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The IUCN–WCPA Grasslands Protected Areas Task Force

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The IUCN–WCPA Grasslands Protected Areas Task Force

Mission and Workplan for 2001–2004 in Mountain Areas

The World Conservation Union (IUCN) Programme on Protected Areas is the focal point within the IUCN Secretariat for Protected Areas and serves as the Secretariat for the World Commission on Protected Areas (WCPA). WCPA is the world's leading global network of protected area specialists. It has designated Task Forces to deal with particular themes. The following is an extract from the "Report on the Mission and Activities of the Grasslands Protected Areas Task Force and Workplan for 2001–2004." The editors have inserted occasional headers and notes. Ed.

Protection of grassland biomes in mountain areas

Grassland biomes, including both tropical grasslands, or savannas, and temperate grasslands, occupy about 27% (excluding tundra) of the earth's terrestrial surface and occur on every continent except Antarctica. Grasslands are one of the most geographically extensive of the globe's 15 recognized biomes, and are also among the most diverse and productive. Levels of protection among grassland types vary widely, where tropical grasslands have a relatively high level of protection approximating 9%, while temperate grasslands have the lowest level of protection of all biomes, at about 1%.

The central mission for the Grasslands Protected Areas Task Force is to attempt to raise the level of protection for grassland ecosystems. In cooperation with WCPA's Mountains Program, the Task Force endeavors also to pursue increased levels of protection for high elevation grasslands, particularly in the Himalaya–Hindu Kush region and the Andes of Chile, Ecuador and Peru.

To achieve a modest level of protection for temperate grasslands worldwide of 10% means about a ten-fold increase over what is protected today. In many parts of this biome, however, the impact of man has been enormous; in these areas, most of the grassland ecosystems no longer exist, and restoration may be necessary. Furthermore, current management practices on both protected and unprotected grasslands may not be conducive to the long-term maintenance of biological diversity. Developing best management practices for the management of grassland protected areas will also be a focus of attention for the Task Force.

Mission statement and objectives: "The 10 in 10 in 10"

Recognizing the above, the Mission of the Grasslands Protected Areas Task Force can be referred to as the "10 in 10 in 10":

> To achieve protection for a balanced, well distributed 10% of the temperate grasslands biome in the 10 priority regions of the world over the next 10 years.

The clock starts ticking at the World Parks Congress in 2003. This Mission can otherwise be stated as:

> To promote and facilitate the establishment of new grassland protected areas throughout the grassland biomes, with a priority on temperate grasslands, toward a goal of protecting 10% of the biome by the year 2013, and to provide for the protection, restoration and wise use of grassland protected areas through the development of best management practices and guidelines.

The 2001–2004 Workplan

Among the 6 tasks that the Task Force has defined in its Workplan for 2001–2004, the following are of particular relevance for mountain areas.

Filling the gaps: a global assessment of existing temperate grassland protected areas

Task: The Task Force is undertaking a global assessment of all temperate grassland protected areas, documenting their location, size, resource values, management practices and challenges, and threats. The assessment will be undertaken by country or region, as appropriate, and will also document, according to a locally relevant ecological land classification system, the extent of existing levels of biophysical representation in protected areas of their indigenous grassland ecosystems. This will also be done globally using Udvardy's biogeographical classification of the earth's terrestrial biomes.

Outcome: The outcome will provide a comprehensive indication of the scope of existing levels of protection for temperate grasslands, will identify where the gaps are in the system and will reveal the prevailing management challenges and threats. The product will be a catalogue of all temperate grassland protected areas in the world described as outlined above. Parks Canada staff are currently developing a prototype for this catalogue, using Grasslands National Park as the model. Upon completion of a draft of this prototype, it will be distributed among the Task Force network for comment and application. Cooperation with WCMC is sought for this project.

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Time frame: The target for project completion is the World Parks Congress, 2003.

