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## Wild vicuñas management in Cieneguillas, Jujuy

### Manejo de vicuñas silvestres en Cieneguillas, Jujuy

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#### Abstract

The vicuña, *Vicugna vicugna*, has been used by the settlers of the high Andes since prehistoric times. After the Spanish conquest, the species was almost exterminated by indiscriminate hunting for its valuable pelt. Since the 1969 Vicuña Convention, numbers have recovered from a low number of about 6,000 to a current estimate in the region of 200,000. In some areas, vicuña are found at relatively high densities, which has led local communities to begin to see the species as a potentially significant source of income. In this paper, we discuss the effectiveness of different types of management. We present a case study our experimental management of wild vicuñas (two captures, May and November 2003) in Cieneguillas, Jujuy Province (Argentina). We describe objectives, methodology, social actors, expectations and economic costs of the activity.

#### Resumen

La vicuña *Vicugna vicugna* fue utilizada por los habitantes de los Andes desde la prehistoria. Luego de la conquista española, la especie fue casi exterminada por la caza por su valiosa fibra. Desde la Convención de la Vicuña en 1969, las poblaciones se recuperaron desde 6000 a una población actual estimada de 200000. En algunas áreas las vicuñas se encuentran en altas densidades relativas, que permiten a las comunidades locales vislumbrarlas como una fuente de recursos potenciales. En este trabajo se presenta como estudio de caso el manejo de vicuñas silvestres (dos capturas: Mayo y Noviembre del 2003) en Cieneguillas, Jujuy, Argentina. Se describirán los objetivos, metodologías, actores sociales involucrados, expectativas y costos económicos de la actividad.

**Keywords:** vicuñas, management, Cieneguillas

**Palabras clave:** vicuñas, manejo, Cieneguillas

#### Introduction

The vicuña is the smallest of the South American camelids and it inhabits the *puna* region of the Andean altiplano (Koford 1957), which extends from 9° 30' to 29° 00' S in Argentina, Bolivia, Chile and Perú. This habitat is the Andean domain of the eotropical egiion, a high plateau between 3,000 and 4,900 m above sea level, characterized by low annual rainfall, high daily temperature range, and low primary productivity (Cabrera, 1976).

For most of their range, vicuñas share their territories with domestic llamas, alpacas, and exotic cattle as sheep, cows and goats. The main threat to the habitat is desertification, due to overgrazing (mainly by exotic livestock) and lack of proper management (Flores, 1991). SACs are considered

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'low-impact grazers' because of their adaptations such as a ruminant digestion specialised for a high fibre-low protein diet (San Martin, 1991), padded feet, sharp incisors and prehensile split upper lip that minimize impact on vegetation and loose soil. (Wheeler, 1991).

Vicuña fibre has been valued since Incan times (Custred 1979). The Incas used vicuñas sustainably by performing hunts or *chaku* every 3-5 years during which they would shear some of the animals and take some for meat. After the Spanish conquest, vicuñas were slaughtered in large numbers which almost caused the extinction of the species by the middle of the 20<sup>th</sup> century. Hunting pressures and livestock competition reduced the world population to approximately 6,000 individuals in 1965 (Nowak 1991). This led to the listing of the species in Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). International conservation efforts enhanced by conservation efforts and tolerance of vicuñas by local communities, resulted in a recovery of many populations (Torres, 1992), and now vicuñas are classified as LRed (Lower risk: conservation dependent) in the 1996 Red List of threatened animals. The ban on trade on vicuña fibre has been lifted entirely from Peru and Chile, and certain specific vicuña populations in Argentina and Bolivia. Exploitation programmes are found in all of the four countries (Bonacic y Gimpel, 2001, Bonacic *et al.*, 2001, Lichtenstein y Vilá, 2003).

There are two main ways of managing vicuñas: wild or captive. The main characteristics of these two alternatives and some of their implications are summarised in Table 1.

