"Observations on Conservation and People Attitude towards Endangered Species (Snow leopard in KP) with Special Reference to Chitral"

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Certificate

This is to certify that this thesis entitled "Observations on Conservation and People Attitude towards Endangered Species (Snow leopard in KP) with Special Reference to Chitral" submitted by Mr. Hafiz Ajmal Saeed, is accepted in its present form by the Department of Environmental Economics, Pakistan Institute of Development Economics (PIDE), Islamabad as satisfying the requirements for partial fulfillment of the degree of Doctor of M.Phil Philosophy in Environmental Economics.

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Abstract

In recent times, the world has lost its biodiversity up to a greater extent as a result of species extinction. But the developing world is the most affected in terms of species loss due to agricultural expansion, weak enforcement of environmental rules and regulations. In Pakistan, there are 37 species and 14 sub-species which are internationally threatened or near threatened mammals and snow leopard is one of those endangered species. There are recent initiatives in Chitral for the biodiversity conservation especially such as *"the community-based snow leopard conservation"*. But the effectiveness of the conservation is questionable. Keeping in view the conservational issues, this study is designed to evaluate the behavior and attitude of local people towards the conservation of snow leopard in Chitral district of Khyber Pakhtunkhwa. To know the household's socio-economic status, their awareness about the snow leopard as an endangered species and their willingness to pay (WTP) for the conservation of snow leopard, primary data was collected through well-structured questionnaire from the Households in Chitral. Then, a binominal logistic regression was used to know the households WTP for the conservation of snow leopard and its determinants in the conservatory and non-conservatory area. The study evaluated that the increased number of livestock in the area and its predation by the wildlife in general and snow leopard in specific are the main hurdles in the way of conservation initiatives. On other hand, those group of people in the selected area were found willingness to pay (WTP) for the conservation of snow leopard who have membership in gross root institution/s, highest education of the family, higher family income, living in the jurisdiction of conservational area, income from eco-tourism activities, experienced weight losses and death costs of their livestocks other than wildlife predation (diseases). Furthermore, recommendations have been made to overcome the problems in the way of conservation of snow leopard in Pakistan in general and Chitral in specific.

CHAPTER I

INTRODUCTION

1. Background

Biodiversity is the variety of life present on earth which allows adaptation to the environmental changes (GOP, 2000). Whenever one form of life breaks its relation with another form of life, usually through the extinction of any species, it disturbs the whole ecosystem and threatens the human lives as well (Shah, 2011). Such kind of disturbance in the life cycle is mostly through the anthropogenic activities because any natural change in the life cycle could be restored.

In recent times, the world has lost its biodiversity up to a greater extent as a result of species extinction. The dependency on natural resources and increased population are the factors accelerating the species loss. (Whittaker et al., 2005 cited in Nawaz, 2008, p, 1). But the developing world is the most affected in terms of species loss due to agricultural expansion, weak enforcement of environmental rules and regulations (Glover, 2008). As these environmental goods are highly income elastic in terms of demand (Perman et al., 1999) so it is natural to wonder that what will be the attitude of the developing country's citizens, with the increase in their income, towards endangered species conservation.

Although, Pakistan is rich in biodiversity but it has been reported that 37 species and 14 sub-species of internationally threatened or near threatened mammals are found in Pakistan (IUCN, 1996). One of the endangered species in Pakistan is the snow leopard (Hussain, 2000). Because according to Malik (1997), the population of snow leopard in Pakistan could be 400 out of total population 3500-7000 snow leopards around the world (Jackson and Hunter, 1996). Besides this, in Pakistan there is a little data available on the exact population of snow leopard. Furthermore, the literature (GoP, 2008) shows that there are few attempts have been made so far to assess the status of these endangered species specially the snow leopard.

In Pakistan, the Hindu Kush range is among 34 biodiversity hotspots around the world. Beside the biodiversity richness, the Hindu Kush area is facing the problem of increased population along with poverty. One of the biodiversity rich areas of the Hindu Kush range is the district of

Chitral (Din, 2005). There are recent initiatives in Chitral for the biodiversity conservation especially such as *"the community-based snow leopard conservation"*. But the effectiveness of the conservation is questionable due to top-down approaches, weak governance (as most of the decisions are taken by the government authorities) and low participation of the local community in the decision making process (Khan et al., 2010). These hurdles can be overcome by following the bottom-up approaches and, in fact, by putting the local communities at the driver's seat where the Government role is just as a fuel for pushing the locals and as a partner/ stake holder.

Furthermore, according to the report of IUCN (2005a cited in Georgina, 2007, p. 8), the conservational objectives, contribution towards the societal well-being and the achievement of the economic, social and environmental targets of the protected areas rely heavily on the quality of governance. The governance is the key to the success of these conservational initiatives. In case of Pakistan, these protected areas are usually run and monitored by the government enterprises which are lacking the participation of the local communities. But if any participation of the local community is there then no proper execution of power, no proper definition of the protected areas along with proper identification of the stake holders.

1.1 Study Area

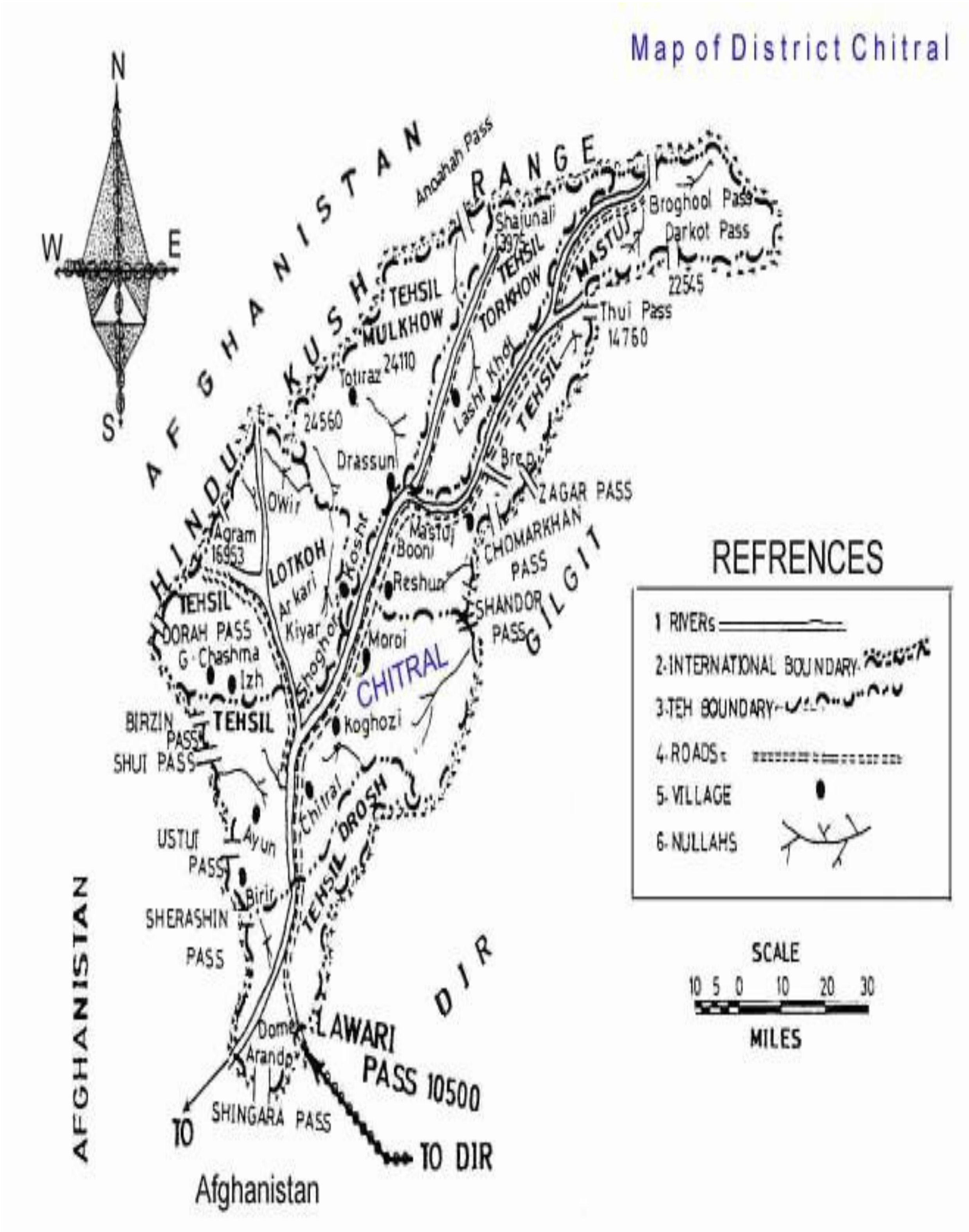
The district of Chitral lies in the north of Pakistan. It is the largest district of KPK province and situated between the Hindu Kush ranges. The Chitral district consists of two tehsils, Chitral and Mastuj. The Chitral district is very important from strategic point of view due to its geographical location and boundaries because in the north it connects with Afghanistan (Wakhan Patti) through Dorah pass which is a gate way between Pakistan and Tajikistan. In the north west, it is bounded by Hindu Kush range. It connects with the Swat valley from east. With the Shandoor pass from the north east, it links with the Gilgit Baltistan. With the help of Kalash valley from the west, it maintains connection with the Nooristan province of Afghanistan. From the south, one can find its connection with the district Dir Upper through Lowari pass. Finally, it ends the geographical relation through Arandu in the south west with the Kunar Province of Afghanistan (Fig 1.1).

The Chitral district inhibits a cultural diversity and almost more than 14 types of different local languages. Among these languages, the Khowar usually known as Chitrali is the dominant and

commonly spoken language of the district and the most prominent and the general population of the area is the “Kho tribe”. The area remained an independent and autonomous state for centuries and later it became the part of British Empire in the late nineteen century. Then it became the part of Pakistan after independence. According to the district census report (1998), the Chitral’s population consists of mostly Sunni Muslims about 70 percent and the remaining consists of Ismailia Muslims and Kalash tribe.

The majority of population of the area is the dependence on the agriculture, which is usually for self sustenance and livestock keeping. There are other local products also on which a number of population’s livelihood depends like Chitral Patti local known as “Shu”, which is a woolen product woven from hand-spun entirely.

Figure 1.1



Map of District Chitral
N
W
E
S
AFGHANISTAN
HINDU KUSH RANGE
Anoshah Pass
Shajunali
TEHSIL
MULKHOW
24110
TORKHOW
TEHSIL
MASTUJ
Broghool Pass
Darkot Pass
22545
Thui Pass
14760
Tohraz
24560
Lasht
TEHSIL
Drassun
Owir
Agram
16953
LOTKOH
Arkari
Kiyar
TEHSIL
DORAH PASS
G. Chashma
Izh
Shoghor
Mastuj
Booni
Reshun
Moroi
CHITRAL
Koghozi
ZAGAR PASS
CHOMARKHAN
PASS
SHANDOR
PASS
GILGIT
BIRZIN
PASS
TEHSIL
SHUT PASS
Chitral
DROSH
USTUI
PASS
Ayun
Birir
TEHSIL
SHERASHIN
PASS
DIR
Dome
Arandp
LAWARI
PASS 10500
SHINGARA PASS
TO
Afghanistan
TO DIR
AFGHANISTAN
REFRENCES
1 RIVERs
2-INTERNATIONAL BOUNDARY
3-TEH BOUNDARY
4-ROADS
5-VILLAGE
6-NULLAHS
SCALE
10 5 0 10 20 30
MILES

1.1.1 Chitral Gol National Park (CGNP)

The Chitral Gol National Park (CGNP) was established in 1984 with a total area of 7750 hectares. The meaning of the word "Gol" according to the local language is "Valley". The Chitral Gol National park (CGNP) is one of the protected areas having a lot of rich biodiversity and the home of migratory species coming from Central Asia. The CGNP has its own uniqueness and beauty because of its geographical location as it lies near to main Chitral city. The valley owns globally extinct, unique and endangered species specially the Snow leopard (WWF, 2002).

The snow leopard used to live in the high mountains of the arid alpine regions like in the Khyber Paktunkhwa, the districts of Chitral, Swat, Dir and Kohistan are prominent. Similarly, the districts of Gilgit and Baltistan of Northen Areas while in Azad Jammu and Kashmir, the Neelam valley (Ahmad, 1994 cited in Khatoon 2010). In the valley of Chtiral, the snow leopard is distributed meagerly especially in the northen isolated mountains (Schaller, 1977). According to Din and Nawaz (2011), at Chitral Gol National Park the existence and presence of snow leopard has been regularly reported since 1989.

But the issues related to property rights also affect the conservation programs when not taken under consideration before the implementation of any activities (Brush et al., 1996). The similar is the case with the CGNP which remained disputed till 1983 because it was considered as a personal property of His Highness-the Mehtar of Chitral. According to the recent decision of Supreme Court of Pakistan, the Chitral Gol National Park is the private property of His Highness so the legal status of the National park has now been challenged.

