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SUSTAINABLE TROPHY HUNTING AND THE CONSERVATION OF ALPINE UNGULATES IN PAKISTAN

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ABSTRACT.– Alpine ungulates are ubiquitous in Northern Pakistan but have declined in numbers in recent decades, possibly because of poaching and habitat degradation by livestock. Experience suggests that the most pragmatic way of achieving sustainable management of wild Caprinae is through a community-based trophy hunting programme. Since the early 1990s, the Bar Valley has been the focus of a project designed to conserve its ibex population using high-priced trophy hunting to generate funds for local development. In 2000, an audit of the project was undertaken to determine its effects on ibex and benefits for local people. Ibex survey data were retrospectively analyzed to determine density and productivity indices for each year. A survey of Bar Valley households was also conducted to obtain both historical and contemporary views on the project's function and effectiveness. The survey was repeated in the adjacent Naltar Valley, where there has been no similar project. The Bar Valley ibex population has remained relatively stable over the past decade, whilst that of Naltar and other valleys has all but disappeared.

RÉSUMÉ.– Au nord du Pakistan, les ongulés alpins se distribuent dans des habitats diversifiés mais leur nombre a diminué ces dernières décades, peut-être du fait du braconnage et de la dégradation de l'habitat par les troupeaux domestiques. Si l'on veut mettre en place une gestion soutenable des Caprinae sauvages, l'expérience montre qu'une solution pragmatique est l'établissement d'un programme de chasse au trophée géré par la population locale. Ainsi, depuis les années 1990 s'est développé dans la vallée Bar un projet de conservation de la population de bouquetins basé sur des trophés de chasse à prix élevés pouvant générer des revenus pour le développement local. En 2000, une révision a été faite pour connaître les effets de ce programme sur le bouquetin et ses bénéfices pour les habitants de la zone. La densité et les index de productivité ont été determinés année par année. L'effectivité du projet et son influence sur les revenus locaux ont aussi été étudiés pour obtenir à la fois une vision historique et actuelle. Cette enquête a été répétée dans la vallée voisine de Naltar, où aucun projet semblable ne s'est

établi. La population de bouquetin de la vallée Bar s'est relativement stabilisée cette dernière décade, tandis que celle de Nalthar et d'autres vallées a presque disparu.

RESUMEN.– Aunque los ungulados alpinos son ubicuos en el norte de Pakistán, han disminuido en número en las últimas décadas, probablemente debido al furtivismo y la degradación del hábitat producida por el ganado. La experiencia indica que la forma más pragmática de desarrollar una gestión sostenible de los caprinos silvestres es a través de un plan de caza de trofeo con participación local. Desde principio de los 90 en el valle de Bar se ha llevado a cabo un proyecto basado en la caza de trofeo de alta cotización, obteniendo así fondos para el desarrollo local. En 2000 se realizó una auditoría con el fin de determinar el efecto del proyecto en el íbice y sus beneficios para la población local. Los datos obtenidos con el seguimiento del íbice fueron analizados retrospectivoamente para determinar los índices de productividad y densidad por años. Se encuestó a las familias del valle de Bar con el fin de averiguar su percepción histórica y actual sobre el funcionamiento y efectividad del proyecto. Se repitió la encuesta en el valle adyacente de Naltar, donde no existe un proyecto similar. En el valle de Bar la población de íbice permaneció relativamente estable durante la pasada década, mientras que en el valle de Naltar, y en otros valles, casi ha desaparecido.

Key-words: Alpine Ungulates, Commuity-based Trophy Hunting, Sustainable Management, Revenue Generation.

1. Introduction

Sustainable use programmes can provide economic incentives in the conservation of natural resources, especially in areas where there is intrusion of the local people. The harvesting method is prime in sustainable management. A controlled removal of a certain individuals of a species helps in sustaining the wild animal populations. Conversely, if harvested species are extracted indiscriminately then the ecosystem cannot sustain a viable population. A refined method, therefore, should be species-specific such as targeted hunting for trophy animals or selective logging of valuable forest timber.

Various trophy hunting and other sustainable use initiatives show how communities can obtain economic benefits from their resources (ROBINSON & REDFORD, 1994). The following are a sample of such projects, initiated by the conservation and development agencies with the local people.