A priority for "Inner" Asia

Task: Inner Asia includes Mongolia, much of northern China and southern Siberia. This region contains over 6% of the world's grasslands—more than 2.5 million km^2, or an area more than 7 times the size of Germany. Historically, much of this region has been occupied by nomadic pastoralists, and still is today. While signs of degradation are evident in several parts of the region, most notably in China and Siberia, other areas such as the eastern or Daurian steppe represent the last of the great plain ecosystems [...]. There is also potential to protect other large tracts of grasslands in other parts of Inner Asia such as in the grasslands of northern China and the Uvs Nuur Basin spanning the boundaries of eastern Mongolia and Tsuva, Russia. There is interest in expanding the existing protected areas to protect more of these valuable ecosystems, as evidenced by two conferences held in Mongolia in 2000, the WCPA-led Seminar on the Protection and Conservation of Grasslands in East Asia, and the conference on "Transboundary Biodiversity Conservation: Trilateral Approach, Experiences and Visions." The WCPA East Asia Steering Committee has endorsed the formation of an East Asia Grasslands Working Group to work specifically on grassland protected areas and transboundary cooperation. The Task Force is in the process of developing a Concept Proposal for the consideration of donor agencies to fund this important work. The Grasslands Task Force would like to work with the Transboundary Protected Areas Task Force on this project.

Outcome: A report will present a design and implementation strategy for the creation of a comprehensive system of grassland protected areas in East Asia, including an assessment for World Heritage Site potential.

Time frame: The target for project completion is the World Parks Congress, 2003.

The World Parks Congress, 2003—development of regional action plans

Task: The Task Force proposes that a workshop on Temperate Grassland Protected Areas be included in the agenda for the "Building Comprehensive Protected Area Systems" workshop stream during the World Parks Congress (WPC) in 2003. [...] In preparation for the WPC, and in honor of the host country, it is proposed a special effort be made to make demonstrable progress in the establishment of new grasslands protected area(s) in South Africa.

Outcome: The development of country or region specific action plans for the creation of new grassland protected areas to achieve a regional target of a 10% of indigenous grassland ecosystems. The workshop would result in a report as an action plan for a global system of temperate grassland protected areas, complete with an implementation strategy.

Time frame: Completion of the task by the conclusion of the World Parks Congress, with the report to follow shortly thereafter.

Best management practices in grassland protected areas

Task: The question of how best to manage grasslands to protect and conserve biodiversity can be a source of great debate: to graze or not to graze; to burn or not to burn? The answers can require a delicate balance between employing natural processes and anthropogenic influences, and sometimes it can be difficult to tell the difference between the two. The effective utilization of such management practices as grazing and fire, and in some cases, realization of the need to accommodate some cultural realities such as sustainable wildlife harvesting or continued nomadic pastoralism, is central to the long-term maintenance of biological diversity. Other management issues such as the introduction of exotic species or the impacts of climatic change are more universal in their influence. The development of a set of best practices for the management of grassland protected areas will assist managers in dealing with a number of these often controversial issues.

Outcome: A report would be prepared as one of the Best Practice Protected Area Guidelines series on the management of grassland protected areas.

Time frame: By the year 2004, perhaps as an outcome of a workshop during the WPC 2003.

Additional information is available at the Web site www.iucn.org/themes/wcpa/theme/grasslands/grasslands.html.

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GMBA Workshop Report: Mountain Biodiversity and Sustainable Land Use

The Global Mountain Biodiversity Assessment (GMBA), a part of the DIVERSITAS international programme of biodiversity science, aims to undertake a global assessment of the biological richness of high-elevation biota and to explain the causes of biological richness in mountains as well as changes in this richness over time. Because changes in biodiversity most often result from human land use, assessment of land management consequences is a specific GMBA goal. Upland grazing, often facilitated by fire management, is the most widespread use of mountain terrain and is often followed by erosion and a greater risk to valley and foreland environments. Cultivation of formerly pristine areas and intensification of agriculture in montane areas are often associated with a loss of mountain biodiversity. Both problems are most severe in the tropics and subtropics.

African mountains offer very striking examples of intensification of human pressure on montane areas. Traditionally, in many parts of Africa, humans have settled in mountainous areas, where the climate is mild and the environment relatively disease free compared with arid or very humid lowlands. However, in recent times, increasing population pressure has created an urgent need to find sustainable forms of coexistence of humans and upland biota. This culminates in the question of adequate pasture management in relation to upland cropping and the value of upland forests as a sustainable source of energy and construction wood.

Therefore, an initial GMBA workshop on the theme "Linking Mountain Diversity with Fire, Grazing, and Erosion" was held in cooperation with the African Mountains Association as a part of the 6th International Conference on Sustainable Mountain Development in Africa: agenda for action, from 19 August 2002 to 24 August 2002, in Moshi, Tanzania, at the foot of Mt Kilimanjaro. The aim of the workshop was to collect and consolidate available knowledge on the impacts of land use on mountain biodiversity.