1.1.2 Snow Leopard Foundation (SLF)

In Chitral, beside the World Wide Fund (WWF), SLF is also working side-by-side which is a non-profit organization which aims to conserve the snow leopard and other carnivores having "community-based conservation". This organization is working from the past few years. The objective is to increase the tolerance of local inhibitants towards large carnivoures especially snow leopard through the reduction of conflict between wildlife and rural communities of the mountain ecosystem by balancing the monetary needs of the communties. The organisation has the following programs:

- **Snow leopard friendly vaccination program**

  Under the "Snow leopard's Friendly Vaccination Program (SLFVP)", SLF used to vaccinate the livestocks of the local communities. The main aim of such vaccination program is to increase the tolerance of the inhibitants towards snow leopard, make contribution with the local house holds in the form of compensating the diseases cost of livestock. In return the community will bear the wildlife cost. In order to run the process smoothly, the SLF adpoted the bottom-up approach by making the organization and committee of local residents in the form of snow leopard conservation organization (SLCO). Futhermore, under this program the SLF has trained one vaccinator from each community for vaccination and treatement of the said community's livestocks and the process is monitered and evaluated by the SLF at different stages.

- **Snow leopard enterprises**

  This major objective of the Snow leopard Enterprises (SLE) is to involve also the female population of the local community in the conservation process of the wildlife especially the snow loepard. Because most of the household's livestock and natural resources are managed by the female.

  Under this program, the female population of the area is assisted and facilitated through various training and awareness sessions. The "Nepkins" designed and made locally by the females are marketed in the local, national and international markets by the SLF. Hence the foundation is empowering the local community especially the female financially and verbally.

- **Livestock insurance scheme**

  The livestock insurance scheme (LIS) was started on 30 June 2010 with the main aim to compensate the household which has been affected by the predation from the snow leopard on the domestic livestocks. Currently the LIS has been started in one of the communtiy in Chitral but this cummunity is exempted from the vaccination program. Under this scheme, the cummunity members are used to pay initially Rs.150 as membership fee and then Rs. 5 per livestock as insurance premium paid annually. Besides this the SLF has released a grant of Rs.50,000 as a conservation fund for the cummunity deposited in the account of cummunity. In case of predation from snow leopard and lynx on the cummunties' livestock, the affected household in the cummunity

will be compensated but subject to the verification by the SLF officials and the cummunity itself. According to the local staffs of the SLF, since the implementation of the LIS there has been no report and complaint of predation by the cummunity.

1.2 Problem Statement and Research Questions

The snow leopard is a globally endangered species and in Pakistan very little research has been done on it. According to the most recent estimates by George Schaller (1977 cited in Hussain, 2000, p.226), the number of snow leopard in Pakistan is as low as 200 and out of this population, 90 percent is thought to live in northern areas.

Attitude of people have significant impact on the conservation of the natural resources. Previous studies proved that people with negative attitudes for specific wildlife species are more likely to respond to future damage by retributive killing or supporting others (Liu et al, 2010 cited in Rosen 2012) hence contributes to the decline in the population of the species.
Similarly in the Pamir region, the values derived by the local people for snow leopards have been generally mixed (positive and negative). *Positive* in the sense, that according to the traditional beliefs of the people of the Pamir region of Northern Pakistan, herders consider the pasture areas to be a spirit realm known as mergich (Mock, 1998 cited in Hussain, 2002, p.4). This realm is governed by mergichan[1], spirits who are pure beings and help the herders in locating good hunting and grazing areas. But mergichan only help those herders who respect the laws and customs of the mergich. The mergichan often come to the aide of the herders in the shape of an animal of the mergich realm. The most powerful and revered animal of the mergich realm is the pes[2] (snow leopard). And there are negative perceptions about the snow leopard mainly because of its predation of local people.

Endangered species are non-marketable goods and there is a lack of information on their economic value and the mechanism to capture non-market value. Jianjun (2008) described that people tend to ignore the economic value of endangered species or biodiversity conversion, which can be gained by preserving the ecological zone in the long term.

[1] Mergichan (Wakhi word spoken by the ethnic population in the northern Pakistan) means Pari (female supernatural dweller of the high mountains)
[2] Pes is the Wakhi word for the snow leopard

In the world, almost every society make choices for the sake of welfare of their people especially among those alternatives which have most affect on the welfare but in case of developing countries it seems difficult to make trade-off between different things where even the basic necessities of life are difficult to finance. So in the developing countries like Pakistan it is a basic question that whether the local people perceive any benefit from that which is considered as non-essential good, firstly the conservation of endangered species and secondly would the people from such countries are willing to sacrifice other things for the sake of such conservation (Indab, 2008).

The problem cannot be address properly without analyzing the determinants of willingness to pay for the conservation by linking it with the attitude of community in general and household in particular. So, focusing on the snow leopard in Chitral Pakistan, the present study by using the contingent valuation method (both for users and non-users) evaluates the attitude and behavior of the people affecting the willingness to pay for the endangered species.

1.3 Objectives

The overall objective of the study aimed to measure the non-market benefits of the snow leopard conservation in Chitral based on the local resident's preferences and responses to help the policy makers to make better policies through the evaluation of local people's attitude towards snow leopard. The following are the specific objectives of the study:

- To understand the current status of conservation, community awareness and attitude towards snow leopard in Pakistan and especially in Chitral district.
- To quantify determinants of willingness to pay for the conservation of snow leopard.
- To formulate policy recommendations for the conservation of snow leopard in Pakistan.

1.4 Hypothesis

H-1 The more the level of education of the family the more will be the conservation of snow leopard.

H-2 Predation by wildlife especially snow leopard on domestic livestock has low/ less impact on the WTP for conservation of snow leopard.

H-3 Increase in the income from eco-tourism will also increase the conservation of snow leopard.

1.5 Limitation of the Study

It is beyond the scope of the study to evaluate the exact population of the snow leopard, whether it has been increased in number or decreased as a result of conservational activities.

1.6 Expected Contribution of the Study

The study will contribute in the economic valuation of and knowledge about the attitude of the communities towards the snow leopard in Pakistan because no research has been done earlier in Pakistan for the endangered species especially snow leopard from such point of view.

1.7 Deposition of the Study

Following the introduction of the study in chapter 1, chapter 2 discusses the literature review used for the study. Chapter 3 highlights the methodology applied for the study. In chapter 4, the results of the study are presented along with the discussion for the validity of the results. Finally in chapter 5 the summary and conclusion of the study along with the recommendations have been presented for policy implications regarding the conservation of snow leopard in Pakistan.

CHAPTER II

LITERATURE REVIEW

2. Introduction and Theoretical Background

The endangered species conservation imposes both direct and indirect costs. Direct cost is in terms of the activities going to implement and indirect cost is in terms of opportunity cost or income forgone. In developed countries, as the rules and regulations are very strict, many land owners have faced the situation due to the identification of their lands as endangered species host area (under US Endangered species Act of 1973, cited from Indab et al., 2008). In such situation, these people cannot carry on those activities, especially the developmental works, which are going to disturb the habitat of endangered species.

2.1 Literature related to attitude towards wildlife species

Milheiras *et al* (2011) has evaluated the attitudes towards compensation for wolf damage to livestock in Viana do Castelo, North of Portugal. According to them, the policy makers usually uses the compensation scheme as an instrument to reduce the conflicts between the human and wildlife as they are natural competitors of each other for space and food. Their study also focuses on the attitude and perception of the local people (general public, hunters and owners of the livestock) towards the predation of Wolf on the domestic livestock and as a result the payment of compensation. For the purpose of study they selected a total of 87 respondents having the general public of 34, livestock owners 31 and hunters having 22. The study was carried-out in the northwest of Portugal in the Viana do Castelo County. The data was collected using the help of telephone instead of mail survey. The data was collected on the variables as attitude and perception towards the wolf presence in the area, compensation payments and the alternatives to the compensation payments. Using the descriptive statistics, the sample's characteristics were analyzed by giving the following results:

As a whole all the respondents of the survey were agreed moderately that the population of wolf should be maintained in the area but the opinion was varying among different groups i.e. the general public and the hunters showed positive attitude towards the wolf population but the

livestock owners showed negative attitude towards the wolf only if the owner experienced loss from wolf. Regarding the current compensation scheme, a large portion of the respondents were agreed that current compensation scheme should be continued especially the livestock owners mostly favored it but the group of general public disfavored the continuity of compensation payments in the absence of preventive measures by the livestock owners. The results of the alternative to the current compensation scheme showed that majority of the respondents favored the current payment mode instead of payment of the compensation in advance as suggested by a lot of researchers (Nyhus P., et al 2005). But the respondents suggested for making improvement in the delayed payments as noticed in the current payment mode of the compensation in the area. The study showed significant relationship between education and attitude towards wolf conservation.

Espineira *et al* (2009) has discussed the attitude towards wildlife habitat preservation in the management of private woodlots in Cape Breton. The Non-industrial private forest (NIPF) owners are very important factors and stakeholders in the management and preservation of the wildlife habitats. But there are other factors also which are affecting the behavior and attitudes of these private owners like demographic factors, size of the land they owned, income, education, children etc. In order to find out the effect of these variables on the attitude towards the wildlife preservation, they carried out a mail survey of two woodlot associations in Cape Breton and Nova Scotia (Canada) having a sample size of 401 members. Their dependent variable was *"How important is the preservation of wildlife habitat to your management of wood?"* For the modeling purpose they have used "Ordered-Logit model".

Their results showed that income has a positive effect and significant but income squared is significant and has negative impact upon attitude towards the preservation. Similarly, the land owners having small size of lands has positive effect and vice-versa. The study highlighted that demographic factors, income and education are the variables affecting the behavior and attitude of the private woodlots. The results shows that education is weakly significant and income has significantly positive impact upon the attitude towards the habitat preservation.

Jackson *et al* (2003) had investigated the local people's attitude toward wildlife conservation in the Hemis National Park with special reference to the conservation of large predators. The study

has been carried-out in the area of Ladakh, India. According to the authors, there have been more losses in the project area due to wildlife. But the wildlife department has been failed to compensate the affected people even after the interval of two years due budgetary problems. With keeping in view these issues, the Snow leopard Conservancy (SLC) has been working on participatory fashion and coordinating with the other parallel organizations. Now the study focuses on the local people's perceptions and attitude towards wildlife. The study has been carried using primary data through a well-structured questionnaire focusing eleven areas of settlements (108 households) even in the early morning or evening.

The study gives us the following results that in the area 90.7 percent peoples have reported the loss of domestic livestock due to wild predators since passed two years. The villagers have been reported that they had lost their livestock due to different wild predator like snow leopard, wolf, fox, wild dog, and lynx contributing 90.0 percent, 83.3 percent, 45 percent, 18.2 percent, 9.1 percent respectively. While the villagers ranked the species in order of preference and importance of existence value interestingly like Snow leopard, wolf and fox gained vote from people of 75.9 percent, 73.1 percent, 65.7 percent respectively. Among the villagers, 7.4 percent of the people told that they didn't guard their livestock at day time while 31 percent of the villagers interviewed that didn't guard the livestock at night. Among the preventive measures and mitigation strategies of the livestock depredation like depredation hotspot avoidance, compensation and trapping, majority of the respondents replied that the compensation scheme is a best alternative to losses incurred by predation. It has increased their tolerance against wildlife and it should be continued as compared.

Finally, the study concluded that almost 90 percent of the households favored the wildlife as a whole. They preferred the herbivores over the predators but the people liked the lynx more than the Snow leopard and less favored the wolf. According to the local people, the presence of the snow leopard is a sign of healthy environment and it should be protected. Based on the preference of the local people the snow leopard had been ranked on the first among the other carnivores but the people preferred herbivores over the carnivores (predators) because the people reported the loss of domestic livestock due to wild predators.

Spiteri, et al (2008) has focused their study on the evaluating local benefits from conservation in Nepal's Annapurna Conservation Area (ACA). According to them, the protected areas play an important role in the biodiversity conservation but their successful management and their effectiveness depends heavily on the Incentive Based Payments (IBP's) to the people who are the most effected of such programs. Their current study also focused on such kind of payments to the people living in the jurisdiction of Nepal's Annapurna Conservation Area (ACA). In order to carry out the study smoothly they selected a sample size of 188, interviewing the head of the household only. While to capture the regional difference in local perception about the IBPs and to find out the perceived benefits and costs of the conservation, the study area was divided into two main parts: (1) tourist villages (TV), (2) distant villages (DV).

The variables included in the study to analyze results were, in terms of *costs*: livestock and crop losses due to wildlife and reduced access to protected area while in terms of *benefits*: economics opportunities from the protected areas, resources provision through extraction, protection of the locals livelihood by mitigation and demographic characteristics.

Using hierarchical Logistic regression, the study gives the following results i.e. the two categories of villages showed different kind of perceptions regarding the benefits of the tourism. It was high in the tourist villages (TV) than that of distant villages categories (DV). The most important benefits from tourism ranges to social development like construction of toilets, control of garbage, bridges and road construction etc to direct and indirect employment from the tourism. Regarding the cost from the wildlife predation of domestic livestock (DV= 0.9, TV= 0.6) and crop loss (DV= 2.1, TV= 0.9) was experienced more in distant villages (DV) as compared to tourist area (the area lays near or under the jurisdiction of protected area). The study found that the regional variations play an important role in evaluating the perception of the local people regarding the perceived benefits and costs of the conservation.

