids. This situation will worsen critically in the next 5 or 10 years.
- **Changes in the logic of some types of production systems.** -

In regions where the Camelids stockbreeding is not the exclusive production activity, that is, where the climatic conditions allow the development of agriculture, drastic changes in the structure of production systems can be considered. The demand for the quinoa markets, which is expected to remain high or to increase in the coming years, has already caused the relegation of stockbreeding to a second place. In this region everything seems to point towards a relictualizacion of stockbreeding activity. In the regions where the productive systems are exclusively based on stockbreeding, it is possible that the strategies for survival will lead the families to migrate to other areas in search of sources of employment.

### **III. MANAGEMENT OF STOCKBREEDING AND POLICIES**

In spite of the socio-cultural relevance of the South American Camelids, it is noticed that in the Andean countries public policies and legislation do not

*suffice, especially in regard to some specific aspects. Generally speaking, they are inadequate and fail to favor the sustainability and conservation of the ecosystems that support the practice of traditional pastoral activity. The few existent policies in regard to this issue have not been adequately applied or have been so only under specific situations that compromise the governments.*

*The pastoralist sector dedicated to Camelids stockbreeding has been persistently forgotten by the state. In Bolivia, the public policies that support the sector appeared by mid 70's, after a relatively short process led by the government; that implied the creation of INFOL (Wool Development Institute), an entity that depends on the Ministry of agriculture. That office promoted important advances in relation to issues related to wool transformation and trade, animal health, ecologic studies of the prairies, genetic selection, including controlled experimentation processes. Unfortunately, the process didn't have continuity, after some years the institution was dissolved and most of the information and experience was lost.*

*In the years that proceeded, the ministry in charge of agriculture and livestock in various governments (whose initials constantly changed) was in charge of the different sectors of stockbreeding in the country. However, attention to the issue of Camelids and traditional pastoral activity was never relevant, in comparison to cattle stockbreeding, which generates cash and expanding industries like dairy milk. On the other hand, public offices are always subjected to strong personnel instability. Change in authorities and technical staff had a constant negative incidence in the concern for llamas and alpacas stockbreeding.*

*In the case of department prefectures characterized by a chronically weak attention to production and environment issues, as well as strong instability in staff due to the rhythm of political change, they were neither consistently involved in issues related to the attention to Camelids stockbreeding. This happened even in departments where this type of pastoral activity is one of the most important in terms of the support to local economies.*

*The issue of support to Camelids stockbreeding is relatively new, the first experiences started around 30 years ago. In the 80's the beginning of the opening of wool market and the increase in the demand of alpaca fiber at world and regional levels were determinant for the appearance of production initiatives related to Camelids stockbreeding. At the same time, private organizations and programs or support projects started to emerge. Years later, the technology for removing the bristle from the wool brought about the opening of relatively important markets.*

*Successive governments between 1985 and the end of the 90s carried out some advances in the definition of policies on the promotion and support of stockbreeding; that partially meant the continuation of what had been initiated by INFOL, but generally speaking little support materialized in the productive regions. As in many other cases, the absence of the state stimulated the*

*emergence of various initiatives and projects carried out by NGOs. That usually happened in isolated ways and without coordination. One of the results was that various local associations of Camelids producers were constituted; some of them achieved a relevant regional projection, while others didn't go beyond the local domain. Another result was a remarkable asymmetry in the degree to which the associations managed to achieve strength and receive attention. This was due to the technical and financial limitations of the projects that emerged, as well as the dispersion of the different communities that produce Camelids. In other words, the projects had limited potential, and only included relatively important regions in the extended macro-region of the highlands (Ulla Ulla, Sajam, Curahuara, Turco, Pacajes). Another conspicuous result, in the mid term, was the alteration in the traditional logic. The common practice of subsistence and exchange were replaced by mercantilist logic and the accumulation of capital, caused by an exaggerated projection of trading of transformed products. This also had repercussion on the vision of accumulating big numbers of animals, in order to ensure a bigger volume production of wool; that situation ended up intensifying the effects of overgrazing and degradation of pastures.*