CAMPFIRE in Zimbabwe: The *Communal Areas Management Programme for Indigenous Resources* (CAMPFIRE) started in 1989, is a successful, community-based programme aimed at improving the management and conservation of natural resources in Zimbabwe. This indigenous programme was designed to allocate rights to use natural resources to small communities, providing them with an incentive to use these resources wisely (CHILD, 1996a). The two key principles underpinning CAMPFIRE are that money should be returned to

producer communities, that should have the full choice of how to use these monies, including the option of cash dividends (CHILD, 1995, 1996a, 1996b).

ADMADE in Zambia: The *Administrative Management Design* (ADMADE) programme was initiated in 1987-88 to conserve the diminishing wildlife populations in the national parks. ADMADE's major innovation in wildlife management has been to hire and train over 500 local residents as village scouts to monitor and police wildlife resources in their home areas. In 1994, income was distributed among 21 participating Game Management Areas (GMAs), with the largest amounts received individually being US$73,408 for wildlife management, and US$64,233 for community development (LEWIS & ALPERT, 1994).

Trophy hunting in Northern Areas of Pakistan: Pakistan is one of the most important countries for Caprinae conservation. It is home to seven species and 11 subspecies of Caprinae, ranging from the hills in the southern desert to the high alpine areas in the extreme north. Currently 10 of the 11 taxa in Pakistan are threatened, with eight classed as endangered (HESS *et al.*, 1997).

WWF project in Bar Valley-Pakistan: WWF-Pakistan Bar Valley project has been selected as an example in this study to evaluate the impact of local people on ibex, the development aid in improving the socio-economic conditions of the local community and the linkage between conservation and development. The Bar Valley (Figure 1) has long been known for the occurrence of Himalayan ibex, Snow leopard *Panthera uncia* and Brown bear *Ursus arctos*. Himalayan snow cock *Tetraogallus himalayensis* and Chukar partridges *Alectoris chukar* were also reported in good numbers for hunting (AHMAD, 1990; MUSTAFA, 1994).

The wildlife of the Bar Valley, because of its relatively isolated location presents a safe environment, although occasional ibex hunting is reported (AHMAD, 1990). In the 1980s, it was suspected that about 15 local hunters and an equal number of outsiders hunted about 10 ibex each year (AHMAD, 1990), which can be attributed to the construction of Kara Koram Highway (KKH).

Despite legal protection to large species, law enforcement was weak due to the extreme terrain, poor communications and lack of effective organisation and trained staff. This has led to over-exploitation and many species being on the verge of extinction (AHMAD, 1990). The people of Bar Valley recognised that this level of ibex hunting was unsustainable. Local leaders discussed the proposal with WWF with a view to possible sponsorship, subsequently WWF-Pakistan became involved in Bar Valley.

The core idea of the first project planned by WWF-Pakistan in 1990 was to provide a loan of Rs.240,000 to the local community to meet their requirements from alternative sources. Thus the basic aim was to protect ibex from

local extinction but creating, simultaneously, a new income source for the entire community (A. Ahmad pers. comm.).

Based on the results of feasibility study (AHMAD, 1990), a project was implemented for five years (1991-1996) with the following major objectives:

1. Conservation of natural resources, especially wildlife populations and their habitats;
2. Sustainable use of wildlife species, especially the ibex; and,
3. Improvement in the living standards of the local families.