Most of the research presented was on the effects of fire on mountain biodiversity in the tropics and subtropics. Fire has had a serious effect on the diversity of afroalpine vegetation in the Bale Mountains of Ethiopia (M. Fetene), influencing the small-scale vegetation pattern and increasing diversity in the ericaceous belt. But because there is no livestock grazing in the ericaceous belt of any mountains in East Africa, except in Ethiopia, these fires are not truly essential for the subsistence of the local population and should be avoided (K. Wesche). For the Andringitra massif in Madagascar, it appears that fire is the key to preservation of the most precious mountain flora, and a cessation of burning would create a massive loss of species and microhabitats (B. Rasolonandrasana), while also diminishing the value of pastures. Fire is now used as a management tool, involving the local communities in the Andringitra National Park (U. Bloesch). In the Maloti–Drakensberg mountain range between Lesotho and South Africa, one study revealed that species richness was greatest in areas with a biennial spring burn, in contrast to annual burning, and in areas protected from fire (T. Everson). It, therefore, seems that moderate burning regimes often provide sustainable land-use options and at the same time maintain a high level of diversity, with both supporting ecosystem integrity.

A follow-up workshop will be held in La Paz, Bolivia, from 20 August 2003 to 23 August 2003, in the hope of linking experience with mountain research on both continents. Both workshops are supported by the Swiss Agency for Development and Cooperation, FAO, and UNESCO. Results from these symposia and activities will be published and will be inputs for the Convention on Biological Diversity Work Programme on Mountains and Millennium Ecosystem Assessment (Chapter 27 on mountains).

Abstracts of the conference are available online at www.unibas.ch/gmba/moshi.pdf.

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Mountain-Specific Activities of the European Grassland Federation

In 1963, grassland scientists officially established the European Grassland Federation (EGF), which represents countries throughout Europe and covers all European mountainous regions. From the beginning, the EFG had the following objectives.

- To facilitate and maintain close contact among European grassland organizations.
- To promote the interchange of scientific and practical experience among grassland experts.
- To initiate symposia and other meetings among European grassland organizations.

Membership is open to national or representative grassland organizations in Europe. These may be national grassland societies or associations, national grassland institutes, or academies of agricultural science. Presently, there are 29 full country members and 7 so-called corresponding members in countries without a national or representative organization.

Focus on mountain grasslands

As a general rule, conference themes are partly tailored to the type of grassland agriculture in the host country. Thus, aspects of mountain grassland farming may be featured regularly in the general meetings or more specifically in symposia held in mountain countries.

The following meetings or symposia included specific aspects of mountain agriculture.

- Scotland, 1968—Hill Land Productivity.
- Yugoslavia, 1980—Forage Production Under Marginal Conditions.
- Norway, 1984—Impact of Climate on Grassland Production and Quality.
- Italy, 1996—Grassland and Land Use Systems.
- Germany, 2001—Organic Grassland Farming.
- France, 2002—Multifunction Grasslands: Quality Forages, Animal Products, and Landscapes.

With 2002 being the International Year of Mountains, it is fitting that Bulgaria (Pleven) was selected for the May 2003 symposium on "Optimal Forage Systems for Animal Production and the Environment."

The next general meeting, on the theme "Land Use Systems in Grassland-Dominated Regions," is scheduled to be held in Switzerland (Lucerne) in June 2004. At this congress, a wide range of aspects relating to grassland systems will be discussed, with a focus on their implications under various environmental conditions and management intensities. Recent advances allowing increased efficiency and sustainability of grassland systems will be presented. Expectations about grassland systems and the achievements of these systems in terms of services to society and production of high-quality food will be discussed. Concepts of transdisciplinary research and system-oriented extension services will be introduced, pointing out how they can help meet future challenges of grassland-based agricultural systems. This general meeting will offer master classes and plenary sessions on themes such as "Balancing Ecology and Economics," "Benefits and Risks to Society," "Efficient Use of Natural Resources in Grassland Systems," "From Forage to Food Quality and Safety," and "Transdisciplinary Research and Exchange of Knowledge." For more information, see www.egf2004.ch.

Additional information on aspects and activities of the EGF, such as member countries, publications, and future conferences, is available on the EGF web site www.europeangrassland.org.

