

Research article

Vicuña conservation and poverty alleviation? Andean communities and international fibre markets

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Abstract

Vicuña (*Vicugna vicugna*) fibre is produced by extremely low-income communities that inhabit the harsh environment of the Andes in Argentina, Chile, Peru and Bolivia. At the other end of the social scale, affluent consumers are willing to pay high prices for vicuña-made accessories and clothes. Vicuña management projects follow the logic of community-based wildlife management. The rationale for seeking to conserve vicuñas through sustainable use is that commercial utilization of the fibre (obtained from live-shorn animals) will generate sufficient economic benefits to outweigh the costs of conservation, and contribute to community development and poverty alleviation. However, although conservation efforts have been extremely successful with vicuñas having recovered from the brink of extinction, the socio-economic achievements have thus far proved modest. This paper explores multiple-objective projects that address vicuña conservation and poverty alleviation in Andean countries. In doing so, it analyses the tensions that exist between these objectives, as well as the factors that limit a more equitable distribution of benefits among stakeholders. Examples are drawn from vicuña management under common-property in Peru and Bolivia, and vicuña captive management under private property in Argentina. These case studies enable us to illustrate the complex relationship between local communities and the global market, and the importance of community enterprises and supportive government policy in managing a common pool resource.

Keywords

Collective action; common pool resources; conservation policies; poverty alleviation; wildlife

1. Introduction

Trade in the products of biodiversity can potentially make enormous contributions to local, national and global economies (Koziełł 2001). In most cases, however, only a relatively small proportion of the revenues generated accrue to local communities (Hutton and Leader-Williams 2003) and management costs tend to exceed the benefits enjoyed by managers.

The relationships between rural communities and global actors can be mediated through social enterprises (Berkes and Davidson Hunt 2007). These businesses are set up to provide social dividends to community members such as self-determination, cultural revitalization, protection of watersheds and sacred sites, employment, capacity building, as well as a cash income (Berkes and Adhikari 2006). They often require a land and resource base, they operate in local, national and international markets, and require partnerships and networks to access knowledge, technology, capital and access to markets (Berkes and Davidson Hunt 2007).

As with most wild ungulates, vicuñas overlap their range with domestic livestock resulting in a conflict for the use of rangelands between local livelihoods and conservation. This paper explores multiple-objective projects that address vicuña conservation and poverty alleviation in Andean countries. In doing so, it analyses the tensions that exist between these objectives, as well as the factors that limit a more equitable distribution of benefits among stakeholders. Vicuña management enables us to illustrate the complex relationship that exists between local communities and the global market, and the importance of community enterprises and supportive government policy in managing this common pool resource.

There are two members of Old World camels living in Africa and Asia, and four members of New World camels living in South America – the wild guanaco (*Lama guanicoe*) and vicuña (*Vicugna vicugna*) as well as the domestic llama (*Lama glama*) and alpaca (*Lama pacos*). Vicuñas live in the Puna and Altiplano, high Andean ecoregions in Argentina, Bolivia, Chile, Ecuador and Peru. While most of the literature on traditional commons deals with fisheries, forests, water management, irrigation and animal husbandry (Laerhoven and Ostrom 2007), wildlife use has not been as widely explored (but see Björklund 1990, Altricher 2008). Although vicuñas can be considered an 'uncommon' common-pool resource (CPR), they do exhibit the two principal characteristics of CPRs: (a) exclusion or the control of access of potential users is difficult, and (b) each user is capable of subtracting from the welfare of all others, or the *exclusion problem* and the *subtractability problem*, respectively (Ostrom 1990; Berkes 1996; Ostrom et al. 1999). Both characteristics shape the history of vicuña use and conservation.

1.1. Brief history of vicuña conservation

In many resource management systems, users have devised institutions [1] to regulate resource use (Ostrom 1990). This was the case for vicuña use during the Inca Empire. Before the European Conquest, vicuña fibre was sacred and only sheared for making special garments used exclusively by the Inca. Vicuñas were captured, sheared and released again into the wild every 3–5 years using a technique known as *chaku*, which required the organization and participation of hundreds of people. The rules and regulations under the *chaku* prevented overexploitation by controlling access to and use of the species (Laker et al. 2006).

With the advent of European domination, this highly prized species became, within little over a century, an open-access resource that was persecuted and hunted to the brink of extinction – as was the case with beaver or bison in North America (Berkes 2008). By 1960, it was estimated that the vicuña population had dropped from its pre-colonial population of 2 million to an estimated 10,000 individuals. International, regional and national conservation efforts were successful in halting further population decline. Strict conservation regulation, through the Vicuña Convention, and the entry into force of the Convention on International Trade on Endangered Species of Plants and Animals (CITES) in 1975, helped to rebuild populations to ~343,500 individuals by 2007 (Table 1). The global programme of conservation was so

successful that it resulted in a progressive shift in international policy from strict preservation (Appendix I of CITES) to sustainable use (Appendix II of CITES), allowing trade in fibre obtained from live-shorn target populations. In 1979, Argentina, Bolivia, Chile, Peru and Ecuador signed the Convention for the Conservation and Management of the Vicuña. In Article I of the Vicuña Convention, and in the signatory states' subsequent submissions to CITES meetings, Andean people that had been bearing the burden of vicuña conservation were named as the main beneficiaries of future vicuña use. However, translating this article into national legislation and ensuring exclusive benefits to local people has proved to be difficult. In the cases of Argentina and Chile, vicuñas are *res nullius* and the rights of usufruct are not specified. In Peru, as will be discussed later, the exclusive usufruct rights given to communities were later extended to persons and businesses distinct from those campesino communities thus preparing the ground for large companies to take part in vicuña management. At present Bolivia is the only country where exclusive rights were granted to Andean communities to benefit from vicuñas (McNeill et al. 2009).