*Both the private organizations and state carried out parallel actions. The former supported the Camelids stockbreeding according to their own visions, experiences and interests, generally having little or no coordination with government authorities (both central and at the prefecture level). The latter did the same with their obvious limitations in regard to logistics and technique.*

*Each new government elaborated strategies of rural development that included policies and actions for Camelids stockbreeding; some of them had an evident local focus, like "Strategy of Productive Municipalities" (or Economic and Rural Promotion). None of them, as a general rule, was actually carried out in the different regions and communities. Each new government would elaborate a new strategy (at a very high cost), which would be filed by the next government only to create a new one.*

*In the year 2003 the National Strategy of Agricultural and Livestock Development (ENDAR, by its Spanish abbreviation) was created. This institution put an exaggerated emphasis on the issue of productive chains, among which it proposed the Camelid as a valuable strategic line for the packet of productive chains. This extremely productivity-oriented vision didn't acknowledge the logic and vision of the peasant. It was fiercely criticized and fortunately was never put into practice, mainly due to the radical political change that took place in the country.*

*Following the document, these are the lines of action considered by the development policy under the item Camelid:*

- *Support to meat, leather and fiber trade.*
- *Insertion of the Camelid product in the market.*
- *Ecological production (wool, meat and leather)*
- *Modernization and technological innovation.*
- *Transference of technology.*
- *Training and technical upgrading of human resource.*
- *Animal health and quality control of Camelids products.*
- *Technical upgrading of the Camelids production systems.*
- *Livestock credit.*
- *Creation of a database for the Topic Camelid.*
- *Deliberation and concertation.*
- *Development of the fiber, meat and leather industrialization.*
- *Conservation and improvement of genetic resources.*
- *Use of genetic resources (biodiversity) in the local development.*
- *Conservation of genetic resources and environment (ecosystems and grazing systems)*

*Notice that, in an ambiguous way, the issue of conservation of the ecosystems is mentioned in the last place, even though they are the basis for the support of the stockbreeding activity. These issues are discussed later.*

*As regards the National Development Plan, it seems to approach the topic from a different angle. It has a more cultural projection, trying to rescue the communitarian aspect. As the previous strategies, however, it ended up having a modernist vision oriented towards productivity.*

*Some elements that persist throughout the years in relation to stockbreeding and Camelids pastoralist activity are:*

- *Persistence of a trading system based on intermediaries or rescuers who do not recognize the quality of the fiber in the price.*
- *Limited basic services in the rural communities of the Camelids producing zones, which have repercussion in the precarious conditions of the stockbreeding productive systems or those where stockbreeding plays an important role.*
- *Limited, not to say null, access to technological and financial resources by the majority of families and pastoralist communities.*
- *Generally speaking, support has been addressed to issues like production, transformation of wool, wool trading, animal health and, to a lesser degree, the sustainable management of forage ecosystems. The latter seems to be a common and constant vision among the different agricultural entities dedicated to livestock, whether from the state or from NGOs.*
- *In spite of having put in place policies, planes and strategies to support the sector, the results were always meager and superficial. In some cases this has been interpreted as the result of lack of will and commitment, as well as the insufficient investment to carry out the foreseen actions or proposals.*

- *Apparently, the state hasn't recognized yet the socioeconomic important they hold for the subsistence of thousands of families in a large geographical area.*

*Taking into consideration: a) that the pastures and humid flooded prairies are the basis for the support of stockbreeding raising and practice, b) their clear and progressive deterioration in the last 20 years, due to factors already analyzed like overgrazing, lack of irrigation or sedimentation caused by floods, it should be cause of astonishment that no policies and actions to promote the conservation and recuperation or restoration of ecosystems have emerged. These elements related to management of ecosystems and water supply become extremely critical within the context of the global climatic change.*