2.2 Willingness to pay for endangered species

Wallmo *et al* (2012) discussed the public willingness to pay (WTP) for recovering and down-listing threatened and endangered marine species in United States. Using the stated preference choice method they collected the date from almost 8476 household respondents in United States selected randomly in-order to estimate the willingness to pay for the recovery and down-listing

among the 8 species which were endangered and threatened. For the purpose of data collection they used the help of email service, in case of no response from the respondents then the help of telephone was made. Their study's survey has been divided into different sections i.e. first section deals with the information regarding the U.S Endangered Species Act (ESA), the second section deals with the information on the species under study, the third section of the survey focused on the issues and solution related to the management of the species and finally the last section of the survey deals with the choices and preferences of the respondents among different options (Plan 1, 2...So on) having different price tags. For the purpose of comparison, they used meta-analysis. Based on the random parameters Logit model their study gives the following results:

- Regarding the recovery of the species the mean WTP ranges from $40 to and $73.
- Regarding the down-listing of the species the mean WTP ranges from $32 to $42.
- Regarding the comparisons of the WTP among 28 for recovery of the species, 20 were resulted as significant.
- In case of down-listing the species, all of the comparisons of WTP for species were in-significant.
- The recovery of the threatened species WTP was more significant than that of the down-listing of the endangered species.
- The marine mammals (which are charismatic/ magnetic in nature) recovery perceived more benefits than the recovery of fishes.

The environmental commodity in question effects WTP of the people. If the environmental commodity is more charismatic or magnetic in nature then the more will be the WTP for its conservation.

Economy and Environment Program for Southeast Asia (EEPSA, 2008) conducted a region wise survey in order to find out the willingness to pay (WTP) for the five endangered species i.e. Philippine eagle, whale shark, marine turtle, Vietnamese rhinoceros, black-faced spoonbill, in four Southeast Asian countries like China, Philippine, Indonesia, Thailand, etc. The study was conducted (using CVM) in different four countries by dropping-off the questionnaire. In order to analyses the results both parametric procedure (Logit model) and Non-parametric procedure was

used. The study suggests that the WTP to conserve the endangered species is relatively low and the mean WTP is well below a dollar a month. A large number of people were unwilling to pay the amount for species conservation due to the perceptions i.e. “I cannot afford the amount” and “the fund raised would not actually be used for the conservation”.

The willingness to pay for the environmental goods and services depends on the ability to pay, payment vehicles and the detailed description of the commodity in question. The study is helpful in evaluating the socio-economic and other determinants of WTP (categorical variable) through Logit model for the conservation of endangered species especially large carnivores.

Bhat *et al* (2007) discussed the conservation implications of contingent valuation of critically endangered white-rumped vulture in South Asia. By using referendum type questions, they selected 103 households in Nepal to elicit WTP for the conservation of critically endangered White-rumped vulture. By using Logit Regression Model they predict the variables that influence that influence the WTP. The mean and median WTP per house hold were NRs 115.2 and 119.9 respectively and the estimated aggregate vulture conservation benefits at local, district and national level were NRs 125,994, NRs 5,989,882 and NRs 510,117,491 respectively. The factors that significantly influenced the likelihood of household`s WTP were bid amount, age, gender, and conservation attitudes. Likelihood of household`s WTP is significantly influenced factors by bid amount, age, gender, membership of gross root institutions and conservation attitudes.

Veisten *et al* (2004) has discussed the Sequencing and the Adding-up Property in Contingent Valuation of Endangered Species: Are Contingent Non-use Values Economic Values? In March 1992 a survey of 1019 person each representing their households of at Norway was conducted by the Norwegian Gallup Institute (NGI). In order to find out the WTP for four samples of endangered species, they used the contingent valuation method (CVM) having open-ended elicitation type questionnaires. The main purpose of the study was to find out the validity of the Contingent valuation method (CVM) in case of environmental goods having the non-use values by changing the sequences of samples to the respondents. During their study, they also changed the sequence of the species and find out that as compared to valuation of the species in two different built-up sequences, the direct valuation of all the species in forest showed almost same

WTP. Finally, they succeeded in finding the affect of adding up property by the use of contingent valuation data. The adding-up property in contingent valuation has the effect on the WTP for endangered species while the direct valuation of all species almost be the same.

2.3 Biodiversity Issues, Conservation and Management: Pakistan's Context

Shah (2011a) has discussed the biodiversity management laws and practices in Pakistan. He investigated that biodiversity issues are often complex and controversial. The concept of biodiversity management has a long history and in recent years it has been developed on the large scale throughput the world. Pakistan has made serious efforts for the conservation of biodiversity i.e. environmental policies, legislation, and institutional setup but the implementation of these are not fruitful. Finally, he suggests that the gaps and needs associated to the biodiversity management can be dealt effectively through coordination of different segments of society for the effectual management strategies and the optimal portfolio may combine state and private actions. In Pakistan there is a good paper work on the biodiversity management and laws but the problem is the lack of "theory into practice". The sharing of responsibilities and coordination among the different concerned stakeholders is the optimum portfolio.

Shah (2011b) has critically evaluated the conservation of endangered species in Khyber Pakhtun khwa. The province of Khyber Paktunkhwa (KPK) is a God gifted having rich natural resources, where one can find each and every kind of flora and fauna. The province supports the xerophytes vegetation in the lowest elevation like Dera Ismail Khan whereas at the highest elevation (Terichmir) one can find unique kind of species i.e. musk dear, snow leopard, ibex, brown and black bear etc. Regarding the organization of the activities (conservation, preservation, protection and management) the Act of 1975 is followed. In order to carry-out the activities smoothly, the province has been divided into two major circles, i.e. *Southern Wildlife Circle* which consists of 8 divisions of wildlife i.e. Kohat, Peshawar etc and *Northern Wildlife Circle* which constitute seven wildlife divisions i.e. Chitral, Chitral Gol National Park etc.

At last, the most important initiatives of the Government of KPK ranges from the establishment of protected areas, Bear centre, trophy hunting programs to community participation, conservational education and human resource development of the wildlife staffs. One of the

positive aspects of Khyber Pakhtunkhwa wildlife Act (1975) is the promotion of community participation through Village Conservation Committees (VCC).

The ministry of Environment, Government of Pakistan (GOP) (2008) formulated a strategic plan in February for the snow leopard conservation in Pakistan. The plan reports that it's an endangered species found almost in the 12 countries of Asian Continent. The population of the snow leopard itself and especially its primary prey species is under stress. Although several efforts have been made in the Pakistan to protect the species itself, its habitat and its primary prey but in-order to strengthened these current practices and to evaluate and solve the underlying problems which the Snow leopard face in its ecology the ministry of Environment developed a Strategic Plan for the proper conservation of snow leopard in Pakistan having a lot of stakeholders like WWF Pakistan, Provincial departments and especially the International Snow leopard trust (ISLT), USA.

In the strategic plan, the emphasis was given on:

- ✓ The proper care and conservation of the snow leopard from every kind of actions which (either direct or in-direct) have a negative effects.
- ✓ Protection of the prey species of the snow leopard
- ✓ To achieve the objectives of the strategic plan through proper and proposed actions.

These actions are the linkage development with other public and private organizations, who are interested in the conservation of snow leopard, controlling the poaching and killing of snow leopard, protecting the primary prey of snow leopard, capacity building of the wildlife staffs, awareness sessions among the people, encouragement of the research in the field of snow leopard conservation and last but not the least important the intervention of community based conservation of the specie. There have been certain efforts in Pakistan that are still continued to conserve relatively small population of the snow leopard, its prey species and habitat. These initiatives, though valid for all practical reasons, do need further support to strengthen them and bring at far with the magnitude of the problems that snow leopard face.

Israr *et al* (2004) have reviewed the eco-tourism in the northern Pakistan and challenges perspective of the stakeholders. In the northern areas of Pakistan, there is a lot of potential and

opportunities of eco-tourism because it is a major source of income for the most of local people. They evaluated the potentials and problems faced by the stakeholders regarding the eco-tourism activities. For this purpose they focused their study on three villages of Hunza valley namely Passu, Ghulkin, Shimshal because it's a hot-spot for the tourists and about 100 percent of the population are tour operators, which is major source of income for the locals. For the study purpose they selected a sample size of 10, 12 and 48 for the three villages of the Hunza Valley respectively having three stakeholders like tourists, tour operators and the tour guides.

Finally they concluded that regarding the existing policies for the promotion of eco-tourism, most of the respondents were un-satisfied from the interventions of the Government. According to the respondents that most of the tourists visit the area due to the beauty, culture, Karakoram highway, glaciers etc. They also answered that the role of Non-Government Organizations (NGOs) are some-how satisfactory. At last, the main hurdles in the way of eco-tourism are the poor infrastructure, security problems, extremism and flight delays due to extreme weather.

Biodiversity Action Plan (BAP) (2000) has been developed by the Government of Pakistan, in which the key issues related to the biodiversity in Pakistan have been discussed. The main issue related to the biodiversity is the loss of species. There are many factors involved i.e.

- Direct factors include deforestation, over-grazing, soil erosion etc.
- Indirect factors include increasing population, market failure, high discount rate etc.

Keeping in view these issues and problems, the government of Pakistan in 2000 has formulated a framework for the conservation of the natural resources. The Biodiversity Action Plan (BAP) of Pakistan has first highlighted the importance of biodiversity by saying that the richness of biodiversity encourages the natural selection and the adaptability to environmental change hence ensures the survival of the species. Furthermore, it also acts a life support system for the humans as well as for other species. By keeping in view the importance of the biodiversity, in 1994 Pakistan has become the signatory and has rectified the Convention on Biological Diversity (CBD). Hence the Biodiversity Action Plan (BAP) is an attempt to meet the requirements and agenda of the Convention on Biological Diversity (CBD).

Under Global Environmental Facility (GEF), the Biodiversity Action Plan (BAP) has been prepared and carried out through the mutual agreement of the World Bank and Government of Pakistan. There are 13 components Biodiversity Action Plan (BAP) which ranges from the planning, policies to environmental education and community awareness having specific objectives and actions for each of the components. The main issue related to the biodiversity is the loss of species due to mainly by the market failure (direct factor) associated with the environmental good and increasing population (indirect factor).

2.4 Literature on snow leopard's status and its conservation

Simms *et al* (2011) has evaluated saving threatened species in Afghanistan: Snow leopards in Wakhan Corridor. They have discussed the conservation scenario in the Wakhan corridor of Afghanistan lies between Pakistan and Tajikistan. The area is rich in biodiversity and habitat to a lot of wildlife especially the endangered snow leopard. The authors have declared the 2006 as base year, by saying that before 2006 the illegal killing and depredation of the domestic livestock have been continuously reported from the area. In Afghanistan which is a conflict zone due to war on terrorism and law enforcements are rare, were adding to the loss of the species. There is other factors also involved accelerating the population loss of snow leopard i.e. fur trade, live snow leopard capturing for private collection, retaliatory killing, lack of awareness among the people, education and governance problems.

According to the authors, the scenario has been changed after 2006 with the introduction of Wildlife Conservation Society (WCS) in the study area. The first stage in an effort for saving the endangered species was the camera trapping survey in-order to find-out the sings and presence of the snow leopard in the project area. Then for the sustainability of the project a number of initiatives have been taken like (1) *Governance and Protection*: for the said purpose village committee with the assistance from WCS had been formed in-order to empower the community by taking the committee on-board. (2) *Education and Awareness program*: by making youth clubs at school level under Environmental Education Program. (3) *Predation Mitigation*: with the construction of innovated corrals or pens and with the introduction of insurance scheme. (4) *Research* (5) *Handicrafts training*. Finally, the authors hope and believe that the current initiatives can save the Snow leopard in the longer term and sustainability in the natural resource

management along with opening new doors and opportunities for the local people in Afghanistan.

Din and Nawaz (2011) analyzed the human-snow leopard interaction, its status and more especially the primary prey species of snow leopard. The study has been conducted in the Torkhow valley of Chitral District, KPK. Furthermore, the valley had been divided into three areas named as Shah Junali, Ujnu and Ziwar Gole. Through SLIMS (Snow leopard Information Management System) method the study presents the following findings.

In the study area, the snow leopard's population was estimated to be 2-3 over an area of 1022 km^2. When extrapolating the findings to the entire District, the snow leopard's population was counted as 36 animals. During the period extended from 2001 to 2008, almost 102 households were found to be affected by 136 cases of predation. They also suggested that the snow leopard's primary prey species is the Himalayan Ibex. The main hurdles in the way of snow leopard's conservation are: poaching, lack of environmental education, poising, illegal killing of primary prey etc.

Khatoon (2010) has studied the diet selection of snow leopard (Uncia uncia) in Chitral Area. In order to support her study she gives the references of other studies by saying that according to one of the study in 1975, Kleiber by his mass-energy equation find out the energy/food requirement of the adult snow leopard which is almost 3000-4000 kcal /kg of its body weight/ day. Further she says that although it is a difficult task to do but it is very important to have the knowledge of the diet selection of the predators because one can easily understand the ecology of the predators and can predicts the influence of snow leopard upon the prey's population. The major aim of the study was to conserve the snow leopard by knowing its food habits.