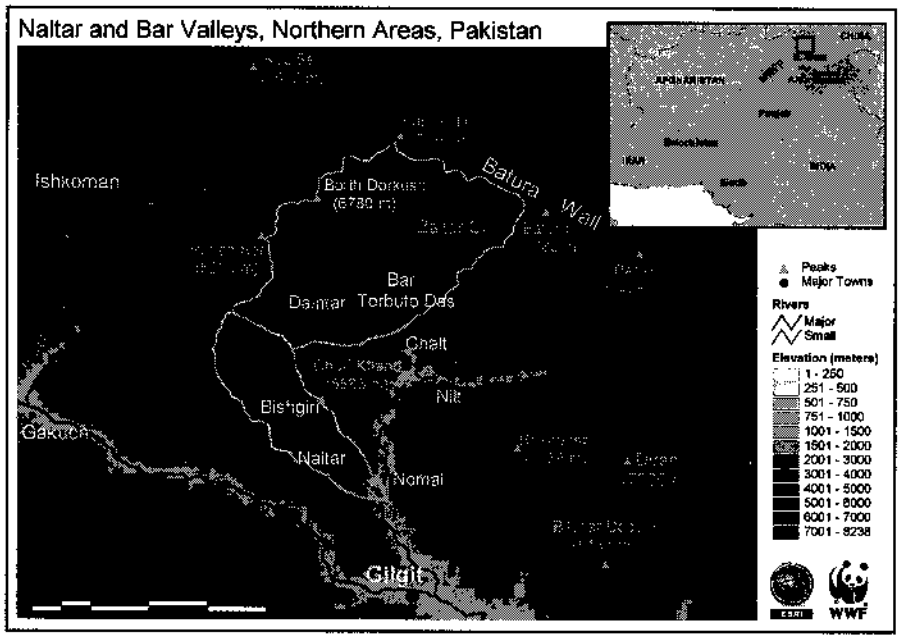

Figure 1. Map of the Northern Areas showing the study site.

In 1991, WWF-Pakistan signed an ibex conservation agreement with the local communities of Bar Valley. Regular ground-based surveys were conducted from 1992 to date by WWF-P with the assistance of local hunters and guides (WWF, 1996). Based on a population survey in April 1994, WWF-P recommended eight (245 animals recorded in one catchment of Bar) trophy-sized animals (horns >90cm) for hunting. Five export permits were initially issued for the international hunters. The Prime Minister of Pakistan approved the 75:25 share between the community and goverment respectively from these trophy permits (AHMAD, 1995).

In the 1995/96 hunting period, three permits were utilised by Germans for US$ 3,000 each and local community offered to repay the loan from WWF-Pakistan. Since the need for a health centre had already been expressed by the community, the money was returned for this purpose (AHMAD, 1997).

The second phase (1996-2001) was designed under the "Partners in Change" (PIC) concept formerly called the PSD21 (Partnership for Sustainable Development in the 21st Century) programme, promoted by WWF-UK. The PIC's objective was to facilitate sustainable development by broadening the range of the community requirements supplied through partnerships, whilst also conserving the environment (WWF, 1996).

2. IUCN-Pakistan projects in Northern Areas of Pakistan

Pre-investment feasibility (PRIF) project (1995-1999): In 1995, IUCN-Pakistan initiated a project entitled "Maintaining Biodiversity in Pakistan with Rural Community Development" which essentially copied the Bar Valley design. It included six valleys in NAs and was funded by UNDP (IUCN, 1999b). The project carried out Participatory Rural Appraisals (PRAs) to assess the needs of the community and plan for natural resource management.

Trophy hunting of ibex and markhor was the successful sustainable use activity laid out in this programme. At the project completion, a comprehensive project process evaluation report was published by IUCN and UNDP, emphasing the need to explore institutional mechanisms at valley and conservancy levels for long term sustainable conservation measures (IUCN, 1999b).

Mountain Areas Conservancy Project (MACP) (1999-2006): The IUCN-Pakistan PRIF project provided baseline for the development of MACP. It aims to protect the rich ecological landscapes and biodiversity, to identify the underlying causes of its loss and empower the local communities to manage biodiversity of the Karakoram, Hindu Kush and Western Himalayan mountain ranges of Northern Pakistan. Within the four established conservancies, activities will facilitate the *in-situ* conservation of habitats and species and promote sustainable uses of components of biodiversity (IUCN, 1998). WWF-Pakistan has been invited to collaborate with the IUCN on the education component of MACP in its education component.

3. Rationale for the present study

The WWF and IUCN projects have convinced some communities of NAs that it is wise to conserve their natural resources whilst generating money

from them without damaging their future persistence. The objective behind appraising such projects is to identify their particular strengths and weaknesses through a pilot study before their further replication.

The Bar Valley projects were not systematic and independently assessed. This evaluation remained the aim of the present study and the subject of the rest of this thesis.

This study has three key objectives:

1. To assess the status of the ibex population in Bar Valley;
2. to assess the impact of development aid activities on the local community; and,
3. to investigate local people's perception of the link between the sustainable use of ibex and development aid.

4. Himalayan ibex (*Capra ibex sibirica*)

Caprinae conservation and management

Many Caprinae live in environments of relatively low productivity and are therefore sparse. Today with increasing human pressure, wild Caprins are threatened due to over-harvesting, habitat loss, competition from livestock for food, and disease outbreaks caused by pathogens of stock. These factors have contributed in increased population fragmentation and the risk of local extinctions (IUCN, 1997). Most of the Caprinae face an additional threat from enthusiastic trophy hunters. Consequently, some authorities are tempted to exploit them without adequate biological information to do so sustainably (EDWARDS & ALLEN, 1992).