Table 1
Vicuña population per country according to country presentations to the Vicuña Convention [4] 2007.

Country	Vicuña population	Fibre exports 2007 (kg)
Argentina	72,678	205.650
Bolivia	62,869	950
Chile	16,942	157.890
Ecuador	2683	0
Peru	188,327	3226.250
TOTAL	343,499	4539.790

1.2. Vicuña use programmes

Vicuña management programmes developed in the Andes follow the logic of community-based wildlife management (CWM) (Western and Wright 1994; Hulme and Murphree 2001). These are a variation on what are collectively referred to as community natural resource management (CNRM) initiatives, a form of natural resource management that emerged as a strategy linking conservation and community development through local participation and sustainable use.

Two general outcomes are expected from CWM. They include the maintenance of wildlife habitats and preservation of the species, and improved social and economic well-being of local communities (Songorwa 1999). An emphasis on power, participation and property rights of frequently marginalized peoples also represents a prominent objective, as well as giving increased attention to traditional values and ecological knowledge (Kellert et al. 2000).

CWM occurs within and around protected areas or on communal or private land outside of protected areas. It can be consumptive (e.g. trophy hunting) or non-consumptive (e.g. ecotourism), subsistence-based or commercial (e.g. trade in wildlife or wildlife products), traditional (e.g. protection of sacred landscapes) or non-traditional (e.g. game ranching) (Roe and Jack 2001). Within this spectrum, vicuñas and guanacos are the only wild species that can be captured, sheared and re-released on a commercial basis, thereby providing a novel example of non-consumptive wildlife use. The rationale behind the vicuña use projects is similar to the "linked incentives" model of Salafsky and Wollenberg (2000); whereby allowing commercial utilization of fibre obtained from live-shorn vicuñas would encourage local participation and the development of positive local attitudes towards vicuña conservation. In turn, this should result in a decrease in poaching (or a decrease in logistic support to poachers), the replacement of domestic livestock (e.g. sheep and cows) with vicuñas, an increase in tolerance for vicuñas on community lands, and greater support for conservation measures.

This rationale is based on the assumption that commercial use of vicuña fibre is a viable economic option that can contribute sufficient benefits to lower the cost of conservation for local communities. Vicuña conservation is perceived as a cost by local people, who must allow vicuña to graze on their properties ("eating the best pastures") and mix with their livestock ("catching and transmitting diseases to domestic animals and bathing in drinking points") (Stollen et al. 2009). The hope is that rather than continue being antagonistic towards vicuñas, rural residents would assist government efforts in monitoring and protecting the species.

The five vicuña countries have adopted different models for vicuña management to reflect country-specific social organization systems, idiosyncrasies and livelihoods, as well as national and local laws pertaining to resource and land tenure. The first management systems, developed in Peru and Bolivia, comprised vicuña management under common property regimes by *Aymara* and *Quechua* speaking communities. These used a capture and release system evolved from the Inca *chaku* tradition, whereby large numbers of community members holding colourful flags chase vicuñas into a funnel from where vicuñas are taken to be shorn. Modern *chakus* incorporate animal welfare considerations and the use of more modern technology (such as motorcycles in Chile) to support the vicuña roundup.

Subsequently, in the 1990s, there was a trend in Peru, Argentina and Chile towards managing vicuñas in captivity and a management entity that varied between single producers, families or communities. Given that vicuñas are a common-pool resource and a migratory species, exploitation by one user (or community) reduces resource availability for others (e.g. if a vicuña is shorn by one community it cannot be shorn by another for the next two years). This has probably contributed towards the development of captive management schemes along with other economic and political interests.

At present, captive and wild management co-exist in Argentina, Chile and Peru. Bolivia is the only country that remains committed to managing vicuñas in the wild under common property regimes. Whereas wild management has the potential to create economic incentives for the conservation of vicuña and its habitat, the link between captive management and conservation is less obvious (Lichtenstein 2006). Furthermore, maintaining populations in enclosures has a potentially negative impact on vicuña populations by disrupting the natural organization of the animals, inhibiting genetic flow between populations, increasing the likelihood of inbreeding, genetic drift, artificial selection, and transmission of diseases (Vilá 2002).

Although vicuña poaching decreased significantly with the implementation of trade regulations and management systems, it still has an important impact in all Andean countries and is a prime concern for policy makers (Proceedings of the Vicuña Convention, 2007). Poaching probably persists because of the logistical difficulty of patrolling large areas in the *Puna*, lack of financial means by local and national

authorities, insufficient legal frameworks, difficulties in law enforcement and extreme poverty. These factors are compounded by the limited relative number of beneficiaries and scale of economic benefits and lack of legal fibre available to local weavers. Weaving vicuña fibre from poached animals forms part of some local people's livelihoods (Renaudeau d' Arc 2005) and in certain towns of the high Andes it is easy to find either local people wearing an item of vicuña clothing (e.g. scarf or gloves), selling or wearing ponchos made out of illegal fibre or bedcovers made of baby vicuña hides (e.g. El Alto market, Bolivia). However, most of the fibre poached is not for internal use but to be smuggled outside Andean countries.