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Vicuna Use by Andean Communities: An Overview

Vicunas (*Vicugna vicugna*) are wild South American camelids that live in high-altitude steppes between Andean mountain ranges in the ecoregions of the Puna and Altoandina. The species is prized for its fine fiber, which placed it at risk of extinction in the 1960s. Effective conservation measures during the past 30 years have resulted in an increase in vicuna numbers, and now the world population is at approximately 200,000. Since the recovery of the species, Andean countries with viable vicu-

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na populations (Peru, Bolivia, Chile, and Argentina) have begun developing management plans with the goal of promoting conservation while creating an alternative source of income for local people who live in a resource-poor area. The authors, both of whom are members of the World Conservation Union's Species Survival Commission, South American Camelid Specialist Group and reviewers of vicuna-related proposals for the Fish and Wildlife Service (FWS) and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), describe ongoing management plans in these countries and explore their biological and socioeconomic impact. They suggest that wild management is a preferable alternative to captive management to promote sustainable use of the species and to improve the quality of life of the local people.



FIGURE 1 Andean landscape in Jujuy, Argentina. (Photo by Bibiana Vilá)

Of vicunas and people

The altiplano of Argentina, Chile, Bolivia, and Peru, with an altitude of 3900–4900 m, is characterized by very harsh conditions such as low annual rainfall, a high daily temperature range, and low primary productivity (Figure 1). The area is inhabited by indigenous human communities with a rich cultural tradition of myths, legends, and rituals, and a particular cosmovision that mediates their interaction with the environment.

Although the economy of the area thrived during preconquest times, at present it is one of the poorest regions in South America. Climatic and management factors such as altitude, harsh weather conditions, destructive frosts, soil erosion, pasture reduction caused by overgrazing, scarcity of water, and periodic droughts reduce the options for agriculture and limit economic activities. This is compounded by the lack of special techniques adapted to production in desert environments, by the distance from markets, and by the low demand for regional products. The lack of opportunities leads to the out-migration of locals, who seek cash-generating opportunities in rural areas and cities at lower altitudes.

The South American camelids, both wild (ie, vicunas [*Vicugna vicugna*] and guanacos [*Lama guanicoe*]) and domestic (ie, alpacas [*Vicugna pacos*] and llamas [*Lama glama*]), have a long history of exploitation. Zooarcheological evidence suggests that vicunas and guanacos have been hunted since approximately 10,000 BP. Recent studies using molecular techniques support the hypothesis that alpacas are the result of the domestication of vicunas and that llamas are the product of the domestication of guanacos. In the mystical world of the local campesinos, vicunas and guanacos are *salqa* (they belong to the Mother Earth, *Pachamama*), and llamas and alpacas are *uywa* (they belong to the people). According to local traditions, economic success depends on the benevolence of *Pachamama.* This is obtained by rituals, offerings, and correct interaction with Nature.

Priceless wool: boon and menace

Vicunas are members of the group of animals that produce fine fiber such as mohair and cashmere, angora, and shahtoosh (produced by goats, rabbits, and chiru, respectively). Vicuna scarves are famous for being warm yet so light that they can be pulled through a ring. The fact that each animal produces a small amount of fiber (on average 0.250 kg every 2 years), coupled with its quality and the relative scarcity of viable vicuna populations, makes vicuna fiber one of the most expensive and sought after in the world. Raw fiber was sold at US$523/kg in Chile's first auction in March 2002. Vicuna scarves are sold at US$1000 at Peru's international airport, and vicuna jackets can be bought starting at US$5000 in the UK.

The value of its fiber brought the vicuna to the verge of extinction. The Incas used vicuna sustainably by conducting roundups or *chakus* every 3–5 years, where some animals were shorn. After the Spanish conquest, vicunas were slaughtered in large numbers; along with competition from livestock, this almost caused the extinction of the species, reducing the world population to approximately 6000 individuals by 1965. This led to the listing of the species in Appendix I of CITES, and the creation of the Vicuna Convention with the aim of protecting the species and promoting sustainable use. International conservation efforts resulted in the recovery of some populations, and vicunas are now classified as LRcd (lower risk–conservation dependent) in the 1996 Red List of threatened animals. The ban on trade of vicuna fiber has been lifted from all

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vicuna populations in Peru and from certain populations in Argentina, Bolivia, and Chile.