In practice conservation and use of wildlife resources are inseparable, because wildlife conservation has on-going costs. In terms of local income provided, the most profitable projects have been those at sites where wildlife attractions command large revenues from international tourists for hunting, game viewing and photo-safaris (RAMBERG, 1992).

TSING *et al.* (1999) emphasised that community-based natural resource management is founded on the premise that local populations have a greater interest in the sustainable use of natural resources than do the state or distant corporate managers.

SCHALLER (1996) reported that a sparse population of pastoralists have coexisted with six wild and four domestic ungulate species within the Chang Tang Reserve, China, thus showing the potential resilience of both the human and wildlife populations. In a Himalayan context both SCHALLER *et al.*

(1987) and FOX *et al.* (1991) concluded that economic development would result in people and their livestock making less use of the difficult rugged grazing areas, thus leaving them to the wild ungulates. Conservation must take the aspirations of the local people into account, for the survival of wildlife and its habitat, which ultimately depends on them.

Targets set by WWF-Projects in Bar Valley

Three different projects by WWF-Pakistan were initiated in Bar Valley in collaboration with all the major stakeholders and the backing of several funding agencies (WWF, USAID, BODA/DFID etc.). In each of the projects, two of the main objectives were to improve the socio-economic conditions of the community and their sustainable natural resource use.

The basic aim of the initial project (1991-96) was to protect ibex from local extinction and then maintain or stabilise the population for sustained trophy hunting (Ashiq Ahmad pers. Comm.). Similarly in the second phase of the project (1996-99), the same objective was followed in four other valleys, in addition to Bar Valley. In phase III of these projects (1999-2004), the ibex population along with those of Snow leopard, markhor and musk deer is targeted to increase by 15%.

5. Methodology

Field methods

In the Bar Valley, the first ibex census was conducted in spring 1992, after which such surveys were conducted every year until 1996 by a WWF-Pakistan team with local guides. In 1996, WWF-Pakistan instigated autumn surveys in the valley and then handed over the responsibility for all survey work to the local community. Reports from the field were submitted to WWF-Pakistan.

Naltar Valley, although a government Wildlife Sanctuary, was only surveyed for ibex in autumn 1999 and spring 2000, as a part of this research project.

Survey method

There are two upper catchments in the Bar Valley and normally two survey teams were constituted. One team went to the Baltar Glacier (northeast of

Bar Valley) and a second team to Bario Darokush (northwest of Bar Valley). Teams used the same format for data recording.

The first observations were made early in the mornings (before 06.00 hrs). Observations were made all day by stopping at various places. All observation points from which the team observed ibex were recorded on the form by name. The night stops used during the survey were always made at the same camping grounds and huts. All points visited in 2000 were marked with GPS (Colour Trek) and later plotted on a digitized map of the valley to help in locating observation points and the routes.

For each observation, the area was first searched with binoculars and animals' sex and age was recorded. In 2000, the data was recorded separately to check its accuracy.

The ibex data were recorded as: males (M: aged >1 year old), females (F: aged >1 year old), trophy size males (TSM: horn size >90 cm) (IUCN, 1999) and yearlings (<1 year old) in a herd (WWF, 1996). Other variables recorded were time of day, date, month and year, weather and aspect (northern, southern, eastern or western).

In Naltar Valley, there is only one large catchment to cover. The spring survey was therefore conducted by single group of three (an experienced hunter, a guide and MA). A total of 15 fixed observation points along the valley were located with GPS. These points were also plotted on a digitised map of the valley.

Two teams were again constituted to cover the two upper catchments in Bar Valley during autumn surveys and the same procedure as in spring were used for recording the data. In Naltar Valley, the autumn survey was conducted by the same team as in spring, using the same observation points.

Analytical methods

In order to analyse all the ibex data from Bar Valley; all the survey reports from the last 8 years (1992-1999) were collected from WWF-Pakistan except the 1993 data which was missing (WWF, 1996). The ibex herd was considered to be the basic unit of measurement, as individual animals in such herds could not be regarded as independent entities for statistical purposes.

Spring data: For the spring analyses, only herds counted in the mornings before 09.00 hrs and evenings after 16.00 hrs were included (SCHALLER, 1977).