In order to carry-out her study, she used the hairs/ furs in 65 scats of the snow leopard which have been collected from different sites in the area of Chitral district. The study used the chi-square test in order to test the null hypothesis.

The results of her study showed that the diet selection of the snow leopard constitute 10.4 percent of Wild ungulates, 26.4 percent of domestic livestock, 33.6 percent of meso-mammals and 28.8 percent of small mammals. Her study also suggested that there exist seasonal variation

in the diet selection of snow leopard. In summer season, the wild ungulates constitute 10.89 percent, domestic livestock 30.86 percent, meso-mammals 45.3 percent and the small mammals having 10.8 percent respectively. While in winter season, the wild ungulates having 11.7 percent, domestic livestock is 20.1 percent, meso-mammals 33.4 percent and small mammals 10.86 percent with a Chi-square of 0.05, 5.7, 4.2, and 13.9 respectively in both seasons. The study concluded with the following remarks that there exists seasonal variation in the diet selection of the snow leopard having varied food habits while the domestic livestock constitute a significant part of its diet. Due to the decline in wild prey, snow leopard predates on the domestic livestocks which lead to increased conflicts between snow leopard and locals. Livestock predation is a major challenge for management and conservation of snow leopard and magnitude of this issue depends on availability of prey species.

Nyhus *et al* (2005) have reviewed the bearing the costs of human-wildlife conflict: The challenges of compensation schemes. According to them, the problem of human-wildlife conflict is increasing in the whole world. Most of these killings by the local farmers and herders are as a result from the damages incurred by the wildlife in the form of animal loss, crops damages and the loss of human life. Their study focuses almost the whole world. According to them, the conflict gap between the humans and wildlife can be reduced by the compensation programs. But the dilemma is that there are some problems and issues related to such programs.

First, the main issue is the *verification of the damages* incurred by the wildlife. Sometimes the loss is overstated and sometimes the understatement of the losses because the research shows that in Namibia the loss incurred by the domestic livestock is higher than any other animals. The second main issue is the *loss of human life.* But it is difficult and immoral to put value on human life. Despite this, in Zimbabwe each out of 21 victim families in 2001 were compensated Z$ 15,000. Finally, they suggested alternatives to the compensations in order to avoid the un-intended effects like the increase of agricultural frontiers i.e. (1) Insurance scheme through participatory approach as successfully running in Pakistan for the conservation of snow leopard (2) Performance payments.

Thapa (2005) in its a report to International Snow leopard Trust (ISLT) has tried to find out the correlation between abundance of blue sheep population and livestock depredation by snow

leopards in the Phu Valley, Annapurna Conservation Area. The people of the area are poor and depend on the agriculture, livestock and natural resources for its livelihood but unfortunately the area has witness the loss of domestic livestock due to snow leopard predation even in the presence of primary prey. Keeping in view the scenario, the study has aims at finding the main causes of the livestock loss even with the presence of primary prey i.e. blue sheep. The study has used two methods to carry on the research:

- Direct Method: using second order through Snow leopard Information Management System (SLIMS)
- Indirect Method: feces, claw marks etc
- Converting the Phu village into three Blocks i.e. Ghyo, Ngoru, Phu

The study identifies the following results, as a whole the Phu village experienced loss of 1.8 livestock per household on average due to snow leopard but most of these losses have been witnessed during winter in fact due to poorer guarding. Among the blocks the Ghyo block experienced highest number of livestock losses while Ngoru at lowest.
The population of the blue sheep area was counted as 1209 but in the Ghyo block its population was very low as compared to other blocks. This low population of the blue sheep in the Ghyo block may be due to the on-going grazing patterns in the area.

Again in the Ghyo block there were remarkable signs of the Snow leopard which indicates that the area having high snow leopard sings have high predation of animals but it may not be true at all because there are other factors also like seasonal variation, the quality of habitat, the mitigation practices for livestock, grazing patterns and especially the Ghyo block is basically the broken terrain and having rocky outcrops.

The study concludes that there exist positive correlation among the abundance of blue sheep, snow leopard and the depredation of livestock in the area. But in the area, the main drivers of the livestock loss due to snow leopard are the herding and grazing pattern as the snow leopard is an opportunistic animal. Grazing patterns, herding and the seasonal/ demographic variations across the region are the factors affecting the livestock depredation by the snow leopard even in the presence and abundance of primary prey of snow leopard.

Jackson *et al* (2004) has followed *a* community-based approach to mitigating livestock depredation by snow leopards. According to the authors, it is well known that the depredation of livestock due to snow leopard has been commonly noticed around the world and India is not a special case. But all of these losses are due to the failure of the conventional system of conservation adopted by the policy makers, absence of mitigation practices and at last but not the least important is the lack of empowerment of local people through community based approaches like "*Appreciative Participatory Planning And Action" (APPA).* The authors described the situation of a Hemis National Park in Ladakh, India. They gave a complete picture of snow leopard in India. According to them usually the local people reported the attack of the species but there are factors involved which are accelerating such attacks i.e. destructed pens, overgrazing, lacking of watch-dogs and lax guarding hence results in killing and poaching of snow leopard. There are other factors also affecting the population of the species like natural accidents, feeding of the poisonous plants in their habitats and the occurrence of diseases especially.

Keeping in view these things, the paper emphasizes on the alleviation of human-snow leopard tension in the Hemis National park. In order to carry out the work smoothly and effectively, they used the participatory approach (Appreciative Participatory Planning and Action) as a tool. Such type of tools like Participatory Rural Appraisal (PRA) is based on the usage of the strengths of the community through four-step process i.e. Discovering, Dreaming, Designing and Delivering. This strategy of 4-D's process has also been adopted by the management of the National Park. These intervention impacts in mitigation of the predation of the Snow leopard on the domestic livestock, reduction in the rate of poaching and retaliatory killing of the species, enough time for the villages available for productive uses as time lost due to looking-after the livestock at night as a guard. Furthermore, for the purpose of income-enhancement and livelihood of the villagers they have been given training in the field of hotelling, guide, hygiene and handicrafts. These strategies have reduced the burden of economics loss by the mitigation practices and side-by-side improved the livelihood of the villagers through capacity building. Income-enhancing initiatives through ecotourism activities can increase the tolerance towards snow leopard.

Hussain (2000) has analyzed the status of snow leopard in the Northern Areas. Livelihood of most of the people in the Northern Areas depends on the natural resources and livestock keeping. According to him, the protection of snow leopard is not an easy task because it attacks the

livestock of the people. Hence the attitude of the local people gets negative due to the predatory nature of snow leopard. He further suggests solution for the protection of snow leopard based on the community-based conservation. If the livelihoods of the local people are enhanced then the conservation of snow leopard could be made possible. He presents the Project Snow Leopard (PSL) as an example, an initiative taken in Baltistan, which compensates the local people through insurance schemes. Under this project, the local people pay the premium on per head of livestock. While through the ecotourism activities further funds are provided to benefit the locals. This scheme is managed jointly by the head of village forum and manger of the Project Snow Leopard (PSL). According to him, if the livelihood of the people is enhanced then the conservation of snow leopard through such schemes could be made sustainable.

Conclusion:

Snow leopard is an endangered species around the world and Pakistan is no more a special case. Number of studies has been conducted by different researchers as indicated in the review, each used different methodologies and variables. But in Pakistan, no research has been done earlier on determinants of WTP for the conservation of snow leopard. So, this study would find out those factors that are affecting the conservation of snow leopard in different ways hence will help the policy makers to formulate policies accordingly for the snow leopard's conservation.

CHAPTER III

METHODOLOGY

The study had been carried out in District Chitral of Khyber Pakhtunkhwa (KPK) province during September-October 2012, in order to achieve the overall and specific objectives of the study. Hence, an econometric model (Binominal logistic model) has been formulated because of ordinal responses based on the willingness to pay (WTP) for the conservation of snow leopard using contingent valuation method (CVM). The study was based on the primary data, collected with the help of well structured questionnaire which had been divided into sections based on the requirement and need of information and variables specification. Furthermore, the coding-decoding procedure was applied to make the data and study quantitative. Finally, the Participatory Reflection and Action (PRA) tools and techniques were used through informal survey for the authentication of the results obtained with the help of formal survey.

The methodology used for the study has been divided into following categories:

i. Theoretical / Conceptual Frame work
ii. Survey Methodology
iii. Techniques and Model Specification

3.1 Conceptual Framework of the Study

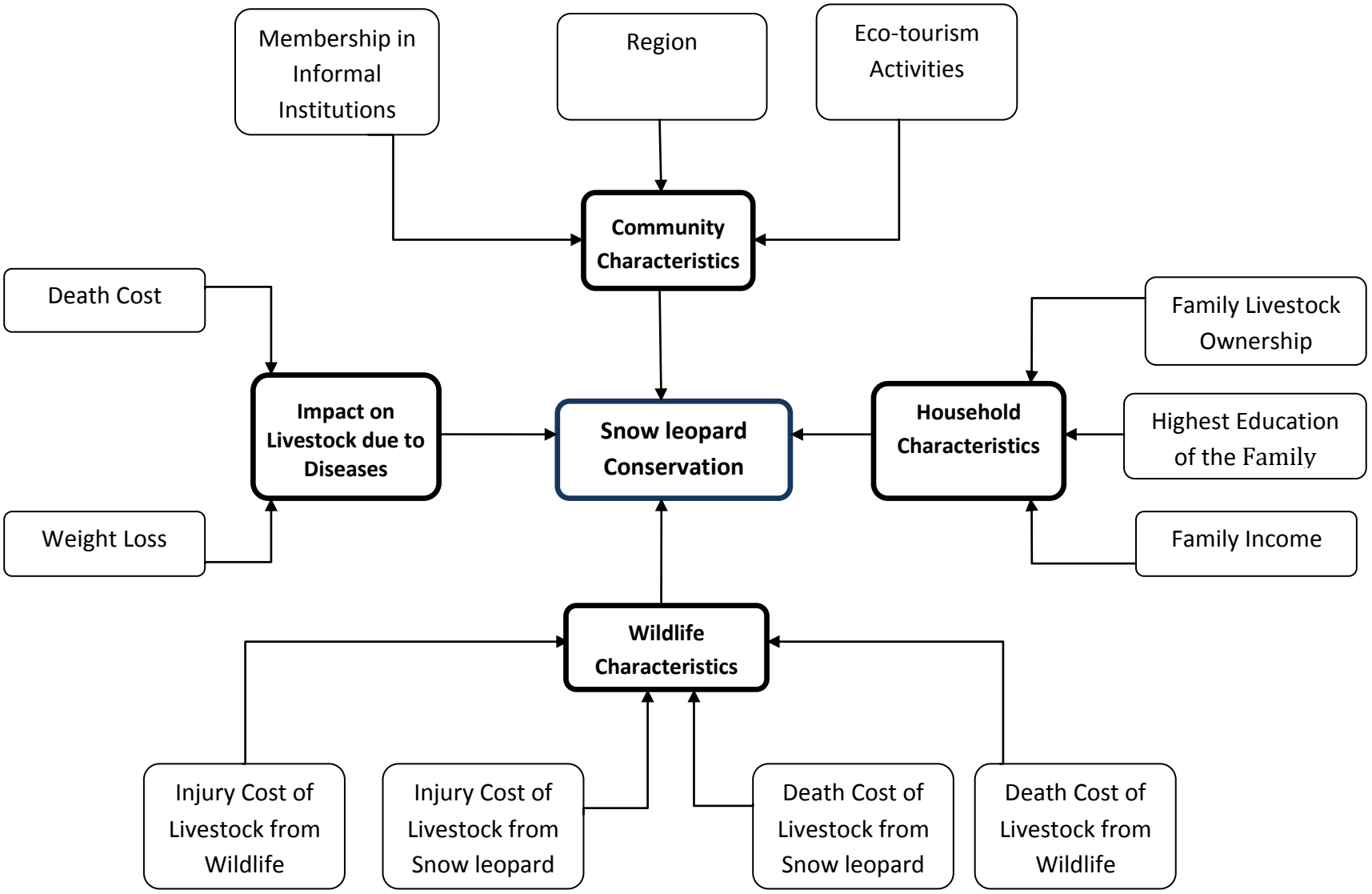
The conceptual framework presented here provides a clear vision about the aims of the study. Below are the variables that are supposed to effect the conservation of snow leopard from different directions.

The variables have been categorized into household characteristics, community characteristics, wildlife characteristics and impact on livestock due to diseases. Selections of these variables are based on the area's context and socio-economic status after consultation with Snow Leopard Foundation's (SLF) staffs. There is not enough literature available on the factors affecting the conservation of snow leopard especially in Pakistan. Household characteristics include family livestock ownership, highest education of the family and family income. It has been observed that livestock owned by a family will have an impact on the decision making of that family with

respect to the conservation of snow leopard especially in case of rural areas. Highest education of the family is another variable in this context. More educated (formal education) person in a family will have more concerns for natural environment hence affects the decision making of the family accordingly. Similarly if a family has poor economic condition and any credit constraint then their current income will influence the family's willingness to pay (WTP) for the conservation of snow leopard (Hellquist, 2004). Community characteristic includes membership in informal institution, region and eco-tourism activities. The informal institutions are highly influencing the decision making of local communities as mover and shaker. Similarly the conservation of natural environment especially snow leopard can be made possible through these informal institutions. So, it had been assumed that households having active participation in informal institution will show positive attitude towards conservation of snow leopard. Regional variations also play an important role in the conservational process. The people residing in the jurisdiction of conservational area have more positive attitude towards conservation than those people living in the non-conservational area. The conservational activities create awareness among the people, hence enhancing the willingness to pay (WTP) for the conservation of snow leopard and vice-versa. Eco-tourism activity is another important factor of snow leopard's conservation. Due to the monetary reward and benefit from eco-tourism activities, people are more willing to pay for the conservation of snow leopard.