In the areas where vicunas are still protected, local people complain about them because of perceived competition for food and water with domestic livestock, destruction of fences, and transmission of diseases. When protection and incentives to protect vicunas are poor, people chase them with dogs and collaborate with poachers. Illegal hunting is still a major threat.

The path to sustainability

The fact that vicuna fiber can be relatively easily obtained from live, shorn wild animals that have been temporarily caught makes this species ideal for sustainable use. Wild management draws on the *chakus* practiced by the Incas; vicunas are caught by surrounding them and driving them toward a funnel-shaped mesh enclosure. Once inside the enclosure, vicunas are taken one by one, shorn, and then released (Figure 2). Stress can be minimized by proper handling techniques. The alternative approach of captive management involves fencing a variable number of vicunas into a corral or larger enclosure and providing them with veterinary care, water, food, and supplements. In smaller corrals, subordinate males are castrated to avoid fights and injuries.

Although the conservation and socioeconomic value of corrals has recently been questioned by international forums (eg, Traffic, FWS, CITES), ranches are becoming quite popular because they allow individual producers and not just whole communities to have a stake.

Data obtained from fieldwork in Ayacucho Region in Peru and from a study in Jujuy and Salta Provinces in Argentina are presented below to describe the biological and socioeconomic impact of ongoing vicuna management plans. This is supplemented with public documents from all countries that have vicuna populations and with presentations made at the last 4 meetings of the Vicuna Convention.

Different countries, different plans, one Vicuna Convention

Management plans in each country have been developed according to the country-specific social organizational systems, idiosyncrasies, livelihoods, and national and local laws pertaining to resource and land tenure (Table 1). In the case of Peru and Bolivia, vicuna management plans were originally designed for whole communities to manage

FIGURE 2 Vicuna being shorn in Pampa Galeras, Peru. (Photo by Gabriela Lichtenstein)



vicunas collectively in communal lands. In Argentina, where land is owned mainly by individual producers, a program for individual ranching was developed. Chile's management plans involve a mixture of community management of wild vicunas by Aymara communities and captive management by groups of Aymara families. Interestingly, in Argentina the main producers are not local farmers but a public organization: the National Institute of Agriculture and Cattle Technology (INTA). This organization not only provides technical assistance

TABLE 1

Country	Total number of vicunas	Type of management	Number of vicunas held in corrals	Price (US$/kg)	Fiber exports (kg)
Argentina	35,000–45,000? (no census)	Captive	1500	250, rump; 70, belly and underpart	807.16 (1997–2001)
Bolivia	56,383 (2001)	Wild	NA	NA	NA
Chile	16,899 (2001)	Wild and captive	200	523, rump: 132, belly and underpart	99 (2002)
Peru	118,678 (2000)	Wild and captive	26,000	308	19,819, raw fiber; 15,607, processed fiber (1994–2001)

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and vicunas to local producers but also organizes the fiber auctions.

The amount and extent of public financing and technical assistance provided by countries for vicuna management vary. In Argentina the government does not provide financing to producers, who instead must rely on a private company to finance their corrals and shearing equipment, whereas in Chile the state provides all of the infrastructure and technical assistance. The number and power of the actors involved also vary greatly; Peru has the most powerful producer organization, the National Vicuna Society, in charge of collecting and selling the fiber from 250 communities from all over the country.

In every country technical assistance is provided by public organizations dependent either on the Ministry of Agriculture or the Ministry of Sustainable Development. The Vicuna Convention provides general guidelines for the development of vicuna management plans and the protection of the species by advocating at the international level and by supporting or failing to support proposals developed by its member countries.

Vicuna management in Peru and Argentina

Since 1992, communities in Peru have had stewardship and property rights over vicunas under national law. Until 1995, vicunas were managed in the wild and were captured only to be shorn, and then released. Since 1996, the National Council for South American Camelids began developing a program that consists of installing 1000-hectare corrals (with a 12-km perimeter) on communal land from which domestic livestock is withdrawn. Corrals generally enclose between 250 and 1000 vicunas. Communities pay US$22,000 for the corrals and provide free labor and land. The fiber produced by all communities is stocked and sold by the National Vicuna Society to an international consortium. Corrals can be paid for in cash (through a loan from the government) or in vicunas (valued at US$1000 each). Vicunas given as payment for the loan are in turn used in a repopulation program that sells them to communities that want to install a corral. By the end of 1998, 250 communities had joined the captive management program, 415 vicunas had been transferred to communities that wished to stock vicunas, and 2400 vicunas came from communities that used vicunas to pay for their corrals.