1.3. Low income producers and affluent consumers

The vicuña is one of the most valuable and highly priced sources of animal fibre on the international market. The adult animal produces only eight ounces (250 g) every two years. According to the textile industry, vicuña fibre is more expensive than other fine fibre because of its rarity and unique qualities. The luxury garments made from vicuña fibre are sold in the most exclusive fashion houses in Europe, USA, Asia and Australia to the world's wealthiest elites. In London, a scarf currently sells for between US\$1418–\$9900, a cardigan for US\$3560, an overcoat for US\$ 11,865 [2] and a suit up to US\$35,460. In Japan, a suit made from luxury Pashmina and vicuña, "the Enzo Ferrari of the clothing world," costs as much as US\$31,000 [3].

Whereas these high prices make vicuña products available only to very affluent consumers, vicuña fibre is produced mainly by extremely low-income communities. Most rural Andean communities face high levels of persistent poverty and inequality which is expressed in high indices of infant mortality and malnutrition, a high illiteracy rate, as well as limited amenities and basic services such as access to water, sanitation and electricity (INDEC 2001; Arias and Bendini 2006; Foncodes 2006). Families in the Peruvian Andes survive on an average income of US\$300 a year (Lichtenstein et al. 2002). In light of such poverty, there are high expectations at the local level that livelihoods can be substantially improved through vicuña use.

Despite a rapid rise in the popularity of vicuña management initiatives and the high market value of vicuña products, the generation and distribution of benefits to local people has been limited thus far. Previous work has looked at the economic impact of projects on single producers or communities (Lichtenstein et al. 2002; Lichtenstein 2006). In this paper, I focus on the asymmetry that exists between stakeholders involved in fibre production and commercialization, as well as the lack of sufficient government policies, as important factors that contribute to the limited tangible benefits derived from vicuña use.

2. Methods

This paper is based on fieldwork conducted in Peru during 1998 (Lichtenstein et al. 2002), and Argentina in 2001–2003 (Stollen et al. 2009), and regional data gathered during the Manejo de Camelidos Silvestres (MACS) project. Data were also collected by participant observation at four meetings of the Vicuña Convention (1998, 2005, 2007 and 2008). Fibre market data were gathered from national reports, Proceedings of the Vicuña Convention and interviews with national directors of fauna and textile companies. Secondary data were obtained from the Proceedings of the Vicuña Convention, national documents from Argentina, Peru and Bolivia, academic papers and international reports (e.g. FWS, CITES).

3. Results

3.1. Vicuña population and fibre production

The total population of vicuñas in the Andes is estimated to be 343,499 individuals (Table 1). However, it is difficult to be confident about this estimate as data from different countries were obtained using different methodologies. All vicuñas in Peru and Bolivia are in CITES Appendix II, whereas all populations from Ecuador are still in Appendix I as well as some populations from Chile and Argentina. This means that fibre exports are only allowed from the whole vicuña population of Peru and Bolivia and certain populations from Chile and Argentina. The trade-off between culturally reinforced positive attitudes towards vicuña and practical concern for their direct impact on forage availability for livestock may be a highly significant factor influencing vicuña distribution (Laker in press).

Peru is by far the region's most important producer and exporter of fibre (Table 1). This is related to the high vicuña numbers, the intensive management system (captive management), and the fact that very few vicuña populations remain untouched. In the case of Argentina, a small percentage of the total population is under use. The high volume exported by Bolivia in 2007 (950 kg) represented their first international auction with the fibre accumulated over a 10-year period. The 272,535 kg exported in 2008 gives a more realistic indication of annual production (Orosco, pers. comm.). The total export figures for the region are only a few tons and thus fibre remains a very exclusive and unique product that cannot be compared with domesticated camelid fibre production (llama and alpaca).

3.2. The stakeholders involved

Vicuña conservation, fibre production and trade are regulated by national wildlife departments within the Ministry of Agriculture in Chile and Peru, the Ministry of Sustainable Development and Planning in Bolivia, and the National Secretariat of Environment and Sustainable Development in Argentina. At the time this paper was written there is political pressure in Argentina for vicuña and guanaco management to come under the control of the Secretary of Agriculture and Cattle Management in order to "promote and develop" the production of wild and domestic South American camelids [5]. The "conservation sector" is concerned that if this happens, the focus for vicuña management might change from conservation-oriented to production-oriented.

Several groups of stakeholders are involved in the legal vicuña fibre [6] production chain: local producers, traders, international textile companies and consumers.

Local people are usually referred to as "Andean communities" in policy papers with regards to vicuña use. However, the target beneficiaries from vicuña use projects vary from individual producers or co-operatives in Argentina, to *Aymara* families in Chile and peasant *Aymara* or *Quechua* indigenous communities in Peru and Bolivia (Stollen et al. 2009).

The definition of a 'community' varies between Andean countries and even between regions within the same country. It may also change over time to reflect political and social developments (Stollen et al. 2009). Although scholarly thinking on 'communities' has changed from a focus on homogeneous entities to systems that are heterogeneous and complex (Agrawal and Gibson 1999; Guijt and Shah 1999), international policies and national management plans usually fail to reflect this new conceptualization as well as the diversity of interests that can be found among different community members (Berkes and Davidson-Hunt 2007).

Although 'Andean people' are understood by the Vicuña Convention to mean low-income indigenous people, failure to acknowledge this in relevant contracts means that any person holding land in the *Puna* or outside (and with no present or past history of interactions with vicuñas) could potentially make use of vicuña. The problem lies in the vagueness of the term 'Andean community' and is exacerbated by inadequate national legislation. For example, in Peru, usufruct rights over vicuña were originally given only to *campesino* communities. During 2000, the custody and usufruct rights were extended to "natural persons or businesses" that include communal and associative enterprises (*Empresas comunales y Asociativas*) and private owners on whose land vicuña live (Sahley et al. 2004). By the year 2008 Loro Piana, the largest Italian textile company that processes vicuña, bought a ranch in the Peruvian Puna and started producing fibre.