Table 1. Characteristics of captive and wild management systems for vicuñas (modified from Lichtenstein and Vilá, 2003).

	Wilderness	Captive
Habitat use and dispersion	Temporary effect during the capture	Permanent changes
Artificial selective pressure?	Yes	Yes
Natural selection (NS) and Sexual selection (SS)	No interference with the mechanisms	Interference with both, mating partners reduced by restricted area
Artificial selection	No	Yes, usually bachelor males are castrated; in some cases breeding selection for fibre quality
Genetic problems risks	Low as there is no interference with NS and SS	High, especially in selecting males
Behaviour	Antipredatory response to capture Post capture groups changes under study	Loss of antipredatory response Taming High aggressiveness between males
Capture	A minimum density is needed	Easier as restricted by fences
Costs	Low as the most expensive component the nets can be sheared between communities	High depending on the size of the captivity
Conservation value for the species	High as the populations must be dense for the captures	Neutral as what happens outside the captivity facility has no relation with the activity

### *Case study: sustainable use of vicuñas in Cieneguillas, Jujuy.*

The Jujuy Province is now changing their politics in relation to the vicuñas, from pure conservation to a limited use. It is a priority now the development of adequate management for a sustainable use of this resource based on local particular situations and in serious research. Los Pioneros Association in Cieneguillas, with a good vicuñas population in their land, started to look for experiences on management of vicuñas in other areas. In 1999 they contacted MACS members (CONICET-Unlu and INBIAL-Unju) for assistance, and now we are working together in the management of Cieneguillas vicuñas.

Cieneguillas is a small town 36 km west of La Quiaca in the Argentine-Bolivian border at 3700 meters above sea level. It has approximately 200 inhabitants and is important in terms of its administrative, religious, public health, and educational functions. This area belongs to the Laguna de Pozuelos UNESCO Biosphere Reserve (66° 15'W, 21° 50'S), Jujuy, Argentina. The climate is severe with high diurnal temperature fluctuations and frequent frosts. Rain is seasonal (December to March) and scarce (350 mm/year). Strong, dry winds are frequent. Soils are stony, sandy or saline. Phytogeographically, the reserve includes the 'una' and 'ltoandino' provinces (Cendrero *et al.*, 1993). The study area used for research and management of vicuñas is on private land belonging to the Los Pioneros agricultural association. In the most recent census we counted approximately 1000 vicuñas at a mean density of 9 vicuñas per km<sup>2</sup> – an ideal situation for wild management.

This high vicuña density is a consequence of a conservationist attitude of most of the Los Pioneros members, whose tolerance of vicuñas grazing with their llamas has been recognized by the national government. Prior to any management interventions we obtained approval for the 'Cieneguillas wild vicuñas management plan' (Vilá *et al.*, 2002) from the Provincial Direction of Natural Resources and Environment (resolution N° 038/03-DPMAYRN).

#### *Wild vicuña use in Cieneguillas*

During 2003, we captured vicuñas in May and in November. The first capture was part of a training course for locals, during which biophysical measurements were taken, but with no animals shorn. In the November capture, most of the animals were partially shorn.

The management technique used is based on the capture of wild vicuñas that receive no other management intervention or genetic selection. The technique used (*chacu*) is similar in principle to ancestral practices (Guaman Poma 1658). It involves the deployment of people stretching out ropes with coloured strings to make a portable barrier used to encourage the vicuña to enter a netting funnel trap (Figure 1). At the end of this trap there is a corral (Figure 2) with several internal divisions. This technique can incorporate the use of motorbikes to drive the animals towards the waiting lines of people (Bonacic *et al.*, 2003) at the start of the capture.

#### *Human resources*

A number of different groups were involved in the capture: (a) scientific group: Cieneguillas team from the MACS-Argentina and Chile Project (10 researchers and helpers), (b) Members of the Los Pioneros Association in Cieneguillas (18 members), (c) Gendarmerie: 4 motorists and the motorbikes trained by Dr Bonacic from MACS-Chile, (d) Environment and Natural Resources Direction of Jujuy (3 members including the Director) (e) members of the Cieneguillas community, (f) members of the neighbouring Cusi-cusi and Tafna communities. In total, there were more than 120 people involved in the activity.