*From all this, the conclusion can be drawn that the development of the different projects was not carried out with a vision that takes into consideration the ecosystems.*

*Unfortunately, the high vulnerability of these ecosystems has not influenced either the creation of proposals for plans of conservation and management, causing that few areas are within the conservation units (National Parks and Reserves). There are various cases of degradation and contamination processes due to mining, water drainage for various purposes or the extraction of peat. In general, no specific policy has been applied for the support of Camelids\_stockbreeding inside protected areas. There have been cases of projects of support to the issue of Camelids inside protected areas (like the case of Sajama National Park) with an eminently productive vision and little projection to aspects of conservation or restoration of supporting ecosystems.*

*In the general diagnosis it has been seen that in the last 40-50 years there has been a progressive and out of control increase in the size of herds of Camelids in almost all the regions of the highlands. Considering that one of the most worrying ecological problems of the pastures and humid areas is hedge degradation due to overgrazing, few projects have tackled this particularly conflictive problem. The communities and cattle owners are generally reluctant to consider the issue of reducing the herds seize in order to reduce and mitigate the impact of overgrazing, even though they know and understand the seriousness of the situation. In relation to this issue various aspects are at stake, such as economic, strategic and survival aspects as well as social status issues. In any case, experiences of awareness as regards the size of the herds have proven successful in the mid term run; they are based on commitment by the communities in exchange for incomes that come from aggregate value and transformation of products, as well as the possibility of fairer and more advantageous trade.*

*It is worth mentioning that some projects of support to the development of Camelids stockbreeding focused on the planting of exotic or native grass to*

*increase the volume of forage, without tackling the structural problem of the seize of the herds and overgrazing. These palliative experiences didn't have good results.*

*As conclusion, it can be mentioned that the policies and actions have given exaggerated attention to the issue of production, technological processes and trade of products (with little success in spite of that emphasis), and a very poor, if any, attention to issues that we consider as fundamental for the issue of Camelids pastoral activity:*

- a) Conservation and sustainable use of ecosystems, which include forage biomass and maintenance of production.*
- b) Impacts and degradation processes originated in overgrazing, drying and invasion of mud landslides and sediments.*
- c) The need for the reduction of the impact, restoration or recuperation of ecosystems.*
- d) Water economy, reduction of water supply in the region and intensification of desertification.*

*Issues related to culture or the Andean pastoralist activity are also absent from the government policies and the vision of many private organizations and projects.*

*Pastoralist activity of native Camelids in the high Andes is a traditional practice that implies the use of: a) the germoplasmic and biologic resource that constitute the herds or flocks of Camelids, b) the ecologic landscape and the mosaic of ecosystems it comprises, which is the major basis for the support of pastoralist activity, c) water management and water economy, fundamental for the continuance of forage production, d) mythical-religious (ritualistic), cultural and social practices related to cattle raising and the management of ecosystems. All this entails a baggage of knowledge and learning inherited from ancient times, basically from the prehistoric beginnings of domesticating llamas and alpacas.*

*Besides disregarding the ecosystem, the state never managed to value Camelids pastoralist activity as a traditional ancestral manifestation that can be considered a cultural heritage. Along this line, public policies or those of the NGOs in general have not considered the following issues or have done it only superficially: a) the ritual and cultural aspects attached to the vision of the cosmos that are associated to stockbreeding and b) the meaning of cultural heritage, c) pastoral activity with Camelids as relevant element of the rich regional and national agro biodiversity.*

*In regard to the use of space, water or the ecosystems that support forage production (prairies and pastures), the management of Camelids stockbreeding obeyed the rules of a logic of communal and intercommoned management. In relation to cattle raising, the management of herds is under families of groups of families, considering the extended families that stay in a ranch. During pre-colonial times,*