Ranch owners from the Patagonia region are also becoming involved in vicuña fibre production in the North of Argentina, diminishing the possibility of nearby low-income communities being able to benefit from this migratory common-pool resource. Bolivia remains the only country where Andean communities that co-exist with vicuñas are granted exclusive rights to use and benefit from them. The National Vicuña Regulation emphasizes the importance of 'fitting' institutions to the socio-ecological system in which communities and vicuña co-exist (Renaudeau d'Arc 2005).

3.3. Fibre production and commercialization

The implementation of vicuña management projects in the region is a process divided into five main stages: conservation, planning, fibre production, commercialization and processing. These stages can be broken down further into activities that involve various degrees of participation among local people, government agents and other external actors such as NGOs, researchers and textile companies (Lichtenstein and Renaudeau d'Arc 2008). Fibre production varies among countries.

In Argentina, the main producer is a public organization rather than local farmers: the National Institute of Agriculture and Cattle Technology (INTA), based in Abrapampa. This organization has more than 1000 vicuñas under production in large corrals, and provides technical assistance and animals to local producers who run small breeding ranches that start with herds of 12–36 vicuñas (Lichtenstein 2006). All the fibre production from the INTA is sold through a bidding process that has always been won by the same company. This company provided financial assistance to producers for building the corrals in exchange for fibre (McNeill and Lichtenstein 2003). Owners of breeding ranches were always paid less than the INTA and producers from other countries (Table 2) as a result of this contract. The lack of transparent biddings kept prices relatively low until 2004 when the director of the INTA Experimental Center was replaced. Social enterprises for selling vicuña were never successfully developed in Argentina and each producer negotiates with the trading company on its own. Given the small volume produced per breeding ranch, the distance to markets, and that a percentage of the production should go to the trading company in order to pay back the debt, it is very difficult for individual producers to attract other clients.

Table 2
Evolution of fibre prices in the different Andean countries.

	Argentina ranches (US\$/kg)	Argentina INTA (US\$/kg)	Chile (US\$/kg)	Bolivia (US\$/kg)	Peru (US\$/kg)
1998	250	349			308
1999	250	349			308
2000	250	349			308
2001	250	349			308
2002	300	349	575		385
2003	NA	363	615		380–437
2004	NA	661	615		507
2005	NA	895	NA		450
2006	NA	896.50	660		365/?
2007	NA	940	677	380	250–507

Note: Fibre exports commenced in different years as a result to differences in timing of downgrading vicuñas in CITES. Sources: Argentina: (INTA Abrapampa, Lichtenstein 2006); Peru (Hoces, pers. comm.; Brewin 2007); Chile (CONAF, SAG, pers. comm.). Figures in italics refer to pre-dehaired fibre (i.e. fibre with some level of processing). NA indicates that the information was not available.

In Chile, fibre is produced mostly in corrals by Andean *Aymara* families. Some of these people had already left small Andean towns to move to nearby cities where they found more economic alternatives and better education for their children. The large support to vicuña management programmes provided by the Chilean Government is, in part, an attempt to reverse out migration.

The production units started exporting fibre through the *Sociedad de Hecho Surire*, with support from several national organizations in terms of marketing, resources, generation of added value, and organization of biddings (e.g. FIA, ProChile). In 2007, the productive units formed a co-operative (*Cooperandino Chile*) aimed at the export of vicuña and alpaca fibre as well as the development of alternative sources of income (ecotourism, crafts, etc.). The business plan (created by a State agency) includes active support from the public sector, universities and financial institutions. Although the trading company that won all the biddings in recent years is the same as the one that buys fibre from Argentina and Bolivia, as a result of State intervention and all the support that producers receive in terms of commercialization, marketing strategies and promotion of exports, market prices were always higher in Chile than in other countries (Table 2).

Although vicuña management in Bolivia was based on pre-existing communities, new institutions for resource management have been created (Renaudeau d'Arc 2005), as well as strategic partnerships between the government and communities that resulted in social enterprises. The levels of decentralization of government are represented by the *Dirección General de Biodiversidad* (DGB) at national level, the *Prefectura Departamental* at subnational level, and the Municipalities at local level. These different levels of governance can interact with the different levels of community organizations represented by communities managing vicuña (CMV) at the local level, Associations for Vicuña Management (*Asociación Regional de Manejadores de Vicuña*, ARMV) at the sub-national level and the National Society of Vicuña Managers (*Sociedad Nacional de*

Manejadores de Vicuñas, SNMV) at the national level, (Renaudeau d' Arc 2005). The development of cross-scale partnerships is promoted by the National Vicuña Regulation. NGOs and international co-operation agencies are involved in providing funds for particular projects.

Management schemes started up in 1998, but a national regulation retained the rights to store and auction vicuña fibre that could only be exported as cloth. Only in 2007 were new national norms created to allow the trade of raw as well as processed fibre. Fibre commercialization is performed by the National Commission for Commercialization that groups the Associations for Vicuña Management (ARMV) from all over the country and is supported by government agencies DGB and SERNAP, and the German international co-operation enterprise GTZ (Orosco, pers. comm.). Nine hundred and fifty kilos were sold to the International Vicuña Consortium (IVC) for US\$380/kg in 2007. This price seems low considering the high volume involved [7] and given that prices paid during the same year to producers in other countries was considerably higher (Table 3). In 2008, however, with more trade experience and less pressure by communities to sell immediately as in the previous auction, the price obtained had almost doubled to USD\$740/kg (Orosco pers. comm.).

