



Biodiversidad, Conservación y Desarrollo Sostenible

“POLICIES ON CAMELID PASTORALISM IN THE  
ANDEAN HIGHLANDS OF BOLIVIA”

Elaborated within the Framework of the:

# TABLE OF CONTENTS

		Pag.	N°
	PRESENTATION		4
	Background of this study		4
	Methodology		4
I.	DIAGNOSTICS		5
I.1.	The history and origins of pastoralism in the high Andean regions		5
I.2.	General aspects of Camelid breeding in the Puna and High Andean regions of Bolivia		6
I.2.1.	Physiographic and geomorphologic description		
I.2.2.	Climate		6
I.2.3.	General hydrological aspects		7
I.2.4.	Ecosystem structure and distribution		8
I.2.5.	Efficiency and productivity of the Bofedales		9
I.2.6.	Loading capacities of the Bofedales		11
I.2.7.	Strategies and rationale for land occupation		12
I.2.8.	Livestock as the basis for productive systems		13
I.2.9.	The Bofedal as a dynamic cultural Landscape		14
			16
I.3.	The development and evolution of Camelid pastoralism		18
I.4.	The current state of Camelid production in the country; (impacts, threats, advantages and potentialities, etc)		20
I.4.1.	Ecological problems of Camelid breeding		
I.4.2.	The problem of the Bofedales from the “tragedy of the commons” perspective		21
I.4.3.	The deterioration of the Bofedales and high Andean grasslands and related problems.		23
			26
II.	FUTURE SCENARIOS AND TRENDS		28
III.	MANAGEMENT OF STOCK BREEDING AND POLICIES		30
IV.	POLICY PROPOSALS		37
IV.1.	Bases and general guidelines for the managing		37
IV.2.	Strategic and fundamental guidelines for the recovery and sustainable managing of fertile plains and humid lands - humedales		40

IV.3.	Negative practices in the use of fertile plains and Bofedales	41
IV.4	Guidelines for projects in support of the pastoralist culture of Camelid	42
IV.5.	Ecological and environmental aspects	
IV.6.	Socio-cultural aspects	43

# 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

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.

## I.2. GENERAL ASPECTS OF CAMELID BREEDING IN THE PUNA AND HIGH ANDEAN OF BOLIVIA

### I.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

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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.

### I.2.3. General hydrological aspects

Bolivia has a closed water basin with 1600 millions of cubic meters of water.

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ter.

2002, many of



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

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.

### 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

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.

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

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 temperau e.

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 cult





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



Large areas of have suffered the effect

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 lead 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 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

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 Ostrom and Ostrom (1975) who argue that the right to common ownership of resources are not the same thing as property rights over them. Hardin himself also differentiates between communal goods and private 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

I.4.3. The deterioration of the Bofedal es and high Andean grasslands and related problems.



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 cause large areas of the Bofedales to be gradually covered in soil thus raising the soil levels, this proces is accompanied by a massive increase in salinity.

An excessive amount of soil from the sl

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.

- x Warming and reduction of water resources.



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

- x Support to meat, leather and fiber trade.
- x Insertion of the Camelid product in the market.
- x Ecological production (wool, meat and leather)
- x Modernization and technological innovation.
- x

x 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 variouthe

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





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:

- $\frac{3}{4}$  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.
- $\frac{3}{4}$  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).
- $\frac{3}{4}$  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.
- $\frac{3}{4}$  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.
- $\frac{3}{4}$  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.
- $\frac{3}{4}$  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.
- $\frac{3}{4}$  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.

<sup>3</sup>/<sub>4</sub> 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.

<sup>3</sup>/<sub>4</sub> Any initiative to extract and use t

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.

- $\frac{3}{4}$  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.
- $\frac{3}{4}$  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.
- $\frac{3}{4}$  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.
- $\frac{3}{4}$  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

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

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.

- $\frac{3}{4}$  Pumping of underground water for purposes of irrigation, would cause the salination of the fertile plains and Bofedales.
- $\frac{3}{4}$  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.
- $\frac{3}{4}$  Diverting or capturing water from other regions, might cause conflicts with the other regions and communities.
- $\frac{3}{4}$  Overlooking or omitting to regularly irrigate those areas of the fertile plains and Bofedales which are under the threat of drying out.
- $\frac{3}{4}$  Increasing the number of Llamas and thereby causing overgrazing.
- $\frac{3}{4}$  Increasing the number of Sheep, which increases overgrazing and the breaking of the soil structure of the fertile plains and Bofedales.
- $\frac{3}{4}$  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.
- $\frac{3}{4}$  Overgrazing on already degraded areas damaged by herd and preventing these areas from recovering.
- $\frac{3}{4}$  Overgrazing dry or less humid areas, which degrade more rapidly because they are less productive and their forage has a lower quantity.
- $\frac{3}{4}$  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.
- $\frac{3}{4}$  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.
- $\frac{3}{4}$  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



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.



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.

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, opportunities for interacting with other producers should be taken into account ( for example the Quinoa producers or tourism) so as to be able to carry out different complementary activities.
16. The projects should pay special attention to the empowerment, organizational strengthening and the generation of technical, as well as administrative and marketing capacities and skills.