*Camelid raising was carried out in relation to the organization of the ayllu; this institution was later replaced, during colonial times, by the community, an this is the entity that continues up to now. In some areas, however, the traditional system still prevails. In Bolivia, the regions that still keep the traditional style of communal management are Ulla Ulla (Apolobamba Mountains), Pacajes Mauri, Sajama, San Pablo de Lipez. The other regions have lost, in one way or the other, the necessary communal practices for the continuance of productivity in the grazing areas and prairies. In some regions in highlands in Bolivia, especially in the central Puna or Altiplano, the introduction of the modern trade unions gradually replaced the traditional authorities; in some cases they still remain as a symbol. In general, the communal organizations have been weakened and this has caused the regression of the practices of communal management of forage ecosystems, especially the grazing areas that require a rigorous use of water. Communal management has been replaced, at least partially, by that of the associations; the latter has somehow helped the weakening of the communal management, though many times has contradicted the ancestral logic and vision.*

*Inside the pastoralist and stockbreeding practices with Andean Camelids, the use and management of water is community based; this has been carried out throughout the years on the base of inter-family agreements. Frequently, systems for organizing work based on reciprocity have been used, like the ayni. The organization of work was dependant on the role of the regional or local traditional authorities (malkus, julacatas); after the weakening of these, the modern system of authorities (judges, mayors, leaders, secretaries, etc.) partly assumed the organizing role. In many cases, however, the inefficacy to lead processes of community work has been noticed.*

*The present document, therefore, will put emphasis on issues that have been ignored by public policies and actions in general:*

- a) Issues about conservation, sustainable use, reduction of impacts and restoration/recuperation of grazing and humid areas.*
- b) Water economy and reduction of risks caused by global climate change.*
- c) Strengthening of the community for the management of water, the ecosystem and cultural landscape.*
- d) Elements that should be considered by projects of support to pastoralist activity and Camelids stockbreeding.*

*The intention is to promote socio-environmental policies that allow the emergence of processes specialized on these issues. Concurrently, the effective inclusion of socio-environmental issues in the general processes of stockbreeding development is also searched. It is intended that there is no divorce between the projects of wool production and trade and environmental problems. The starting point is the fact that it makes no sense to promote and*

*support the processes of wool production and trade when the ecosystems that support stockbreeding are collapsing due to problems of degradation.*

#### **IV. POLICY PROPOSALS**

##### **IV.1. BASES AND GENERAL GUIDELINES FOR THE MANAGING**

*Managing Bofedales and fertile plains:*

- *To emphasize on the processes of awareness and training on the issues related to the fertile plains and Bofedales of the region, and on the topic of water and its gradual local, regional and global decrease.*
- *To promote various actions and dynamics meant for the organizational strengthening and the social mobilization concerning the managing and recovery of the Bofedales and fertile plains (for example to regularize the communal activities of irrigation).*
- *To promote and support the activities of organization of communal, group, family and individual work, for the managing of fertile plains and Bofedales as well as Camelid breeding.*
- *To encourage and orientate concrete actions related to the improvement of knowledge and traditional practices related to the managing and conservation of fertile plains and Bofedales (for example the ones related to irrigation and water management), as well as those related to the management of the Camelid herd.*
- *To emphasize the recovery of oral transmission (orality) of knowledge, mostly when a significant number of community members, especially women, have writing difficulties and are not familiar with writing material, with the exception of people such as leaders or teachers.*
- *The trans-generational transmission of knowledge and information about the issue related to the Bofedales and fertile plains and the actions for their recovery and sustainable management, generated and recovered along the development process. This implies working with dynamics of popular environmental education (EPE) especially with children at school and informally at home.*
- *To define strategies and measures (specific activities) that favour major "saving" and retention of water volume in the Bofedales, carrying out communal actions organized for reducing the outflow of large volume of water across various courses of the Alota River.*