In order to calculate the encounter rate, all the herds seen in each morning session (i.e. <09.00 hrs) were grouped, as were herds seen in each evening ses-

sion (i.e. >16.00 hrs). The encounter rate or herd density index was then calculated by the following formula:

$$\text{Encounter rate (Herd density index)} = \frac{\text{No. of herds observed in a morning/evening session}}{\text{Distance covered in that session (km)}}$$

Mean herd size was calculated by the following formula:

$$\text{Mean Herd Size} = \frac{\text{Total no. of animals observed in a morning/evening session}}{\text{Total no. of herds observed in that session}}$$

An ibex density index was calculated by multiplying the encounter rate for herds by the mean herd size (KREBS, 1989).

$$\text{Ibex density index (Herd density index)} = \text{Encounter rate} \times \text{Mean herd size}$$

In the Bar Valley dataset, some mornings and evenings were not represented because no ibex were seen. In order to estimate the survey effort for such sessions, the mean distances covered by observers in mornings and evenings were calculated separately from the whole dataset. The mean distance for mornings was 1.50 km, with 0.93 km for evenings.

The spring ibex density and herd density indices were checked for normality using the Kolmogorov-Smirnov goodness of fit test (Minitab 12). All the sets of data were not normal and transformed for further analyses (ZAR, 1997). Graphical presentations of the results required back transformation to original units. The reverse square root transformation was applied for this purpose.

Autumn data: Adverse weather often made the observation of slopes difficult or impossible in the autumn, mainly because of low cloud. Thus, the clearly recognisable new kids (<6 months old) were used to derive a kid/female as an index of annual breeding productivity. The data were divided into three time categories, morning (<09.00 hrs), afternoon (>16.00 hrs) and the midday period (09.00-16.00 hrs), to check for diurnal differences in kid/female ratio.

The kid/female ratio was calculated for each herd as follows:

$$\text{Kid/female ratio} = \frac{\text{Total no. of yearlings in a herd}}{\text{Total no. of females in the same herd}}$$

The kid/female ratios so generated were checked for normality using the Kolmogorov-Smirnov goodness of fit test (Minitab 12). They were found not to be normal and were transformed by using a reciprocal transformation.

6. Results

Variation in ibex density index

General Linear Modeling (ANOVA/GLM: Minitab 12) was applied to the transformed dataset in order to identify any effect of year, time of day or date on ibex density index. The dataset consisted of all morning and evening sessions covered during the surveys each year.

There are some fluctuations in the ibex density index (Figure 2) there is no significant variation in ibex density amongst years. Similarly, date, time of day and the interaction term for date and year are not significant predictors of the ibex density index.

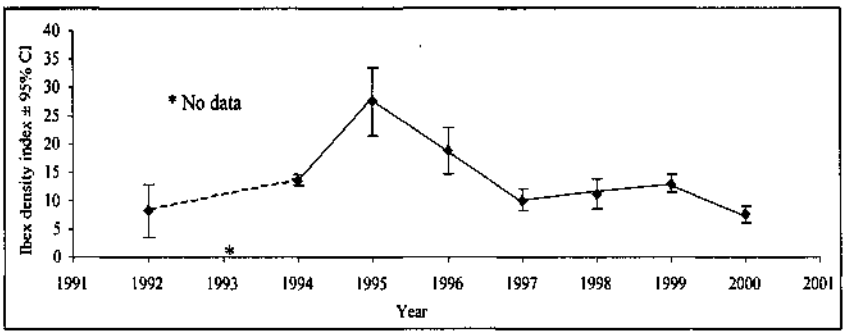

Figure 2. Mean ibex density index (ibex.km^{-1}) in spring for Bar valley in 1992.

Variation in herd density index

Transformed values for herd density were considered as the response variable and year and time of day as factors. Date, as a continuous variable, was used as covariate in the model. This GLM analysis suggested that there is a significant difference in the ibex herd density between years (P=0.026). Time of day and the interaction between year and time of day did not have any significant effect.

In order to know which years were different from others, two sample t-tests were carried out between adjacent years. The tests showed that there is a significant decrease in the herd density index between 1996 and 1997 and a significant increase between 1999 and 2000. The t-test results are shown Figure 3.