Injury cost of livestock from wildlife, injury cost of livestock from snow leopard, death cost of livestock from snow leopard and death cost of livestock from wildlife are the variables come under wildlife characteristics. If there are more injury and death costs from wildlife, there will be low chances of snow leopard's conservation, especially if the cost is directly by snow leopard. Impact on livestock by diseases is another important factor in this regard. Weight loss and death cost are the two types of impact by diseases on livestocks. Those households suffering by costs from diseases are more likely to conserve snow leopard as compared to those bearing the cost by wildlife and snow leopard.

3.1 Conceptual Framework



3.2 Survey Methodology

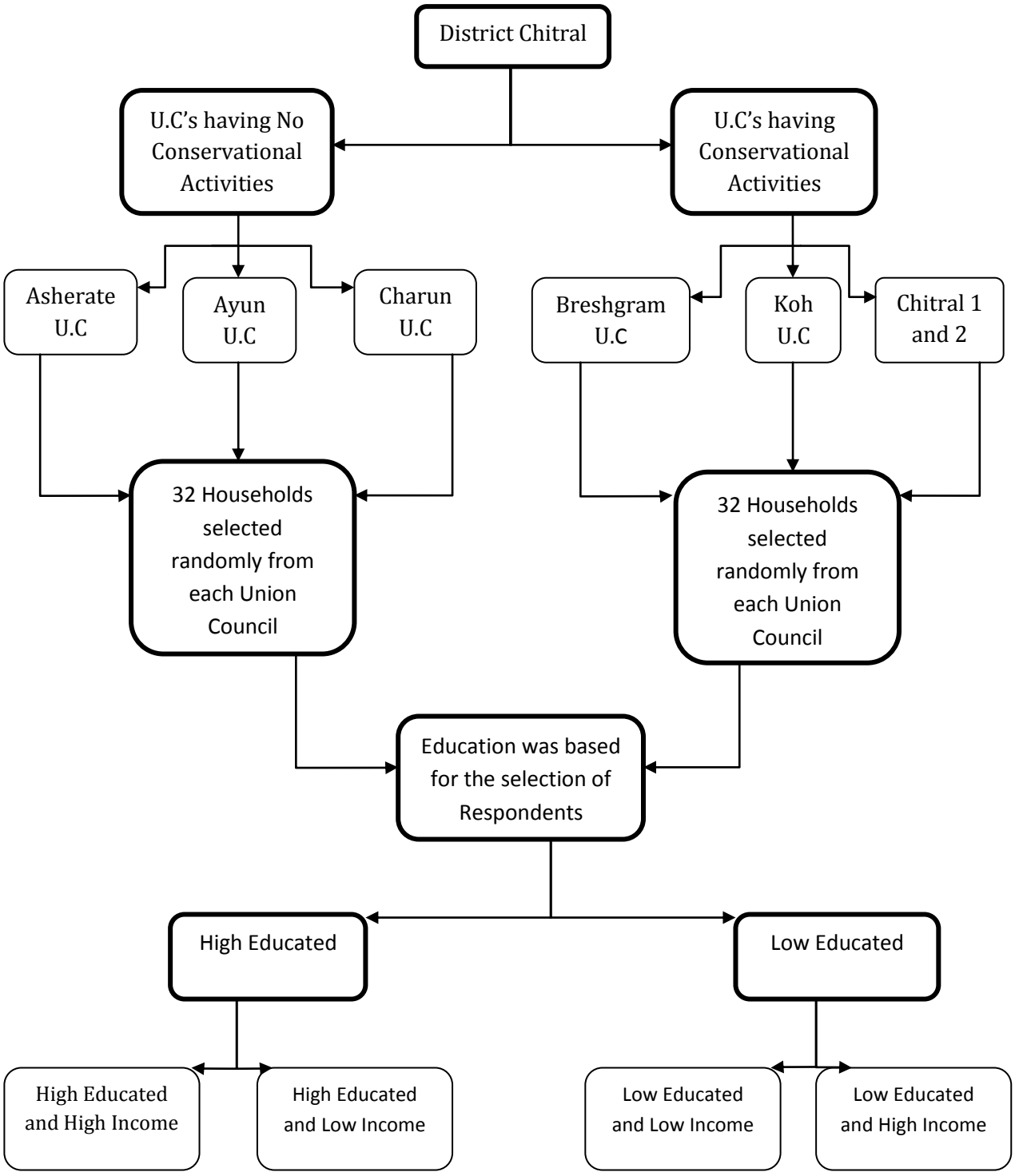
In order to conduct the survey both probabilistic and non-probabilistic sampling techniques were adopted. For probabilistic sampling, stratified random sampling technique was used, whereas for non-probalilistic technique focus group discussion (FDG) and key informant survey (KIS) were used. The detail discussion is as follow:

3.2.1 Probabilistic Method

Stratified random sampling technique was adopted for the selection of the sample unit in case of heterogeneous population. District Chitral was selected because according to George Schaller (1977 cited in Hussain, 2000, p.266), in Pakistan the number of snow leopard is as low as 200 and 90percent is thought to live in Northern areas out of this population. Out of 24 union councils (U.C's), only 6 union councils were selected randomly. According to the local staffs of Snow leopard Foundation (SLF) all of the 6 union councils (U.C's) show the mobility of the snow leopard. But the difference is that among the six union councils there have been no conservational activities in the first three U.C's (named as group A) and the remaining three U.C's (named as group B) have the conservational activities either by the Government or other agencies. From each union council at least 32 households were randomly selected.

The sample size used for the study is 196 with a confidence interval of 10 and confidence level of 90percent. Furthermore, according to the District Census Report (DCR, 1998), the total population of the Chitral district is 318,689. While the population of Asherate U.C, Ayun, Charun, Breshgram, Koh and Chitral 1and 2 (Chitral Municipal Committee) is 16162, 16028, 16297, 19189, 21242 and 30622 respectively with the total of 119,540. Below is the chart showing stratified random sampling technique used for the study (Fig 3.2.1).

Fig 3.2.1 Fig 3.2.1 Stratified random sampling technique



Stratified random sampling size formula

Stratified random sampling also sometimes called proportional or quota random sampling, involves dividing the population into homogeneous subgroups and then taking a simple random sample from each subgroup.

Divide the population of N units into non-overlapping sub groups (i.e., strata), such that the h_{t_h}stratum consists of $N_h$units, where h = 1,2,....,L and also $\sum_{h=1}^{L} N_h$=N. Then do a simple random sampling technique for selecting a sample.

The population mean of h^{th} stratum is given by ;

$$\bar{Y}_h = \frac{1}{N_h} \sum_{i=1}^{N_h} Y_{hi} \qquad \text{for} \quad i = 1,2,.....L$$

Where N_h is the population size of h^{th} stratum.

The sample mean of h^{th} stratum is;

$$\bar{y}_h = \frac{1}{n_h} \sum_{i=1}^{n_h} y_{hi}$$

The unbiased estimators of population mean Y is given by;

$$\bar{y}_{Strat} = \sum_{h=1}^{L} W_h \ \bar{y}_h$$

Under SRSWOR sampling, the variance of the estimator $\bar{Y}_{Strat}$ is given by;

$$Var\ (\bar{y}_{\text{Strat}}) = \sum_{h=1}^{L} {W^2}_h \ \frac{(1-f_h)}{n_h} \ {S^2}_{hy}$$

Where;

$${S^2}_{hy} = \frac{1}{N_h - 1} \sum_{i=1}^{N_h} (Y_{hi} \ - \ \bar{Y}_h)^2$$

and $f_h = \frac{n_h}{N_h}$ is the correction factor for the h^{th} stratum.

The (1 - α) 100 % C.I is given by;

$$\bar{y}_{Strat} \pm t^{\propto}/_{2}\ (\text{d.f} = n\text{- L})\ \sqrt{Var\ (\bar{y}_{\text{Strat}})}$$

Where d.f is the difference between the numbers of observations (*n*) and the number of parameters (L = no. of Strata).

It follows from inspection of the formula that stratified random sampling is preferable to simple random sampling, if the strata are relatively compact and well separated from each other, so that the $S^2{}_h$ are smaller than S^2. On the other hand if the strata are defined so that the $S^2{}_h$'s are larger than S^2 , the variance will be larger than for simple sampling. This, however, is an extreme and highly hypothetical situation. In practice though it is frequently seen that the differences between strata are marginal, implies that $S^2{}_h$'s are not much smaller than S^2 , so that the efficiency gain from stratification is only marginal.

3.2.2 Non- probabilistic Method

In order to evaluate the knowledge and attitude of the people in the study area, qualitative analysis had been considered and focus group discussion (FGD) is one of these qualitative tools and techniques which are basically used for the conformation of results obtained through qualitative type of formal surveys (Gulzar, 2012). Hence, in the study a few families (living in the area from past a minimum of 50 years) had been targeted for FGD both from conservative and non-conservative areas.

While to evaluate the personal views of the people key informant survey (KIS) was used. Such kind of information had been collected from different people having rich knowledge about the ongoing conservation activities in the area and especially about the snow leopard.

3.2.3 Contingent valuation method

Estimating the non-market benefits from endangered species conservation is not easy, given the market failure associated with the public good (Hussain, 2009). Consequently, economists have been addressing the questions concerning the economic value of non-market goods or services using different approaches. These may be divided into revealed and stated preference methods.

Revealed preference methods, also known as indirect methods, infer the value of associated non-market goods and services by studying actual (revealed) behaviors on an actually observed market. Typical examples of revealed preference methods are travel cost method (TCM) and hedonic price method (HPM) (Braden et al., 1991). Since the revealed preference methods require observable market data to make inferences about non-market values, it is hard to apply them to measure adequately the non-use or intangible values of endangered species conservation (Cooper, 1994; Stevens et al., 2000; Bateman et al., 2002).

Stated preference methods, also known as direct methods, assess the value of non-market goods and services by using individuals' stated behaviors in a hypothetical setting. The most widely used stated preference methods is the contingent valuation method (CVM). This study is interested in assessing the value of endangered species conservation to the public measured in terms of whether people would be willing to pay for the endangered species conservation.

The contingent valuation method (CVM) (Mitchell and Carson, 1989) is a survey approach that involves developing a hypothetical market or referendum, which an individual uses to reveal or state his or her WTP for the protection of a specific species in a particular location (Loomis and White, 1996). It was originally proposed by Ciriacy-Wantrup in 1947; however, Davis (1963) was the first to use the CVM empirically, when he estimated the benefits of goose hunting through a survey among goose hunters. This method gained popularity because it is the only approach that estimates the total economic benefits of environment amenity for both the users and nonusers (Amirnejad et al., 2005). Over the past two decades, the use of CVM for measuring WTP for social projects has been well accepted and widely used in many different circumstances in developing countries (Tapvong and Kruavan, 1999).

The dichotomous choice method, which seeks simple 'yes' or 'no' answers to an offered bid, is generally preferred to other methods (e.g., open-ended method) because it most closely approximates the "take it or leave it" nature of most market transactions (Indab et.al, 2008).

3.2.3.1 Effects of payment vehicles on willingness to pay (WTP)

A number of studies in developed countries found evidence that the payment vehicle influences WTP for public goods (Rowe et al. 1980, Brookshire et al. 1983). However, there have been mixed findings on which payment vehicle, voluntary or mandatory, is best suited in CV

applications. Some studies have shown that mandatory tax is more incentive compatible than voluntary contributions or donations. The latter, though widely used and may be the only way to generate financing for some type of goods (Berrens et al. 2002, Champ et al. 1997), is considered prone to strategic overbidding as a result of warm glow and free riding. However, Ledyard (1995), in his review of this issue, concluded that although voluntary contribution mechanism is not incentive compatible, empirical evidence has consistently shown that pure free-riding occurs far less frequently than what expected utility theory predicts.

Methods have also been devised to correct for the hypothetical bias inherent in voluntary mechanisms. In an experimental context, Murphy et al. (2005) used the voluntary contribution scheme with an added feature that included a provision point mechanism (PPM) with a money-back guarantee (MBG). His results show that PPM with MBG can reduce hypothetical bias.

The current study also used the voluntary mechanism because the study area is "Tax free Zone" as declared by the Government and the local inhabitants are often reluctant from the term tax.

3.2.3.2 Hypothetical scenario

The survey was conducted using a well structured questionnaire which is usually pre-tested. The contingent valuation method was adopted for the survey (EEPSA, 2008). During the survey a hypothetical scenario was presented to the respondents regarding the proposed conservational program in the area which helped the study to evaluate the attitude of the people regarding the conservation of the endangered species. On the basis of such scenario, the respondents were able to vote for and against the conservation program at a particular price provision. A lot of time was spent for structuring such hypothetical scenario and for the generation of survey instruments with the consultation from the experts to better capture the value of snow leopard conservation.