- *Considering that the suitable management of irrigation will be one of the main traditional "tools" to favour the recovery, maintenance and sustainable management of the Bofedales and fertile plains, it is important to systematize a communal protocol with regard to irrigation, taking into account aspects like aims or objectives, zoning of the irrigation, duration, frequencies or periodicity, necessary infrastructures (such as channels, dams, and work organization for the execution and permanent follow-up.*
- *Any initiative to extract and use the subsoil or underground water for irrigating the Bofedales and fertile plains should be considered high risk, due to the massive salinity and high degradation that may result.*
- *To seek commitments and agreements for the development of methodologies that may favor the sustainable management of the Bofedales and fertile plains and reduce the impact, for example with respect to digging out layers of earth to be used in the construction of canals and bunkers.*
- *The recovery and sustainable management of the Bofedales and fertile plains also depends on the quantity of the herd, therefore in order to reduce overgrazing, concrete actions will have to be taken such to determine the number of heads of Camelid herd per family, and its distribution in different areas of the Bofedales, the time to be spent by livestock each of the mentioned zones and the rotation among existing zones.*
- *Considering that one of the major problems of degradation that faces the Bofedales is overgrazing, there should be an important commitment by the pastoralist families, not to increase the number of Camelid heads per herd.*
- *Decrease in overgrazing implies having less herds (fewer heads) but of higher quality in terms of weight, color or fiber, while seeking and adapting to modalities and technologies that increase the addition of value or transformation of the products from Camelid breeding (meat, wool, handcrafted fabrics, leather, etc.). This must be a guideline for fundamental management, in order to increase the income and earnings of the families and that the reduction (or non-increase) in the number of heads per herd should not inconvenience them.*
- *The driest areas of the Bofedales and meadows should have a lower animal load and should be used for grazing for a shorter time, since they constitute less productive zones and are more likely to degenerate rapidly, that is to say they are the most fragile and vulnerable zones of the Bofedales.*
- *Encourage the rotation of the herds currently this practice is hampered by large areas of quinoa plantations and towards the hills and hillsides, nowadays the above mentioned this dynamics obstructed by the presence of the extensive quinoa crop and the decrease in shrub plant cover on the*

slopes. Encourage decisions and commitments which favour the presence of the herd on the hillside and which help secure high quality forage, and consequently revenue by ecologically managing agriculture.

- *Taking into account the fact that most Camelid pastoralists are also quinoa farmers, certain commitments and collective decisions should be taken with a view to reducing massive sedimentation of sand and soil towards the Bofedales and fertile plains, this requires the adoption of a series of measures for quinoa farming, which would affect not only the Bofedales but also the proper conservation of the agricultural soil and the sustainability of the quinoa crop.*
- *Actions taken in the management of the herd should take into account aspects that facilitate the production of higher quality herd, for example selected breeding, aspects of animal health and the control of pest infestation and diseases, or the issue of supplementary forage also for periods of extreme scarcity, etc.*
- *The issue of overgrazing and recovery of the Bofedales (therefore of its sustainable management) also has to do with the issue of the pasturage of other types of animals such as Sheep and Donkey. It will therefore be necessary to promote a debate and analysis, as well as a process of decision making over non-increment of Sheep flock for the families and a reduction as appropriate always seeking opportunities of added value in the case of the Camelids.*
- *As part of the integral management of the Bofedales and fertile plains of the region, certain important commitments and effective actions for favouring the conservation of the species of wild fauna in the Bofedales and fertile plains, rivers and lagoons, for example birds (Huallatas, chokas<sup>1</sup>, ducks, etc.), native fish, frogs etc. have to be taken into account. This conservation is important because it favours the maintenance of conditions of ecological stability of these wet lands and on the other hand they can favour activities such as ecological tourism, and environmental education.*

#### **IV.2. Strategic and fundamental guidelines for the recovery and sustainable managing of fertile plains and humid lands - humedales**

1. *Taking into account the acute lack of water potential in the region, actions favouring water retention in the systems of the Bofedales and fertile plains should be encouraged in order to avoid or rather reduce the "losses" or rapid outflow across the courses and riverbeds of the rivers, generating logic of saving of this one. This should be done by re-instituting the communal managing of the water, which will lead to the maintenance of the treasure of lagoons, puddles, and especially the flooded Bofedales, the construction*

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<sup>1</sup> Original names of native species.