Table 3
Stages involved in industrial fibre processing.

	Raw fibre	Pre-dehaired fibre	Washed	Dehaired	Yarns	Cloth	Clothes
Argentina	X						
Chile	X						
Bolivia	X	X					
Peru	X	X	X	X	X	X	X
Italy			X	X	X	X	X

Vicuñas are also managed under a common property regime in Peru. However, the degree of decentralization and complexity of stakeholders and cross-scale partnerships present in Bolivia does not exist in this country. Furthermore, there seems to be a decrease in horizontal and vertical partnerships as exclusive usufruct rights are being removed from Andean communities by law (DL No. 653, Sahley et al. 2004). There are two types of community management of vicuña in Peru: captive management and management in the wild. Until 1995, vicuñas were managed exclusively in the wild, but in 1996 a captive management programme was introduced by the government agency in charge of camelid management (CONACS). This programme consists of installing corrals in the communal land from which domestic livestock is withdrawn. The corrals were supposed to enclose from 250 to 1000 vicuñas, but in practice they have from 0 to 600 animals. Communities pay US\$22,000 for the material to construct the corrals, and provide free labour and communal land. Communities with large numbers of vicuñas were able to keep managing free ranging vicuñas whereas communities with small number of vicuñas were encouraged to participate in captive management and had less freedom to opt-out given that they relied heavily on technical assistance from the CONACS (Lichtenstein et al. 2002). Captive management proved not only to be a high investment with little economic returns (Lichtenstein et al. 2002), but also in some cases it led to conflicts between communities over land and resource ownership as the corrals impede the free movement of animals between neighbouring communities (Brewin 2007).

Until 2004 there was one channel for commercialization through the National Vicuña Society (SNV). The SNV was made up of campesino community management committees that in turn formed regional associations. The SNV acted as the representative negotiating entity when selling fibre that had been collected via the regional associations. In addition to negotiating with exporting companies, the SNV secured verification that the fibre was from live-shorn vicuñas (instead of poached ones). The certification process is cumbersome and intensive, and the SNV facilitated the process for individual communities, many of which would not have the capacity to complete the process (Sahley et al. 2004). Since 2004 the SNV disintegrated and at present communities can negotiate individually with middlemen or textile companies. The range of prices obtained in 2007 (Table 2) is an indicator of the various negotiating capacity of communities.

3.4. Fibre market

There is no formal market for vicuña fibre and, unlike merino wool or cashmere, there are no reference prices. In the past 10 years, prices paid for raw fibre have ranged from US\$250 to US\$940 (Table 2). The highest prices were not obtained by local communities negotiating by themselves, but rather by governmental agencies (e.g. INTA in Argentina after 2004) or by a local co-operative strongly supported by the government (e.g. Chile). Prices vary greatly among countries for the same year (e.g. 2007). There is also a large regional variation within countries, as with Peru since 2004, following market liberalization.

Most of the fibre from Peru is sold to the International Vicuña Consortium (IVC), a holding company led by the Italian firm *Loro Piana* (2008). A small proportion of the fibre is sold to British, Peruvian and Japanese companies (CONACS 2007). The fibre from Chile and Argentina is sold to the same trader company (Pelama Chubut) that also bought all the production from Bolivia in 2008. The number of textile companies operating in the vicuña market remains minimal, creating very few options for communities to get new clients and a better deal. This is, according to the textile companies, because vicuña fibre is a very specialised product, serving a niche market where only a few companies have the expertise and technological capacity to transform it into high-end products. In addition, due to the small amounts of raw fibre available internationally, textile companies claim that production costs are high, which may act as a deterrent to other companies to develop capacity (Brewin 2007).

3.5. Fibre processing

In broad terms, there are two types of vicuña goods: handicrafts or industrialized products. Locally, it is possible to buy hand-made *ponchos*, scarves and blankets produced by local artisans, mainly from illegal fibre (i.e. fibre that comes from poached animals). Traditional processing is done with legal fibre by only two co-operatives in Argentina. However, as most of the handicrafts sold in the region come from illegal fibre and tracing illegal fibre is very costly and inefficient, handicraft production is just not encouraged by government officials.

The value of vicuña fibre increases with the level of processing. At the lower end is raw fibre, obtained after shearing the animals, which has no added value. At the other extreme is the production of industrial textiles. Raw fibre accounts for the highest volume of vicuña exports by Andean countries (Table 3). In Peru, two textile companies are also producing industrial textile products, but this only represents 14% of Peruvian

vicuña exports (CONACS 2007). Most of the value-adding activities are concentrated in Italy by one company that buys more than 70% of vicuña fibre from Peru.

The revenues obtained from the transformation of raw material in Italy are very high. Assuming the market prices paid to communities in Peru or Bolivia in 2007 (i.e. USD380/kg), the cost in raw material for a vicuña scarf [8] that is sold for USD\$1975 is, at most, USD\$95. According to these figures, producers get <4.8% of the price paid for the final product.

3.6. Economic and non-economic impact on beneficiary communities

The production of fibre relies on a substantial investment in infrastructure such as fencing (e.g. 1000 ha in Peru), corrals in Argentina or construction materials for enclosures in Bolivia (Renaudeau d'Arc 2005). These costs can be borne by the State, as in Chile and Bolivia, or by local people, as is the case of breeding ranches in Argentina and Peru. In the latter case, communities acquired a sizeable debt to finance construction, the loaning entity being either the State (Peru) or the Argentinian firm that is the principal local buyer of vicuña fibre.