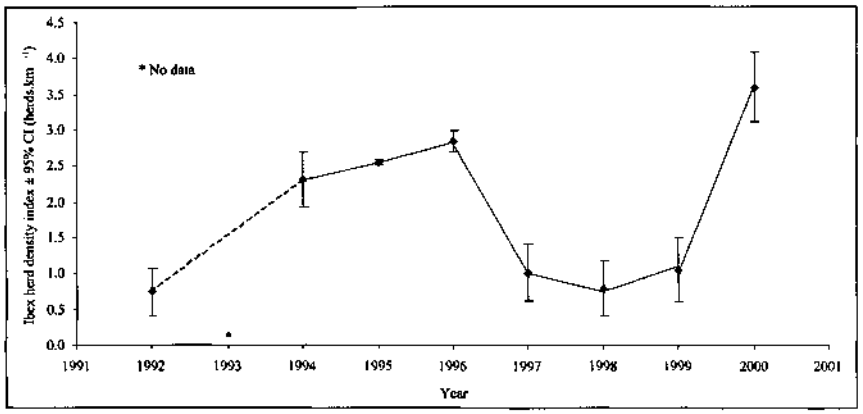

Figure 3. Mean ibex herd density index (herds.km^{-1}) in spring for Bar Valley in 1992-2000.

Kid/female ratio

The kid/female ratio was calculated from the autumn census data, only available for 1996 -1999. The dataset was composed from all herds observed in each year. General Linear Modeling (GLM) was applied to the transformed data for kid/female ratios as the response variable with time of day and year as the factors. Date was considered as a covariate because it was a continuous variable. The results show that there is a significant year effect on the mean kid/female ratio ($P<0.001$). However, neither time of day nor date had any statistical effect. Two sample t-tests showed that there was a significant increase between 1997 and 1998 and decrease between 1998 and 1999.

7. Discussion

Several floral (MUSTAFA, 1994) and faunal surveys (YOUNG, 1995) have been carried out in Bar Valley to determine the status of its natural resources, but no scientific study has yet been undertaken into the status of the ibex population. Although ibex counts have been conducted since the start of the project, no proper analysis of these data has been undertaken. Analysis of the spring data of Bar for 1992-2000 showed that there was no significant variation in the ibex population density over that time. However, significant variation was found in the ibex herd density. There was an increase in population density from 1994-95 but a decrease from 1995-96. Data from autumn

count suggested that there was also a significant fluctuation in ibex productivity (i.e. kid/female ratio) from 1996-99. The fluctuation in the productivity was observed from 1997-99, during the same time, when there was a community conflict between two parties and the freezing of money into two bank accounts resulted in resuming ibex hunting activities again.

During the analysis undertaken, the survey has been found to be poorly designed, requiring a number of assumptions to be made. Firstly there was a need to measure survey effort which varied from day to day and year to year in order to produce a meaningful population index measure. As things stand, if no ibex were seen, no entries were made in the data sheets, so it is hard to be sure how much survey work was done.

For the spring analysis it has been assumed that the weather was always clear (Ghulam Mustafa pers. comm.) The decision to exclude spring data collected after 09.00hrs and before 16.00hrs was based on assertions by SCHALLER (1977) and ROBERTS (1997) that most ibex are bedded over the midday period, thus rendering them much less visible than when they are actively foraging at other times during daylight hours.

At a rough estimate, 20% of the 900 km^2 area of Bar was covered during surveys, the spring data indicates an ibex density of 0.74 animals/km^2. These may be compared into figures of 0.88 and 0.62 animals/km^2 for two wildlife sanctuaries in Ladakh, India (MALLON, 1991), 1.3 ibex/km^2 in the Taxkorgan area, China (SCHALLER *et al.*, 1991) and 0.4-0.5/km^2 in Ladakh (FOX, 1991) however the ibex density estimate for Naltar in spring 2000 was < 0.1.km^{-2} indicating that here it is severely threatened. As these other areas in Ladakh are in a Budhist dominated region, where hunting is rare, it seems fair to claim that the Bar ibex population is in a good state, although it may not be at carrying capacity.

The autumn 1999 data for Naltar based on a small sample size of herds (N=4) indicate that ibex productivity is zero whereas in Bar it was 0.581 kid/female compared 0.850 kid/female during autumn in India (FOX *et al.*, 1992).