Proceso de arreo final a pie de vicuñas  
Modelo mixto de arreo

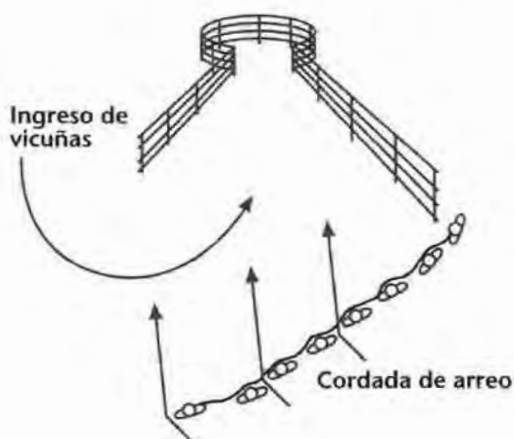


Figure 1. Capture method with a funnel.

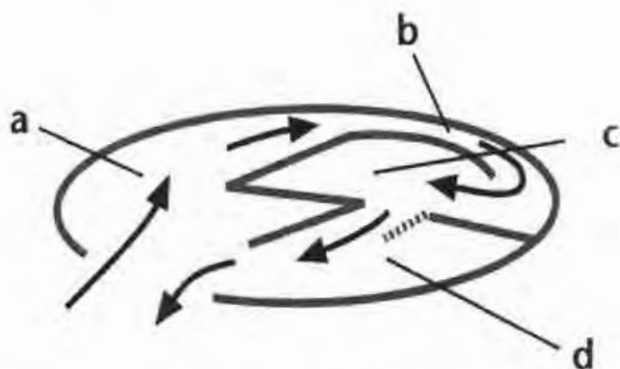


Figure 2. Capture corral (adapted from Bonacic and Macdonald, 2001). a: entrance; b: pre manipulation zone; c: manipulation and shearing area; d: pre-release area.

### Capture results

Some of the results from the captures can be observed in Table 2. In total 98 vicuñas were caught (16 were captured twice). In the first post captured sample (the week before the activity) 95 marked animals were found grazing in the same area.

### Handling

The wood-lined pre-handling area isolates the recently-captured vicuñas and allows a period in which the animals can calm down. Each vicuña was blindfolded and moved to the handling area by two people. The holding technique involves taking a firm hold of the vicuña's head to prevent

Table 2. Date, number of vicuñas in each captured group, number of sheared vicuñas per group, mean manipulation time and total fibre obtained.

Date	Vicuñas in the group	Sheared vicuñas	Mean manipulation time (min)	Fibre obtained (gr)
06/11/03	21	19	18	4659
07/11/03	9	7	22	1837
07/11/03	9	8	22	1608
07/11/03	5	3	19	581
08/11/03	2	2	23	320
08/11/03	11	9	18	2194
08/11/03	14	11	6	2018
09/11/03	43	16	9	3086
Total	114	75	17.12	16303

it shaking its neck. Dragging by the ears and/or tail must be avoided. In the handling area, the animals are laid down in a sternal recumbent position ready for the various sampling procedures, shearing with scissors and individual marking takes place.

The data we sampled:

- General data: age (by dentition), sex, type of group (bachelor, family member).
- Morphometric data: weight, length, thoracic diameter, head and leg length.
- Physiological data: cardiac and respiratory frequency, rectal temperature (two measurements at the beginning and at the end of manipulation). General evaluation of strength, injuries and ecto-parasites.
- Blood samples: Samples were taken for studies on genetics, haematological variables, hormones, internal parasites (viruses and bacteria), biochemistry, nutritional state.
- Fibre samples: For lanimetric studies.
- Marking: We put collars with a big mark for post capture individualization and ear tags.
- Time taken for shearing.
- Behaviour sampling of animals in the different stages of the capture: movements, vocalizations and individual behaviour.
- All handling operations were carried out to high animal welfare standards to minimize the stress produced by the activity (Bonacic *et al.* 2003ab).