The impact of the commercialization of vicuña fibre on the economic development of the Andean communities who are responsible for its management has proved to be very limited across the whole region (Brewin 2007; Stollen et al. 2009). In the case of Peru and Argentina, earnings from the production of fibre from captive vicuñas did not cover the costs of purchasing vicuña corrals. As a result many communities and producers found themselves in debt to the government (Peru) or to a private company (Argentina [9]) and were unable to use the income from fibre for the benefit of the community. Furthermore, captive management involves additional opportunity costs in terms of labour and land. Management of wild vicuñas is preferable to captive management as it has the potential to incentivize species and habitat conservation, and has proved to be more economically viable.

The economic impact of vicuña use is also related both to the number of beneficiaries within the communities and to the number of vicuñas managed. In the case of a common property regime, a large area is important because it increases the number of sites available for capturing and shearing vicuña (Renaudeau d'Arc 2005). The best scenario is a small community with a large number of vicuñas, but this is usually not the case. In Chile or Argentina, the amount of beneficiaries is very low but the number of vicuñas managed is below the minimum required to make captive management viable. In the case of Bolivia and Peru, economic returns can be meaningful at the community level, but when benefits are distributed per capita, they are still low.

However, incentives for vicuña conservation do not rely only on economic benefits. Non-economic benefits have played a key role. For example, in Bolivia over the last ten years, where local people participated in and supported a common property regime in spite of the absence of commercial markets (Renaudeau d'Arc 2005). Non-economic benefits included aesthetic, cultural and social values people attach to vicuña, capacity building programs to enhance community identity and social cohesion, and as a vehicle for demarcating community boundaries (Renaudeau d'Arc 2005). Securing land tenure was also an important driver for vicuña management in Peru (Sahley et al. 2004).

4. Discussion

Common property literature has been quite successful in demonstrating that community-based and common property institutions can guide sustainable resource use (Agrawal 2003). However, most of the case studies analyzed deal with subsistence-oriented activities, whereas little attention has been paid to the degree to which these management institutions have the potential for poverty alleviation via the production and commercialization of commodities to be sold to international markets (Bray 2005).

Vicuña management is an interesting case study as it enables us to illustrate the complex relationship that exists between local communities that manage a common pool resource, and the global market. Vicuña management projects present the following features: a) vicuñas are managed under both common property and private regimes; b) fibre is mainly produced by low income producers that live in remote villages in the Andes; c) projects are based on using live animals (in opposition to safari or subsistence hunting); d) the product to be commercialized has a high market value; e) the demand for vicuña products comes from distant markets; f) there is practically no technical capacity in the region to produce the luxury goods presently sought after by an exclusive consumer market; and, f) the market is controlled by oligopolies. As a result of all these factors, vicuñas are an international commodity that attracts a diverse range of economic and political interests.

As with other community conservation experiences, vicuña management projects include multiple objectives that pull in different directions. The original conservation goal Vicuña Convention from the 1970s was expanded to include poverty alleviation in the 1980s. In recent years, the high market value of vicuña fibre has attracted the attention of investors and textile companies and promoted a 'production' objective that is gaining force in most Andean countries, although it is not yet mentioned in any official documentation. Maximizing production threatens the conservation of this wild species, the exclusive rights of Andean communities and is threatening to undermine the spirit of the Vicuña Convention.

Each objective is supported by a different set of actors that have different agendas and degrees of relative power. The resulting situation is complex and involves a compromise between different interests and perspectives.

1. The *conservation objective* is predominantly supported by international conservation organizations, NGOs, researchers, and national environmental agencies. A pure conservation approach would be based on protecting untouched vicuña populations, and would have no fibre production or poverty alleviation impact. Conservation approaches, however, have shifted over time, and many researchers support the conservation of vicuña populations through sustainable use under strict animal welfare conditions, research and adaptive management approaches.
2. The *poverty alleviation* objective is used in the rhetoric of most projects and in all the country proposals to CITES. However, poverty alleviation is not properly addressed in most of the initiatives (Stollen et al. 2009) and not sufficiently discussed at the Vicuña Convention. This goal could be supported by NGOs, universities, research centres, and local governments with international donors involved in raising funds, institution building, marketing, technical training, knowledge transfer, legal support, etc. (Berkes et al. 2004). However, very few of these tasks are being addressed by vicuña management projects and most of the stakeholders mentioned are not present in most countries, showing a bias towards the other two approaches. The impact of the commercialization of vicuña fibre on the economic development of Andean communities has proved to be very limited across the whole

region (Brewin 2007; Stollen et al. 2009), and this has been largely overlooked by policy makers. A key issue that needs to be tackled to address poverty alleviation is to secure exclusive usufruct rights of vicuñas to Andean communities. This right seems to be threatened in every country but Bolivia.

3. The *production objective* is promoted by national government agencies concerned with agriculture and cattle production, textile companies and political lobbies that have an interest in getting involved in fibre production and maximizing economic returns. This objective usually collides with the conservation approach as it promotes vicuña management through husbandry techniques used for domestic animals (i.e. artificial selection, captive management or hybridization). Many production policies include beneficiaries other than local people in vicuña use, turning local people from resource owners into wage labourers. The lack of a sufficient legal framework and national vicuña management plans favours this objective.