In Naltar, people spoke of ibex being plentiful in the valley in the 1970s and still quite common until the early 1980s. Excessive hunting throughout this time is said to have virtually exterminated the population from this area. Some people asserted that the ibex sometimes used to graze with their livestock, even coming down to the valley floor. There can be no doubting a marked decline in the ibex population over the last 30 years in Naltar.

There appear to be at least 3 possible explanations for the levels of ibex population:

1. The apparent stability of the ibex population in Bar compared to Naltar and all these other localities could be a result of the conservation activities under the WWF-P project over the past decade.

2. The relative availability of foraging grounds in Bar versus other localities could provide an alternative explanation for the relative health of the population there. Ibex use southerly facing slopes due to their better pasture availability (SCHALLER, 1977) and much of Bar Valley's area has such aspects i.e. southeast (30%) and southwest (70%). Naltar Valley slopes are mostly facing southwest (>80%).
3. A third possible explanation for the difference relates to the trend in domestic stock numbers. The numbers in Bar remained constant approximately between 1990-2000. Naltar Valley stock numbers have gone down as compared to 1990. The ibex may have gone down with the decrease in stock numbers because the shepherds now move with their domestic herds, while this was not the practice before. The graziers kill most of the ibex and the rest might have migrated to nearby safer valleys.

8. Questionnaire Surveys

Objectives of the questionnaire survey

The questionnaire designed for this study aimed to determine any changes in local community's income, living conditions and working patterns between 1990 and 2000 in Bar and Naltar Valley.

Survey interviewees were chosen at random, from a broad range of backgrounds (e. g., hunters, arable farmers, livestock herders and local businessmen). In Bar Valley, a total of 39 people including 10 females (with the help of a lady teacher) and 29 males (with the help of locally educated person) were interviewed. In Naltar, 69 respondents including 14 females and 55 males were interviewed.

9. Results

Change in ibex population and productivity

The results showed that there is a significant difference ($P<0.001$) in the responses of the people regarding the ibex population in the two valleys. People in Naltar were unanimous in asserting a decrease, whilst 38% of people in Bar thought there had been an increase due to effective protection (i. e.

anti-hunting patrols by the Bar Valley NGO members) provided by the local community. .

In Naltar, the decrease in ibex population is due to excessive hunting by locals and especially outsiders using automatic weapons (40%), disturbance due to firing (20%), forest cutting (20%), reduced availability of undisturbed pastures (20%) as the shepherds now move (not earlier) with their livestock to the top pastures thus possibly restricting the use of these pastures to ibex herds.

Ibex-domestic stock grazing interaction

The present study showed that 34% people from Bar Valley and 90% from Naltar Valley thought that ibex do suffer from diseases.

There is no persuasive literature on the possibility of diseases in domestic stock being transferred to wild ungulates. There are instances of foot and mouth disease in Himalayan ibex in Pin Valley National Park (BHATNAGAR, 1997), pleuropneumonia in markhor *C. f. falconeri* in Tooshi Game Reserve, Chitral, NWFP, Pakistan (NWFP Wildlife Department, 1999)

Discussion

In the past, two socio-economic studies have been conducted by questionnaires in Bar: one as part of the original feasibility study in 1990 to plan Phase I of the WWF-P project and a second in 2000. The first study by AHMAD (1990) was based on collecting information on general socio-economic conditions at the household level as well as the hunting statistics in Bar Valley. From an analysis of the questionnaire data in this study it can be suggested that there has been increase in household incomes and an improvement in the living conditions in both Bar and Naltar during 1990-2000. As many people thought Bar ibex population had increased and decreased. However, there can be no doubting the evidence for a marked decline in the ibex population in Naltar Valley. The Naltar people expressed the view that this decline was caused by uncontrolled hunting by both locals and outsiders.

There is no evidence that the total livestock population had declined significantly in Bar over the last decade and the people claimed that there is no grazing interaction between the ibex and domestic stock. No evidence that disease is transmitted to the domestic stock from the ungulates or vice versa, although the people know that wild ungulates suffer from scabies-like (mange) diseases.

The Bar people said that they received aid because of their co-operation with the several NGOs involved with the development in the valley. These also said that the trophy hunting programme has enhanced conservation awareness amongst the community and that is this largely due to the activities of WWF-P.

10. Conclusion

The study concludes that the Bar Valley communities realises that trophy hunting programme has increased conservation awareness. However, the conservation and development link has weakened over time, which has led to resumed hunting, therefore there is a need to strengthen this relationship.

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