Scenario: Snow leopard Conservation Program

"The snow leopard conservation program means that your household would pay a fixed amount voluntarily every month for few years. This amount will go to the *Snow leopard Fund* to finance the conservation program.

Under this program your livestock will be insured via the *Insurance scheme***.** Through the *Snow leopard enterprise,* trainings will be given especially to the household's female in-order to produce best quality of local products; your family income will also increase. Finally, under the *Snow leopard tourism program*, there will be tourism activities in your area which will help to increase your income also. So, would you like to vote for the conservation program?"

In the proposed scenario, the respondents were informed about their expenditures and the benefits in terms of the conservation program to extract a true willingness to pay (WTP).

3.2.3.3 Colored photographs effect on willingness to pay (WTP)

Le Grange (2000) had highlighted the importance of the use of communication devices and visual aid in the contingent valuation studies because it's a significant factor and provides a level of information results in affecting the respondent's valuation of the commodity in question. According to Labao et.al (2008), the colored photographs are value enhancing and have significant impact upon the willingness to pay (WTP) of the respondents for environmental commodity. In order to make familiarity of the respondents with the proposed endangered species in Chitral like wolf, lynx and brown bear and especially of the subject specie (snow leopard), they were showed the colored photos of these species.

3.2.3.4 Questionnaire design and structure

A well and properly designed questionnaire is a key and significant element in the studies of contingent valuation method (CVM). By using such instrument one can be able to get the required information in a formal way (Bateman et al, 2002).

In the first step, to identify the potential problems regarding the structure and design of the questionnaire a pre-test survey was conducted from the different respondents from different areas. The results of the pre-test survey provided feedback and useful indicators in the context of the area. Then the questionnaire was revised based on the results of and the observations made during the pre-testing. The survey was self-administered and it was decided that the household head would only be the respondent because of his/ her responsibility as the in charge of the family itself and the day-to-day expenses of the family

The questionnaire was structured using single-bounded dichotomous choice with follow-up questions of open-ended and debriefing questions as the end of the questionnaire after communicating successfully the scenario. The main purpose of the debriefing was to evaluate whether the respondent is stating the protest bid or his true valuation about the species. The questionnaire has been divided into different sections:

The section 1 contains question related to the "*problems faced by the country*". The main purpose of this section is to involve the respondent in thinking about the social and public priorities and to choose among the alternatives. Hence to assess the priorities of the people regarding the problems face by them those are general and common in nature.

Section 2 contains question related to the *"attitude towards conservation and awareness about the snow leopard"*. This section aims to evaluate the attitudinal behavior of the respondent towards the conservation of endangered species in general and Snow leopard in specific, knowledge about Snow leopard and familiarity with snow leopard.

Section 3 presents a *"conservation plan for the Snow leopard"*. For the protection of snow leopard's existence, this section presents a conservational plan for the respondents through willingness to pay (WTP) questions. In order to find out the true willingness to pay (WTP) for the conservation of the snow leopard, the respondents were asked that how much they would be willing to pay for the conservation program as an *individual house hold*? They were further asked that how much they would like to pay when the *whole (100 percent)* village, *half (50 percent)* of the village and *25 percent* of the village showed their willingness to pay in favor of the program and decided to join the conservation program? Whether they will bring any change (increase or decrease) in the amount stated (initially/ earlier as an individual house-hold) with the changes in the pattern i.e. whole village, half village and so on. Finally, section 4 helped to find out the "*socio-economic status"* of the respondents.

3.3 Techniques and Model Specification

The following section discusses the choice of regression technique, model specification and variables specification needed for the study. Due to special estimation problems associated with linear probability models, the logistic regression model had been used because it is simply a non-

linear transformation of the linear regression. The Logit distribution constrains the estimated probabilities to lie between 0 and 1. While in the variable specification, those variables have been discussed that are supposed to affect the WTP for the conservation of snow leopard.

3.3.1 Linearity test and choice of regression technique

As long as dependent variable remains quantitative, the independent variables or regressors can be quantitative or qualitative (taking value 1 or 0). But what happens when dependent variable itself is qualitative or dummy variable, taking value 1 for occurrence and 0 otherwise. The answer is that there are certain types of regression models in which dependent variable are dichotomous in nature, taking a 1 or 0 values. For example; in this study we want to study the determinants of willingness to pay (WTP) for the conservation of snow leopard as a function of membership in gross root institution (MGI), family income (FI), highest education of the family in years. (HEF) etc. a respondent is either willing to conserve the snow leopard or not.

Hence, the dependent variable, willingness to pay (WTP) is a dummy variable and can take only two values: 1 if the Household is willing to pay and 0 if not willing to pay (EEPSA, 2008).

A unique feature of the model mentioned above is that the dependent variable is of the type which elicits a yes or no response. If we use a typical linear regression model, it will be called linear probability model because the dependent variable is dummy variable and we are interested in finding out the probability of occurrence and the probability that the event will not occur. There is special estimation problems associated with such models. This type of model is estimated and it is found that there are certain problems associated with the estimation of linear probability models such as:

- The disturbances are not normal and violate the assumption of linearity
- Heteroscedastic variance of the disturbances
- Non fulfillment of $0 \leq E(M \mid Xij) \leq 1$ means the conditional probability of occurrence of the event is outside the 0 and 1 range
- Very low value of R^2shows that model is not fit very good

Linear probability model is not logically a very attractive model because it assumes that Pi=E (M=1|Xij) increases linearly with X, that is, the marginal or incremental effect of X remains constant throughout. This seems sometimes very unrealistic. Therefore, there is a need for probability model that has two features: (1) as X increases, Pi=E (M=1|Xij) increase but never steps outside the 0-1 interval, and (2) the relationship between Pi and Xij is nonlinear, that is, approaches "one" which approaches zero at slower and slower rate as Xij gets small and approaches one at slower and slower rates as X gets very large. In the presence of such problems, we cannot use the linear probability models.

In the case of binary dependent variables, there is Logit model other than LPM. The "Logit" model solves these problems:

$$\text{Ln } [p/ (1-p)] = a + BX + e$$

Or

$$[P/ (1-p)] = \exp^{(a + BX + e)}$$

Where:

- ln is the natural logarithm, log exp, where exp=2.71828…
- p is the probability that the event Y occurs, p(Y=1)
- p/(1-p) is the "odds ratio"
- ln[p/(1-p)] is the log odds ratio, or "Logit"
- All other components of the model are the same.

The logistic regression model is simply a non-linear transformation of the linear regression. The "logistic" distribution is an S-shaped distribution function which is similar to the standard-normal distribution (which results in a Probit regression model) but easier to work with in most applications (the probabilities are easier to calculate). The Logit distribution constrains the estimated probabilities to lie between 0 and 1.

For instance, the estimated probability is:

$$p = 1/ [1 + \exp (-a - BX)]$$

With this functional form:

- If you let a + BX =0, then p = .50
- As a + BX gets really big, p approaches 1
- As a + BX gets really small, p approaches 0.

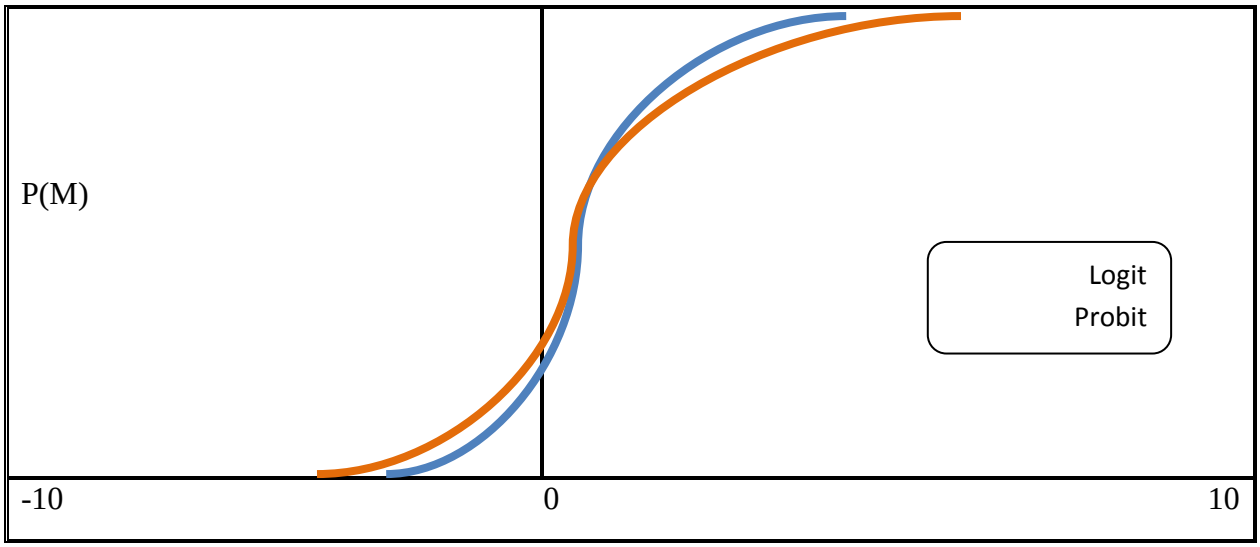
The estimated coefficients must be interpreted with care. Instead of the slope coefficients (B) being the rate of change in Y (the dependent variables) as X changes (as in the LP model or OLS regression), now the slope coefficient is interpreted as the rate of change in the "log odds" as X changes. This explanation is not very intuitive. It is possible to compute the more intuitive "marginal effect" of a continuous independent variable on the probability.

The marginal effect is dp/dB = f (BX) B where f (.) is the density function of the cumulative probability distribution function [F (BX), which ranges from 0 to 1]. The marginal effects depend on the values of the independent variables, so, it is often useful to evaluate the marginal effects at the means of the independent variables. An interpretation of the Logit coefficient which is usually more intuitive (especially for dummy independent variables) is the "odds ratio" --exp *B* is the effect of the independent variable on the "odds ratio" [the odds ratio is the probability of the event divided by the probability of the non-event]. For example, if expB_3=2, then a one unit change in X_3would make the event twice as likely (.67/.33) to occur. Odds ratios equal to 1 mean that there is a 50/50 chance that the event will occur with a small change in the independent variable. Negative coefficients lead to odds ratios less than one: if expB_2=.67, then a one unit change in X_2leads to the event being less likely (.40/.60) to occur. {Odds ratios less than 1 (negative coefficients) tend to be harder to interpret than odds ratios greater than one (positive coefficients).} Note that odds ratios for continuous independent variables tend to be close to one, this does not suggest that the coefficients are insignificant.

Logit models and probit models are used extensively in such type of research where dependent variable is binary. The choice of the model is based on the preference of the researcher. Both the models give same results but they are not comparable directly. There is very small adjustment required to compare the coefficient of the both models. The difference is only that, in probit models, the distribution of error terms is assumed normally distributed whereas the Logit model assumes the logistic distribution of error terms. The conventional wisdom is that in most cases

the choice of the link function is largely a matter of taste. We test the normality of error terms of Logit model and rejected the null hypothesis of normality. So it preferable to use the Logit model for the determinants of willingness to pay (WTP) for the conservation of snow leopard. Figure 3.2.1 shows the difference between the two more elaborately.

Figure 3.3.1 Linearity test and choice of regression technique



3.3.2 Logit model

Logistic regression analysis is a technique allows for estimation of the probability that an event occurs which predicts a binary dependent outcome from a set of independent variable. Hence in our case of snow leopard conservation where the dependent variable is willingness to pay (WTP) or not willing to pay in relation to membership in gross root institution (MGI), family income (FI), highest education of the family in years. (HEF) etc, the linear probability model depicts it as the following:

$$Pi= E\ (WTP=1/Xij) = \beta_{0+}\beta_1\ (MGI)_i + \beta_2\ (R)_i + \beta_3\ (HEF)_i + \beta_4\ (FI)_i + \beta_5\ (FOLV)_i + \beta_5\ (DCLSWLP)_i + \beta_6\ (DCLSSLP)_i + \beta_7\ (ICLSWLP) + \beta_8\ (ICLSSLP)_i + \beta_9\ (WLLSD)_i + \beta_{10}\ (DCLSD)_i + \beta_{11}\ (IETA)_i \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(3.1)$$

Where Xij is a vector of all variables in the model like WTP= Household's willingness to pay for the conservation of snow leopard, MGI=Membership in gross root institution R= Region,

HEF=Highest education of the family FI=Family income, FOLV=Family owned livestock value, DCLSWLP=Death cost of livestock due to wildlife predation, DCLSSLP=Death cost of livestock due to snow leopard predation, ICLSWLP=Injury cost of livestock due wildlife predation, ICLSSLP=Injury cost of livestock due to snow leopard predation, WLLSD=Weight loss of livestock due to diseases, DCLSD=Death cost of livestock due to diseases, IETA=Income from eco-tourism activities and E=1 that the a person is willing to pay.