*and maintenance of dikes or stored waters, the proper management of irrigation projects etc. The Bofedales acts as a "sponge" from its muddy soils and its vegetation and plants structure, retains or captures the water and liberates them slowly, a suitable and careful process of irrigation will allow that the Bofedal to store water allowing a better saving of the latter.*

- 2. We should reject any initiative or proposal that seeks to irrigate the Bofedales and fertile plains (by pumping) using subterranean water resources taking advantage of underground waters, due to its high concentration of salt content. These have the potential to quickly cause irreversible damage to the ecosystems on account of their salinity ("kollpar" the Bofedales).*
- 3. Another important element to bear in mind is not to increase the animal load, that is to say not to increase the number of Lamas and if possible, to reduce them gradually up to an ideal level, preferring to have smaller herds of high quality with greater possibilities for economic benefit on account of their value added products. The same argument may be applied for the Sheep flock.*
- 4. Given the enormous threat of widespread ecological degradation and its direct effects on the fertile plains and Bofedales, quinoa cultivation should be made more agro-ecologically friendly and that will reduce the negative effects of soil erosion and slow sedimentation of (soil and sand) from the slopes and rivers towards the wet plains and Bofedales.*
- 5. Emphasize organizational strengthening, social mobilization and community work, at the same time to give continuity to the awareness creation and sensitization processes about environmental issues pertaining to the wet lands of the region in general, as well as the generation of capacities (capacity building) and leadership.*
- 6. One of the measures of management for the recovery of the Bofedales should undoubtedly be, the gradual reduction (little by little) of the size of the family herd in relation to the lower loading capacity of the Bofedales. The suggested alternatives should have a relation to generation of better economic income and the possibility of recovering the fertile plains and Bofedales, that can be done by keeping smaller herds of higher quality, and also seek to add other products such as meat, leather, wool, Lamas for transportation, etc., breeding animals, etc.*

### **IV.3 . Negative practices in the use of fertile plains and Bofedales**

*During the participative processes it was possible to identify a set of negative practices in the use of the fertile plains and Bofedales that cause the impacts and effects of degradation on the said ecosystems, some of these are possible*

*practices (they are not used in actuality), others are currently being practiced. These practices are just the opposite of what these guidelines of good practice suggest.*

- *Pumping of underground water for purposes of irrigation, would cause the salination of the fertile plains and Bofedales.*
- *Allow the water from the rivers or springs to be extracted, for purposes of mining, ranching or farming (for the irrigation of quinoa crops) in other regions. This would greatly reduce the water resource in the wetlands.*
- *Diverting or capturing water from other regions, might cause conflicts with the other regions and communities.*
- *Overlooking or omitting to regularly irrigate those areas of the fertile plains and Bofedales which are under the threat of drying out.*
- *Increasing the number of Llamas and thereby causing overgrazing.*
- *Increasing the number of Sheep, which increases overgrazing and the breaking of the soil structure of the fertile plains and Bofedales.*
- *Failing to reduce overgrazing due to donkeys, allowing their numbers to increase which is even worse, as this causes serious damage to fertile plains and the Bofedales.*
- *Overgrazing on already degraded areas damaged by herd and preventing these areas from recovering.*
- *Overgrazing dry or less humid areas, which degrade more rapidly because they are less productive and their forage has a lower quantity.*
- *Extraction of layers of earth from specific areas repeatedly for the containment of harvested water and canals encourages soil degradation by erosion and it slows the regeneration of the vegetable cover.*
- *To carry out tasks and individual work in fertile plains and Bofedales (e.g. irrigation, bunkers or dikes, canals, control of the number and type of animals), without considering the communal processes and a necessary level of consultation and of consensus building with the rest of the families in the community.*
- *In relation to the above, the loss of cultural values and practices is considered as something very negative in the way it affects the organizational aspects of the management of the fertile plains and Bofedales since it favors the individualized and sectorial management of the same and*

also it also leads to the loss of related knowledge due to the lack of opportunities for oral transmission of traditional information.