The vicuña story is usually considered a "success story" in the "conservation world" at international forums [10]. Vicuña populations increased from 10,000 individuals in 1960 to ~350,000 in 2008 and as a result they were recently re-categorized from Low Risk conservation dependent to Least Concern in 2008's IUCN's Red List. However, given the high market value of its fibre, the lack of significant economic benefits accrued by local people, the lack of secure resource tenure, and the emerging "productivist" agenda with projects that range from hybridizing vicuñas and alpacas to artificial selection, conservation threats still persist. The large extent and promotion of the captive breeding programmes not only fail to provide benefits for vicuña conservation but are also threatening to lead (yet again) to the domestication of this wild species (Vilá 2002). On the other hand, breeding pacovicuña hybrids poses a serious threat in genetic, biological, and commercial terms [11]. It is also convoluted way of smuggling vicuña genes outside the Andean countries and bypassing CITES prohibitions of exporting live animals.

From the community perspective, vicuña management also fulfills non-economic objectives. In the cases of Bolivia and Peru, these entail: enhancing community identity, social cohesion, revitalizing communal work, reaffirming community boundaries and a means to solidify land claims (Sahley et al. 2004; Renaudeau d'Arc 2005). Participating in vicuña use probably also helps remote (and usually neglected) communities to become visible to local and central governments and be in a better position to ask for credit, schools, health service, better roads, infrastructure and support for economic activities.

The multiplicity of objectives and agendas found in vicuña use projects illustrates the difficulties facing academics and policy makers in dealing with complex systems, and the need to build an interdisciplinary framework that can deal with all these dimensions during the development of conservation policies, national programmes on resource utilization, and at the stage of project planning and implementation.

The high international commercial value and world demand for vicuña products could potentially have a significant economic impact and act as a means for promoting development at the local level. However, as in many other conservation and development projects, benefits for the local community have proved elusive (Adams et al. 2004). This study reveals that poverty alleviation goals through vicuña management reflect rhetoric more than substance. It would appear that the economic benefits to local communities in most countries are a means to achieving conservation of a threatened species but not an end (McNeill and Lichtenstein 2003). Although goods made from vicuña fibre are sold at exorbitant prices on the international market, local people still fail to obtain significant economic benefits from the legal use of vicuñas, whether through captive management or management in the wild. The limited benefits received for selling vicuña fibre is no different from other natural fibres produced in the region such as llama or alpaca. In all three cases intermediaries capture much of the value in the production chain (FAO 2009). Meanwhile, in the case of domestic camelids, alpaca farms in Australia and New Zealand or USA are emerging as strong competitors, thanks to processing technology, quality standards and investment in research which is far superior to the one in Andean countries. Given the international interest in camelid breeding and the asymmetry in economic resources it is fundamental to impede export of vicuñas either as live animals, embryos or genes (e.g. via the export of pacovicuña hybrids) as this will hinder vicuña use programmes in the region.

Key determinants of the economic benefits derived from vicuña management are: the distribution of costs and benefits amongst stakeholders, degree of investment required by local communities for vicuña management, the structure of the commodity chain, the market structure, the fluctuating price of fibre, the degree of value added at the local level, the degree of consolidation of local institutions and the existence of a supporting policy framework.

This study suggests that the distribution of costs and benefits between and within different stakeholder groups should be revised and made more equitable. Local communities "pay the cost" of vicuña conservation by allowing vicuñas to graze on communal or private land. The production of fibre also relies on a substantial investment that is borne by the State, as in Chile and Bolivia, by local people as is the case with breeding ranches in Argentina, or by both as is the case in Peru. However, most of the benefits are captured not by local producers but by traders and international textile companies. Further research performing a commodity chain analysis could examine in more detail the distribution of benefits as in the study of Senegal's charcoal (Ribot 1998).

The vicuña fibre market is an oligopsony [12] with a few large buyers and a large number of sellers. This market places the control of the terms of trade and most of the profits with the oligopsonist (Ribot and Pelusso 2003). A common theoretical implication is that the price of the good is pushed down, which seems to be the case with vicuña fibre. There is no formal market for vicuña fibre and there are none of the 'reference prices' that exist for merino wool or cashmere. Vicuña fibre prices have historically been related to factors such as: market demand; the bargaining power of the actors involved; actors' cash flow issues; volume of fibre stocked; number of channels for commercialization and the degree of corruption in the case of biddings (Lichtenstein et al. 2002; Sahley et al. 2004; Brewin 2007). The volume produced is also very important, as communities or producers that manage few animals end up with no option but to sell the fibre to middlemen for relatively low prices.

Although at present some communities receive support from NGOs, governments and researchers during the conservation and management stages, in most cases, they are left on their own at the crucial stage of commercialization. It is almost impossible for a remote Andean community (or producer) to negotiate with a European textile company or large trading company on equal terms. According to Ribot and Pelusso (2003), the ability to benefit from resources is mediated by constraints established by the specific political-economic and cultural frames within which access to resources is sought. The limited access to "bundles of powers" such as technology, knowledge, capital (equipment and credit), markets, information and authority by Andean people needs to be acknowledged by policy makers in order to enable a more equitable distribution of benefits to address the poverty alleviation goal. The lack of information about prices paid to other

producers, communities or countries is a disadvantage at the time of negotiating, as is distance to international markets and the fact that local people are unaware of the demands imposed by the market and, as a result, find themselves in a poor negotiating position.

Efforts to increase the benefits accrued to the rural poor cannot rely on "neutral" policies if they are to enable producers to access resources (Larson and Ribot 2007). Policies and regulations must explicitly redress access asymmetries unless the lack of policies was a policy in itself. The vast disparities in power and formal commercial experience among community members and international market actors should not be underestimated when management plans are conceived. Policies should also take into account reducing the dependence on intermediaries, strengthening producer's associations and providing assistance to small local processing companies.