Let us consider the following representation of the willingness to pay for the conservation of Snow leopard model:

$$Pi = E(WTP=1/Xij) = 1 \,/\, 1 + e\{\beta i + \beta 0 + \beta 1 (MGI)i + \beta 2 (R)i + \beta 3 (HEF)i + \beta 4 (FI)i + \beta 5 (FOLV)i + \beta 5 (DCLSWLP)i + \beta 6 (DCLSSLP)i + \beta 7 (ICLSWLP)i + \beta 8 (ICLSSLP)i + \beta 9(WLLSD)i + \beta 10 (DCLSD)i + \beta 11 (IETA)\, i\} \quad (3.2)$$

$$Pi = E(WTP=1/Xij) = 1/1 + e^{\{-Zi\}} \quad (3.3)$$

$$Where\ Zi = \{\beta i + \beta 0 + \beta 1 (MGI)i + \beta 2 (R)i + \beta 3 (HEF)i + \beta 4 (FI)i + \beta 5 (FOLV)i + \beta 5 (DCLSWLP)i + \beta 6 (DCLSSLP)i + \beta 7 (ICLSWLP) + \beta 8 (ICLSSLP)i + \beta 9 (WLLSD)i + \beta 10 (DCLSD)i + \beta 11 (IETA)i \quad (3.5)$$

This equation (3.3) is known as the logistic distribution function. Here Zi ranges from $-\infty$ to $+\infty$; Pi ranges between 0 and 1; Pi is non-linearly related to Zi thus satisfy the conditions required for a probability model.

In satisfying these requirements, an estimation problem has been created because Pi is nonlinear not only in Xij but also in the β's. This means that one cannot use OLS procedure to estimate the parameters.

Here, Pi is the probability of being willing to pay and is given by

$$1/1 + \exp^{-Z_i} \quad (3.6)$$

Then (1- Pi), the probability of being no willing to pay is given by

$$1\text{-}P_i = 1 / 1+ \exp^{Z_i} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots. (3.7)$$

Therefore, one can write

$$P_i / 1\text{-}P_i = 1+ \exp^{Z_i} / 1+ \exp^{-Z_i} \ldots\ldots\ldots\ldots\ldots\ldots\ldots. (3.8)$$

Pi / (1- Pi) is the odd ratio in favor of conservation i.e.; the ratio of the probability that a person will be willing to pay to the probability that a person will not be willing to pay. The natural log of (3.8), we obtain

$$L_i = \ln \left[P_i / 1\text{-}P_i\right] = Zi = \beta i + \beta 0 + \beta 1 \text{ (MGI)i} + \beta 2 \text{ (R)i} + \beta 3 \text{ (HEF)i} + \beta 4 \text{ (FI)i} + \beta 5 \text{ (FOLV)i} + \beta 5 \text{ (DCLSWLP)i} + \beta 6 \text{ (DCLSSLP)i} + \beta 7 \text{ (ICLSWLP)} + \beta 8 \text{ (ICLSSLP)i} + \beta 9 \text{ (WLLSD)i} + \beta 10 \text{ (DCLSD)i} + \beta 11 \text{ (IETA)i} + \mu_i \ldots\ldots (3.9)$$

That is, the log of the odd ratios is not only linear in variables, but also in parameters. L is called the Logit.

For the issues of the multi collinearity, overall goodness of the model and overall significance of the model log likelihood, Pseudo R Square and likelihood ratio *chi²* test have been applied (Yasir, 2013).

3.3.3 Variables specification

The study focuses on evaluating the attitude of both users and non- users communities with respect to the conservation of snow leopard. User communities are those who are benefiting from on-going conservational activities in that area while non- users are those who are lacking the direct conservational benefits. According to Ulibarri and Wellman (1997), the total economic valuation of any environmental good or services include both the use and non-use values.

The following are the variables that are supposed to affect the willingness to pay (WTP) for the conservation of snow leopard which is a dependent variable of the study. The independent variables have been decomposed into household characteristics, community characteristics, impact on livestock due to diseases and wildlife characteristics.

3.3.3.1 Dependent variable

Willingness to pay (WTP)

WTP has for conservation of snow leopard is the explained variable of this study. To find the attitude and perception of local people, the study categorizes the WTP into two; (i) Willingness to pay (ii) Not- willingness to pay. The dummy for yes is (1) and for No is (0). "Willingness to pay (1)" is the base category (Yasir, 2013).

3.3.3.2 Independent variables

To find out the willingness to pay (WTP) for the conservation of snow leopard and it's determinants, the following variables had been considered as the explanatory variables affecting the snow leopard's conservation in different ways. There are not such studies available as the willingness to pay for conservation of snow leopard and its determinants have been taken into consideration. So these explanatory variables were selected based on the area's context and SLF staffs practical knowledge. These variables had been categorized into four categories, at broad level.

A. Household characteristics

The household characteristics include family livestock ownership, highest education of the family and family income.

Family livestock ownership

The type of livestocks considered in this study are; sheep, goat, cow and other large animals. It is one of the important determinants of willingness to pay. According to Jackson et al. (2003), families' livestock keeping are often reluctant to conserve snow leopard.

Highest education of the family

Education is important and significant determinant of willingness to pay for environmental goods (Nabangchang et.al, 2008). As education provides awareness and an educated person will have more concerns for natural environment in general and snow leopard in particular. According to Bhandari and Heshmati (2010), a person having more superior level of education will be more involved in the conservation activities due to the

information available, awareness level and experience. So, it has been assumed that higher education level in the family will affect the willingness to pay (WTP) for the conservation of Snow leopard positively.

Family income

Family income is most the important determinant of willing to pay (WTP) because the WTP for anything rely heavily on the capacity to pay (Bhandari and Heshmati, 2010). According to Hailu et al. (1996), if a family has budget constraints then it will affect the WTP negatively (especially in case of use and passive use values) as the family has to fulfill the day-to-day expenses also. So, it has been considered that as income grows, the willingness to pay for snow leopard's conservation will also be higher.

B. **Community characteristics**

Membership in informal institutions

Among the community characteristics, membership in informal institution is also one of the important determinants of willingness to pay. According to Ahmed and Hussain (1998), these informal institutions play a vital role in the collective action and decision making of the community in general and households in particular for the conservation of natural resources. As the informal institutions provide social infrastructure and create awareness at gross root level, so membership in such institutions will affect the WTP for snow leopard conservation positively and vice-versa.

Two dummies have been made, if a person has membership and active role in informal institution then = 1 and if person hasn't any membership and no active role informal institution then = 0. "Membership in informal institution" is the base category.

Region

Conservational area and non-conservational area have been considered for study purpose because regional variations also play an important role in the conservational process. The people residing in the jurisdiction of conservational area have more positive attitude towards conservation than those people living in the non-conservational area. The conservational activities create awareness among the people, hence enhancing the willingness to pay (WTP) for the conservation of Snow leopard and vice-versa. "Conservational area" is the reference category.

Eco-tourism activities

Sustainable ecotourism activities help in the justification and payment for the conservation of cultural and natural resources (Nuva et.al. 2009). It has been observed by Honey (1999), that ecotourism activities create awareness and provide financial benefits for local inhabitants hence minimize the negative impact on natural resources. So, it has been considered in this study that a person's involvement in ecotourism activities in the study area will have positive impact on his willingness to pay (WTP) for the conservation of Snow leopard. As the benefits and income from ecotourism get increases then the WTP will also be higher accordingly.

C. Wildlife characteristics

The wildlife characteristics include the cost to the local communities from wildlife in general and Snow leopard in particular, either in the form of livestock injury or death. Usually these forms of cost from wildlife as a whole have negative impact on the people willingness to pay for the conservation of snow leopard.

D. **Impact on livestock due to diseases**

Sometimes the local communities also bear the losses of livestocks due to diseases. The costs due to diseases are either in the form of death or the weight loss of livestock. In rural areas like Chitral, livestock keeping is the only source of income for most of the people. So this variable had been used to know the impact of such kind of losses on the people willingness to pay (WTP) for the conservation of snow leopard.

CHAPTER IV

Results and Discussion

This chapter describes the results derived by using a logistic regression model for finding out the willingness to pay for the conservation of snow leopard and its determinants. In order to present the results in systematic and accurate way, the chapter has been decomposed into different sections. The first section of the chapter deals with the descriptive statistics by explaining the study area's socio-economic characteristics of the sampled households. The second section highlights the survey results estimating the willingness to pay for the snow leopard's conservation and its determinants. Whereas the final section of the chapter encounters the ideas shared by the Key Informants and Focus Group Discussion (FGD) in informal way by adding Participatory Reflection and Action (PRA)

4.1 Descriptive Statistics of the Study Area and Key Variables

This section is dealing with the socio-economic characteristics of the study area and households which provides the bases for the empirical and fruit-full analysis of the next section. Also places at the same time a bird-eye-view on the characteristics of the variables used.

4.1.1 Socio-economic characteristics of the sample area

The study revealed that the average family size in the study area constituted more female than the male with 51.00 percent and 49.00 percent respectively. The results further showed that average dependent family members consist of more female with 60.00 percent than the male dependent members with 40.00 percent.

The income plays a critical role in the willingness to pay (WTP) for the conservation of snow leopard. Because with the increase in the per capita income, the living standard of the household also rises and the household will be in the better position to make trade-off between use and non-use values. In the study area, family income had been further decomposed into different categories which showed that out of total population 78.57 percent of people lies in Rs. 6000-50,000 income group, 20.41 percent of people fall in the income group of Rs. 50.001-100,000

and a small portion of population with 1.02 percent lies in the category of Rs. 100,001 and maximum income group (Table 4.1.1).

Table 4.1.1 Percentage Average Family Size, Dependents and Family Income (in Rs.) in the Sample Area

Variables	Number	Sexes	Percentage
Average Family Size	7	*Male*	49.00
		Female	51.00
Average no, of Dependents	*5*	*Male*	40.00
		Female	60.00
Family Income in Rs.	*6000-50,000*		78.57
	50,001-100,000		20.41
	100,001-max		1.02

4.1.2 Educational disparities between sexes in the study area

Formal education plays an important role in the personality development and in the behavioral change of an individual hence had a great impact upon the conservation of eco-system and the willingness to pay (WTP) for the conservation of snow leopard also. The results showed that the percentage of literacy among the male population (80.52 percent) was higher than that of the female population (69.86 percent) and vice versa. The main reason for the higher literacy differences between the both sexes are the gender disparities, lack of opportunities for the female population specially and cultural constraints. The educational indicators like primary education, middle passed, intermediate and so on in the study area with educational disparities showed the similar trend of more male educated persons than that of female educated persons. Even the indicator of religious education showed the higher trend of male persons than the female except the vocational education as shown below (Table 4.1.2).

Table 4.1.2 Percentage of Educational Disparities between Sexes in the Study Area

Educational Level	Male	Female
Illerate	19.48	30.14
Primary	18.36	18.77
Middle	15.33	16.78
High	20.12	15.34
Graduate	13.26	8.3
Master's	8.3	3.65
Vocational	1.91	3.96
Religious	3.06	2.7
Other	0.18	0.36

4.1.3 Willingness to pay and membership in gross-root institutions

In order to evaluate the willingness to pay for the conservation of the endangered species like snow leopard in the study area, it was tabulated against membership in gross-root institutions (informal institution) and no-membership in the gross-root institutions. Keeping in view the results, it had been noticed that the people who expressed their un-willingness to pay for the conservation of snow leopard were 56.1 percent (having no-membership in informal institutions) and 17.54 percent (having membership in informal institutions) respectively.

The informants who expressed their yes-willingness to pay response regarding the conservation of snow leopard were 82.46 (having membership in gross-root institutions) and 43.9 percent (no-membership in gross-root institutions) respectively. The results suggested that the respondent's active participation in the informal institutions have positive impact on the WTP for the conservation of snow leopard (Table 4.1.4).

Table 4.1.3 Willingness to Pay for the Conservation of Snow Leopard and Membership in Gross- Institutions (Percentage)

Willingness to Pay (Response)	Membership in Gross-root Institution		Total
	Non-Members	Members	
No	**46**	**20**	**66**
	56.1	17.54	33.67
Yes	**36**	**94**	**130**
	43.9	82.46	66.33
Total	**82**	**114**	**196**
	100	100	100

4.1.4 Willingness to pay and income from eco-tourism activities

To understand the impact of income from eco-tourism activities on the willingness to pay for the conservation of snow leopard, both of the variable was been tabulated against each other. The results showed that 35.8 percent were those who showed their un-willingness to pay for snow leopard's conservation, belonged to the income (generated through eco-tourism activities) group of Rs. < 20,000, 17.65 percent of people belonged to the income group of Rs. 20,000- 40,000 and 0 percent belonged to Rs. > 40,000 income group. This concluded that as income grows the un-willingness to pay decreases accordingly (Table 4.1.5).

Table 4.1.4 Willingness to Pay for the Conservation of Snow- leopard and Income from Eco-tourism Activities (Percentage)

Willingness to Pay (Response)	Income from Eco-tourism Activities (in Rs.)			Total
	<20,000	20,000-40,000	>40000	
No	**63**	**3**	**0**	**66**
	35.8	17.65	0	33.67
Yes	**113**	**14**	**3**	**130**
	64.2	82.35	100	66.33
Total	**176**	**17**	**3**	**196**
	100	100	100	100

Furthermore, the people's willingness to pay for the conservation program, increases with the increase in income from eco-tourism activities i.e. the income groups Rs. < 20,000, Rs. 20,000-40,000 and Rs. > 40,000 expressed their willingness to pay for the conservation with the 64.2 percent, 82.35 percent and 100 percent respectively with the increasing trend across the income groups.