#### Property rights to fibre

The agreement made with the provincial government (Resolution No. 146/2003 de la DPRN y MA) states that Los Pioneros owns 80% of the fibre harvested. The remaining 20% is a resource for the provincial government to conserve, research and manage vicuñas. Los Pioneros has to make an open auction. At this moment they are deciding about selling the raw fibre (approximately 360 dollars per kilogram in the current market) or to dehairing the fibre (approximately 650 dollars per kilogram in the actual market).

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### *Economic analysis*

The costs of the capture can be classified in (Table 3):

- Infrastructure: corral, nets, ropes, strings, etc.
- Consumables: food, stationary, freightage, photographic and video, veterinary medicines, sampling material, fuel, etc.
- Travel expenses.
- Labour costs and viatics.

Using the mean price per kilogram in different sales in the tour countries (360 US dollars per kilogram) 32 kg are needed for the total costs of the first capture. UIT the mean fibre obtained per individual in our capture (220 grams) this means that 145 vicuñas sheared covered the initial cost. To cover the infrastructure alone 104 vicuñas are needed. The most expensive component of the infrastructure is the net and this item can be shared between Andean communities.

Table 3. Costs of the capture of vicuñas.

	Pesos	Dollars (2.9)
Consumables	5,967	2,057
Travel	2,172	749
Infrastructure	23,620 (18,000 nets)	8,145
Personnel	1,600	552
Total	33,360	11,503

### *Environmental impact of the capture*

In the management plan agreed with the authorities, a detailed environmental impact analysis was presented using the identification of different effects that this management practise may have (Dalmeier *et al.*, 2000) using a check-list methodology and cause-effect matrix. In the event that there is an impact, this is qualified by sign and intensity using a Leopold modified matrix in the different stages of the process: planification, execution and maintenance and the natural or socioeconomic factors susceptible to have impact on. Care was taken in order to minimize those impacts that could be harmful to the environment.

## Discussion

The Cieneguillas trial was the first wild vicuña capture in Argentina and care was taken to plan the activity step-by-step. This is a preliminary report of that event, and most of the data is currently still being processed. This study is the first to be able to adequately assess the long term impacts on group composition and dynamics as it was preceded by a year-round monitoring of the population prior to the commencement of active handling. We worked under high animal welfare standards with no serious injuries or deaths.

Some advantages of the use of wild populations are published (Vilá, 2002; Lichteinstein and Vilá, 2003).



Article 9 of the Convention stated that the conservation of vicuñas has to be equilibrated with other local human activities with their particular regional characteristics (production systems, land tenure, carrying capacity) using technical accepted methods. In this line, the complete economic sustainability analysis must include not only the operational capture costs, but also be related to the maintenance of the animals grazing in productive areas and the conservation actions made by the Andean communities.

In terms of economic sustainability, the costs of capture are paid off in the second year of the activity. If different Andean communities develop a way of sharing the nets, the corral costs can be paid off with 24 vicuñas sheared in the first year.

One of our goals was to train the local people in capture techniques for wild vicuña under strict animal welfare standards. This care taken is important in terms of successive success in captures, biology of vicuñas and international marketing (Bonacic *et al.*, 2001). Vicuña management attracts international attention as it has the potential to become a key model for sustainability (Bonacic, 1996, Bonacic and Gimpel, 2003). Nevertheless, captive management continues to generate scepticism in terms of its value for conservation and sustainable development (U.S. Fish and Wildlife Service, 2002; Bonacic and Gimpel, 2001 and 2003; Lichtenstein, 2003; Lichtenstein and Vilá 2003; Vilá 2002).

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