Vicuna captive management plans in Argentina are led by INTA's Abrapampa Station. This station donates 12–36 vicunas from its own captive herd to individual producers. A greater number of young vicunas, produced under captive conditions, have to be returned to the INTA station by each producer as compensation for the initial vicuna donation. Fencing material for the installation of 10-hectare corrals is financed by the principal local buyer of vicuna fiber (Pelama Chubut SA). Once vicunas are shorn, producers sell the fiber obtained to Pelama Chubut SA to pay for the fences and obtain some cash. It takes 4–10 years for producers to pay back the loan depending on the percentage of production they allocate for this purpose.

Biological impact

Vicuna captive management plans either in small corrals or in large enclosures have similar consequences for the enclosed population. The social organization of vicunas is based on stable family groups and bachelor groups. Males regulate the size of their group and access to females by aggressive displays or fights. Bachelor groups play a key role in reproduction. The genetic importance of the bachelor groups is related to the fact that they can move freely between populations, "moving genes" over extended areas. In captivity, bachelor groups can neither run away from the aggressive territorial males nor migrate. Captive management practices in Argentina include the castration of bachelor males, which disrupts the natural social organization of vicunas and inhibits the genetic flow between populations. Other genetic consequences include inbreeding, genetic drift, and artificial selection.

Producers often force captive vicunas to live at levels of population density higher than they would tolerate in the wild, because larger animal populations mean greater returns. As space becomes limited, competition can become severe, and antagonistic interaction rates may increase. Because subordinate individuals are often unable to avoid or escape from aggressive or dominant conspecifics, they may experience injury and physiological stress. Stress causes a dramatic decline in the vicuna birth rate in the small enclosures of Argentina. This is particularly problematic because producers must return young vicunas to INTA in exchange for the ones that were originally donated.

Socioeconomic impact

A socioeconomic study of the management plan in Peru revealed that captive management implies a high-risk investment with low expected returns. Local people have to work for free in vicuna capture and installation of corrals, paying an opportunity cost for not doing other jobs and for removing their livestock from the best lands. The program appears to have had little direct financial impact so far on most community members. Corrals generate a conflict between environmental and economic interests: given the low carrying capacity of the Peruvian Puna (0.3 vicunas/hectare), placing more than 300 vicunas in a 1000-hectare corral has a negative impact on the environment and on vicuna population

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growth. But from an economic perspective, more vicunas per corral produces greater short-term profit.

For communities with 400 vicunas, corrals are a high-risk investment with low expected returns. For communities with fewer than 250 vicunas, corrals are not profitable. This contrasts with revenues from the management of free vicunas, which is a moderately risky venture with a good chance of profitability. Because wild management entails paying wages to local people, it helps the local economy and provides a direct benefit to workers. Because they do not have to remove domestic livestock from the area of the corral, community members pay no opportunity cost for wild management.

Workshops with communities in Peru revealed that having to remove domestic livestock from the corral area acts as a disincentive to establishing captive vicuna populations. Moreover, neighboring communities are fighting over where to install the corrals. Even though communal work is part of the local tradition, interest in participating in vicuna captures is decreasing because people realize that they do not receive benefits. This is also causing an increase in poaching activities.

An economic study in Argentina revealed that it is unlikely that an investment in a 10-hectare corral for 12–36 vicunas, which produce at the most 7.2 kg of fiber every 2 years, can be profitable, especially because producers have to return the original number of vicunas to INTA and pay for the loan for the corral. Producers believe that they need at least 120 vicunas to make the enterprise profitable and 10–12 years before they realize economic returns under present conditions. The lack of economic returns limits producers' investment in the care and management of vicunas. Thirty-seven percent of the corrals have already returned their vicunas to INTA or were closed down because animals were not provided adequate care.

Concluding remarks

All available evidence leads us to conclude that management of free-ranging vicunas is a preferable alternative to management of captive vicunas, from both a biological and a socioeconomic perspective. Furthermore, in captive management programs indigenous knowledge is generally ignored and replaced by systems of exploitation alien to local people. We fear that the lack of benefits to local people might threaten the long-term viability of many vicuna populations because poaching could increase.

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