- *To negatively affect wildlife in the fertile plains and Bofedales for example, by increased hunting of certain specific species of birds or the extraction of their eggs, or by chasing and harassing these species.*
- *The establishment of quinoa farms in areas close to the cliffs, rivers and slopes (with more than 25 degrees slope gradient) will encourage the transfer of sediment towards the plains and Bofedales. This will have the effect of covering those areas with soil and silt during the wet season.*

#### **IV.4. Guidelines for projects in support of the pastoralist culture of Camelid**

*The support projects for ranching of Camelid have developed outside the coordination and supervision of the state authorities. In many cases the processes have been very discretionary and have been wrongly managed generating both ecological and socio-cultural impacts. Already the weakness and the total absence of the mentioned public policy related to the conservation and sustainable managing of humid lands - humedales and vegales or fertile plains along the rivers, which could serve as guidelines for the development of projects in the Andean zones of pastoralism, as well as in their protected Areas.*

*It is proposed, therefore that in this respect, a set of overall policies relative to the development of projects and actions in order to support to argument of strengthening the topic of cattle sound production of Camelid, bearing in mind in a main way the aspects of sustainable use, conservation and the socio-cultural ones. This proposal of policies intends to support and to orientate as much the state with its promotion and regulatory role as well as the organizations that seek to support the pastoralism way of cattle production and ranching of Camelid:*

#### **IV.4. Ecological and environmental aspects**

- 1. There must be a prioritized approach to those regions of special vulnerability and in major risk of intensive degradation, seeking to reduce or to neutralize the impacts on the ecosystems that are determinant and supportive of the pastoralism, as for the overshepherding.*
- 2. To promote specific or transverse actions for the reduction or neutralization of impacts or threats to eco-regions or ecosystems, which are prioritized like of special patrimonial importance, and / or that are in critical condition or in increasing vulnerability \*Note. - For example, the unique ones, the particular ones, the relics, those that are highly representative, highly fragile or ecologically sensitive, sites or elements or of geomorphologic landscape, or those of extraordinary value.*

3. *The projects should not cause changes in the supportive ecosystems nor on those that are in process of recovery, for example, by stimulating the increase of the size of the herds which would create pressure that can cause degradation.*
4. *The projects should centre on the mainsprings that determine the impacts and the deterioration of the humid lands - humedales and fertile plains or the unsustainability (low efficiency) of the productive systems, to the vicious circles, that is to say, by attacking the central problems. It is not considered to be strategic to concentrate efforts in isolated changes that can be attractive for the local producer but that do not have a positive impact on the central problems of conservation and sustainability of the supportive ecosystems of the pastoralism as a sound means of livestock production.*
5. *The processes of transformation and aggregation of value must focus on the reduction of environmental costs in general. This implies seeking processes of integral certification (ecological, organic, cultural, of equity, towards improvement of the quality, denomination of origin, etc, in order to open and to guarantee processes of fair and profitable marketing by the communities, trying to make these as accessible and user friendly as possible to the local producers, for example by reducing the general transaction costs.*
6. *Those that are considered to be friendly or amicable projects to the sustainable conservation and use of the supportive ecosystems of the ranching production of Camelid cattle are those that should promote: a) The reduction or neutralization of impacts or threats on essential ecological processes, b) Those that promote reduction of impacts in the direct environments of zones or sites where ecological impacts and degradative processes exist because of the pressure of its use, c) The conservation, valuation, or reduction of the risk of loss of the native agro-biodiversity, or their forms and practices of traditional managing*
7. *The projects considered to be favourable are those that can promote and facilitate the use of alternative ecological technologies in the processes of transformation and aggregation of value, but the projects that promote initiatives of incorporation of innovative or alternative technologies of low ecological impact must not imply a disadvantageous replacement of the traditional and ancient technologies or practices*