Investigating cases from the UNFP Equator Initiative, Berkes and Andhikari (2006) found that successful projects had rich networks of support involving 10–15 partners, and links across various levels of organization. In the case of vicuña management, the number of stakeholders involved and the level of vertical and horizontal integration is relatively small in every country other than Bolivia. In the case of Peru, the common channel of commercialization was even disintegrated by law. The commercial relationship between Andean producers and the global market would require firstly to strengthen existing commons institutions, and secondly to build linkages horizontally and vertically. Creating networks of partnerships with NGOs, universities, research centres, private sector, scientific societies, and donor agencies (Berkes et al. 2004), would clearly benefit the sector.

The Vicuña Convention has a key role to play in a multi-level linkage model. Although historically the Convention has not dealt with commercialization nor the fulfilment of poverty alleviation objectives, those issues have to be incorporated in its agenda. This regional Convention could take an active role fostering a horizontal integration of producers across countries for commercialization, promoting the sharing of commercial information at the technical level, and the promotion of joint country commercialization schemes, while reporting to CITES (at an international level), and to national governments. The Vicuña Convention should also continue to ensure that management plans do not threaten the conservation of the species and that they fulfil the poverty alleviation objectives. Given that vicuñas do not recognise national frontiers and are a migratory species, the Convention should develop some novel governance and foster bi-national strategies at borders in order to manage vicuñas as a transboundary common-pool resource.

Trade structures need to be developed in each country that can help redirect a more equitable proportion of benefits to local people. In order to capture more benefits, communities need to stop merely supplying raw material and start selling more processed products that meet market needs. More benefits could be accrued either by increasing the price of the fibre, becoming more vertically integrated in the commodity or production chain (e.g. dehairing, washing, etc.), or by creating partnerships with textile companies in order to get payments related to the sale of final products. A drastic alternative posed by some academics is to ban the export of raw fibre and only commercialize products manufactured locally in order to increase value at the local level. In all these cases, capacity building in areas of commercial engagement, power sharing and government assistance are crucial as well as the creation of social enterprises with a bottom-up approach.

The vicuña case study highlights one of the major findings of the commons literature; that the legal recognition of communal resource rights is fundamental to the success of community-based commercial enterprises (Berkes and Davidson-Hunt 2007). The current distribution of ownership rights, where communities lack secure tenure rights over land and wildlife provides more incentives to own domestic livestock (e.g. sheep) than to favour vicuña (Stollen et al. 2009). On the other hand, unless the first article of the Vicuña Convention, which states that the beneficiaries of vicuña use should be the Andean population, is translated into national laws, it will continue to only be hollow words. Allowing textile companies and investors to compete with Andean communities in the production of fibre challenges the very nature of the projects. Without legal protection, conflicts among competing groups for resources become inevitable and local communities are vulnerable to pressures from more powerful actors.

According to Berkes (2007), for effective community based conservation the project needs to find strategies to: strengthen existing commons institutions; build new linkages horizontally and vertically; engage in capacity-building; build trust; encourage mutual learning; and invest enough time and resources to achieve these objectives. According to the regional comparison presented in this review and an in-depth study of vicuña management in Bolivia Renaudeau d'Arc 2005, vicuña management under common property in Bolivia fulfills these requirements. It has the most developed social institutions and a favorable policy framework in regard to vicuña conservation and poverty alleviation. Furthermore, the commitment for managing vicuñas in the wild under common property seems the best strategy for managing this common-pool resource. However, the level of poaching and the extent of illegal local markets should not be overlooked. On top of expressing poverty, need and greed, it is also an indication of the number of local actors that are not integrated as beneficiaries of the projects (e.g. weavers).

Vicuña management projects are not only about conservation of a wild species and its fragile environment (as if that was not important enough). They are also about strengthening local communities, revitalizing old traditions, creating relationships among communities, recuperating local knowledge, developing a framework for local participation, solidifying land claims, providing incentives to avoid migration to cities, and providing alternative sources of income to communities that are usually forgotten by nation states. Hopefully, one day, all of this added value will be acknowledged by the multiple actors involved in the commodity chain, and this will result in a fairer and more equitable distribution of profits and more efforts geared towards the conservation of this emblematic species.

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Notes

Rules in use or "rules of the game" that people develop to specify what may and may not be done under a particular situation (North, 1990).

- 2 Loro Piana Shop New Bond Street, London, May 2008.
- 3 <http://www.dormeuil.com/en/site.html>
- 4 Informes al XXVI Reunión Ordinaria del Convenio de la Vicuña de las Repúblicas de Argentina, Chile, Perú, Bolivia and Ecuador. www.conveniovicuna.org.
- 5 The Law proposal: *Régimen para el fomento y promoción y desarrollo de los Camelidos sudamericanos* is already at the Senate House waiting to be discussed during 2009.
- 6 There is also an important illegal market in vicuña fibre and products that will not be discussed in this paper.
- 7 That represented ~60 shearing events from 4000 vicunas performed over 10 years (<http://www.biodiversityreporting.org/article>).
- 8 Made of 250 g of vicuña fibre.
- 9 Producers with 24 vicuñas need 6–12 years to pay back the debt of the fencing material.
- 10 E.g. CITES presentation at TRAFFIC workshop during the World Conservation Congress, Barcelona 2008.
- 11 See South American Camelid Group Newsletter, www.gecs.com.ar.
- 12 An oligopsony is a market form in which the number of buyers is small while the number of sellers in theory could be large. This typically happens in market for inputs where a small number of firms are competing to obtain factors of production. It contrasts with an oligopoly, where there are many buyers but just a few sellers.