#### **IV.5. Socio-cultural aspects**

1. *It is in the of interest of the State to support projects that foment the increase of the sustainability of the traditional cattle productive systems that interact with the unique, highly singular ecosystems and of very high ecological fragility as it is in the case of the humid lands - humedales, and on which they exercise increasing pressures of modification.*



2. *Favourable projects are those that seek to value and to recover the character of traditional productive systems (knowledge, technologies, and practices) that are sustainable, productively efficient and that in general exercise a low impact on the ecosystems.*
3. *The projects will endeavour to internalize the diverse essential aspects of the local family or community cattle realities, as the reciprocity, solidarity, productive diversity, conservation of the native agro-biodiversity, reduction of risks, or mobility.*
4. *The projects must not distort (nor replace) the nature of the traditional organizations of the communities and of their intrinsic mechanisms of control and reciprocity, eliminating any risk of creating forms of clientele or cooptation.*
5. *The projects should not to cause processes of alteration or distortion of the traditional productive ranchers systems have shown stability and productive efficiency, they must not interfere in these, avoiding the interruption of the reproductive logic of reciprocity that still exist in many communities, by transforming or promoting their replacement in favour of the market economy (capitalist logic).*
6. *One of the premises is that all the projects should have a real and profound local participation in the design and execution of projects, following a “down-upwards” management format. The local participation must be considered not as a means but as an end in itself, this involves an effective incorporation of the local actors in the process of decisions making.*
7. *The project strategies should intergrate with the local life of the communities keeping in mind and prioritising their perceptions and approaches, (topics, scopes, problems, opportunities, etc.) and should promote actions which are initiated and developed keeping in mind the capacities, potentials and limitations of the local communities.*
8. *The projects must foresee in an implicit way, effective and evident processes of improvement of the quality of life, of the levels of empowerment and capacity building, and of the income of the producers or ranchers.*
9. *In all the projects the commitment of the participating communities should be emphasized in the responsibility of the execution, both at the level of the leadership and at that of the involved families.*
10. *They will have to consider the incentives and direct subsidies (that serve as means of motivation or project development), clear disadvantages*

*should be associated with being counter-productive to the goals of appropriation and sustainability, and may distort the relations of the local project - community approach on having created not desirable links of dependence and clientelism. The direct incentive to leaders or representatives ends in undesirable processes of cooptation and community discomfort.*

- 11. Efforts should be made for pastoralist support projects to achieve far reaching positive social impacts for many of their families rather than localized impacts that reach only a few beneficiaries (the mechanized ones or those who have more livestock. This will result on the one hand in the generation of more positive impacts for conservations, greater social awareness and on the other hand it will result in the reduction of inequalities thus avoiding the creation of local elites that can affect the communal organization.*
- 12. Projects should promote efforts that seek to achieve the effective social and technical empowerment of the pastoralist communities so that they may have ownership of the process and in this way to ensure its long term continuity and sustainability.*
- 13. Projects should promote efforts that seek to achieve the effective social and technical empowerment of the pastoralist communities so that they may have ownership of the process and in this way to ensure its long term continuity and sustainability.*
- 14. In all the projects active participation should be encouraged as should the effective commitment of the Municipalities (City Halls)*
- 15. Projects should be strategically inclusive, though particular aspects may be focused on, oportunities for interracting with other producers should be taken into account ( for example the Quinoa producers or tourism) o as to be able to carry out different compelmentary acctivities.*
- 16. The projects should pay special attention to the empowerment, organizacional strengthening and the generation of technical, as well as andministrative and marketing capacities and skills.*