4.1.5 Conservation and informal institutions

The analysis showed that membership of the people in gross-root institution (informal institutions) were very high in conservatory area of the snow leopard with a percentage of 57.89 as compared to the people (41.46 percent) having no-membership in any kind of institution in the jurisdiction of the conservatory area of snow leopard.

The results further suggested that in the non-conservatory area about 58.54 percent of the people had no-membership in any kind of informal institutions but 42.11 percent of people were linked to the informal institutions (Table 4.1.6).

Table 4.1.5 Membership and Non- Membership in Gross-root Institution across the Region (Percentage).

Region	Gross Root Institutions		Total
	No-Membership	Membership	
Non-Conservative Area	**48**	**48**	**96**
	58.54	42.11	48.98
Conservative Area	**34**	**66**	**100**
	41.46	57.89	51.02
Total	**82**	**114**	**196**
	100	100	100

4.1.6 Willingness to pay and education

The purpose of the analysis was to highlight the importance of education in the conservation of Snow leopard and the people's willingness to pay for the conservation.

The study showed that the people who expressed no-responses regarding the willingness to pay for the conservation of snow leopard decreases in ascending order as one moves from low level of education to next higher level of education but up to sixteen years of education and then-after it again turns into increasing trend (of no-responses) with further increase in education level. i.e. Zero years of education, primary education, middle passed, matriculation, intermediate, bachelor level of education, masters and MPhil having 100 percent, 72.73 percent, 47.37 percent, 48.65 percent, 35.29 percent, 26.79 percent, 13.21 percent (decreasing trend of no-responses with increase in education) and 100 percent (again increased in no-response with further increase in education) respectively.

Similarly, the study further highlighted that the percentage of people who expressed their yes-responses of the willingness to pay for the conservation increased with the increase in education

(no educated indicating 0 percent, primary education 27.27 percent, middle passed 52.63 percent, matriculation 51.35 percent, intermediate 64.71 percent, bachelor 73.21 percent) but up to the limit of masters level of education (86.79 percent) because with further increase in education, the yes-response dramatically decreases (Table 4.1.7).

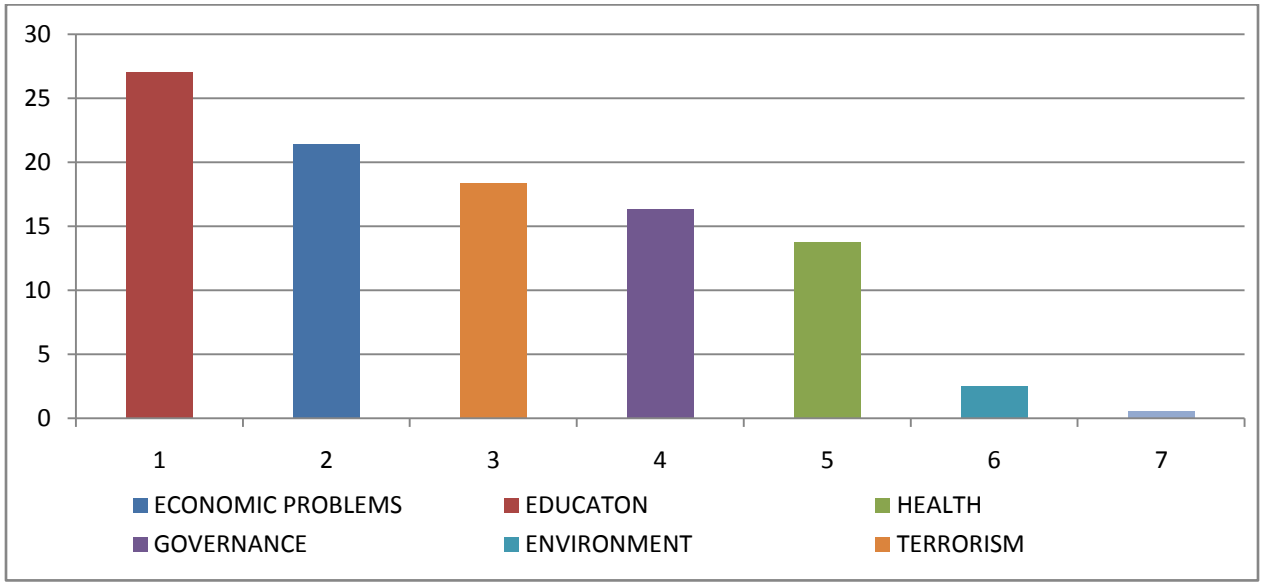
Table 4.1.6 Characteristics of the Sample Families by Highest Attained Education Disparity between the choices of Willingness to Pay (Percentage)

Highest Family Education (in Years)	Willingness to Pay (Response)		
	No	**Yes**	**Total**
Illiterate	**1**	**0**	**1**
	100	0	100
Primary	**8**	**3**	**11**
	72.73	27.27	100
Middle	**9**	**10**	**19**
	47.37	52.63	100
Matric	**18**	**19**	**37**
	48.65	51.35	100
Secondary	**6**	**11**	**17**
	35.29	64.71	100
Bachelor	**15**	**41**	**56**
	26.79	73.21	100
Masters	**7**	**46**	**53**
	13.21	86.79	100
M.S/ Max	**2**	**0**	**2**
	100	0	100
Total	**66**	**130**	**196**
	33.67	66.33	100

4.1.7 Priorities of local residents regarding the problems facing by the country

The people were asked to prioritize the current problems prevailing in Pakistan from the most important (1) to least important (7). According to 27.06 percent of respondents, educational problems are the most important that should be tackled first. While the economic problems with 21.43 percent secured the second position among the most important problems, terrorism 18.39 percent, governance 16.3 percent, health 13.78 percent, environment 2.5 percent and other problems 0.54 percent respectively (Figure 4.1.8).

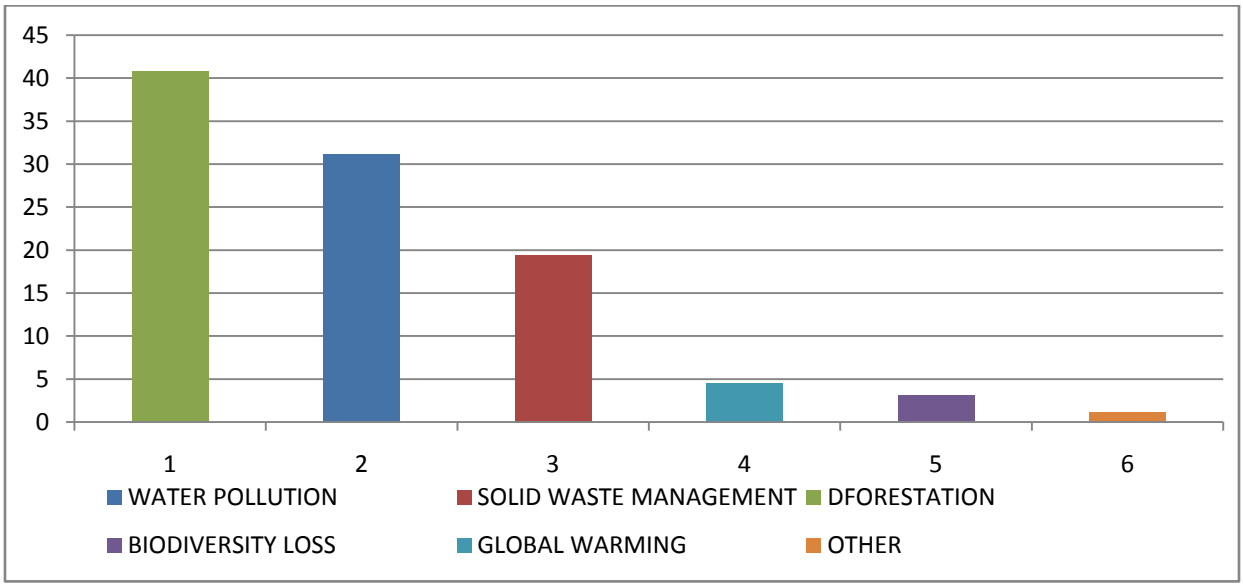
Figure 4.1.7 Prioritization of the Problems facing the Country by the Respondents (Percentage)



4.1.8 Issues related to natural environment

In order evaluate the respondent's preferences, they were requested to prioritize the issues related to the natural environment from the most important (1) to least important (6). Among the most important problems related to natural environment, the respondents ranked the deforestation on first with 40.8 percent. Furthermore, they ranked water pollution (31.1 percent) on second following solid waste management (SWM) 19.39 percent, global warming 4.48 percent, biodiversity loss 3.09 percent and others 1.14 percent respectively (Figure 4.1.9).

Figure 4.1.8 Prioritization of the Issues related to the Natural Environment by the Respondents (Percentage)



4.1.9 Attitude of local people toward predators

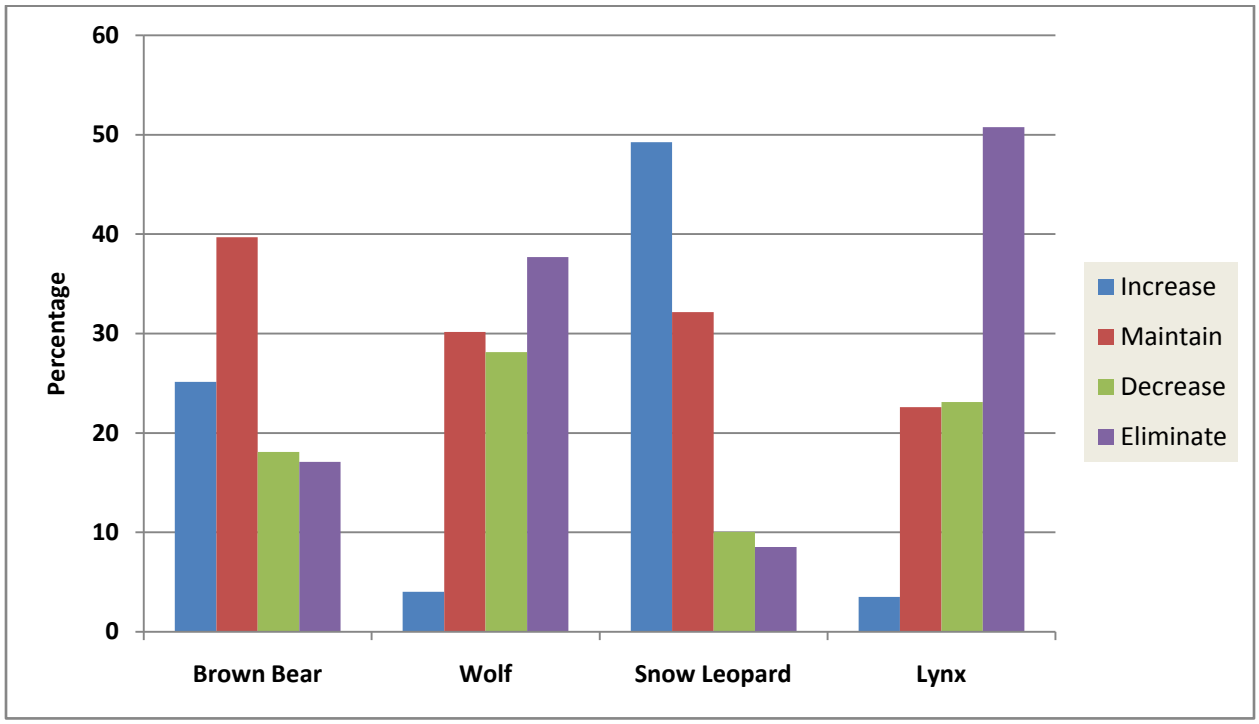
The purpose of such information was to evaluate the local resident's preferences towards predators especially the endangered species. They were asked to prioritize the different species i.e. brown bear, wolf, Snow leopard and lynx (endangered but predatory nature) found in Chitral on the basis of their importance.

The analysis showed that 49.25 percent of people expressed that the snow leopard's population should be increased because of eco-tourism, followed by brow bear 25.13 percent, wolf 4.02 percent and lynx as 3.52 percent.

The results also indicated that 39.7 percent of the people were of view point that the brow bear population should be maintained, following wolf 30.15 percent, snow leopard 32.16 percent and lynx 22.61 percent. About 28.14 percent respondents told that the population of wolf should be decreased then lynx by 23.12 percent, brown bear by 18.09 percent and snow leopard 10.05 percent. The most disliked species in Chitral was lynx and wolf because 50.75 and 37.69 percent of the respondents were in favor of its elimination from the area respectively. While the least disliked species were brown bear (17.09 percent) and snow leopard (8.54) because only a small

percentage of the respondents stated that the population of these species should be eliminated, as shown by (Figure 4.1.9).

Figure 4.1.9 Preferences of the Local People toward Predators (Percentage)



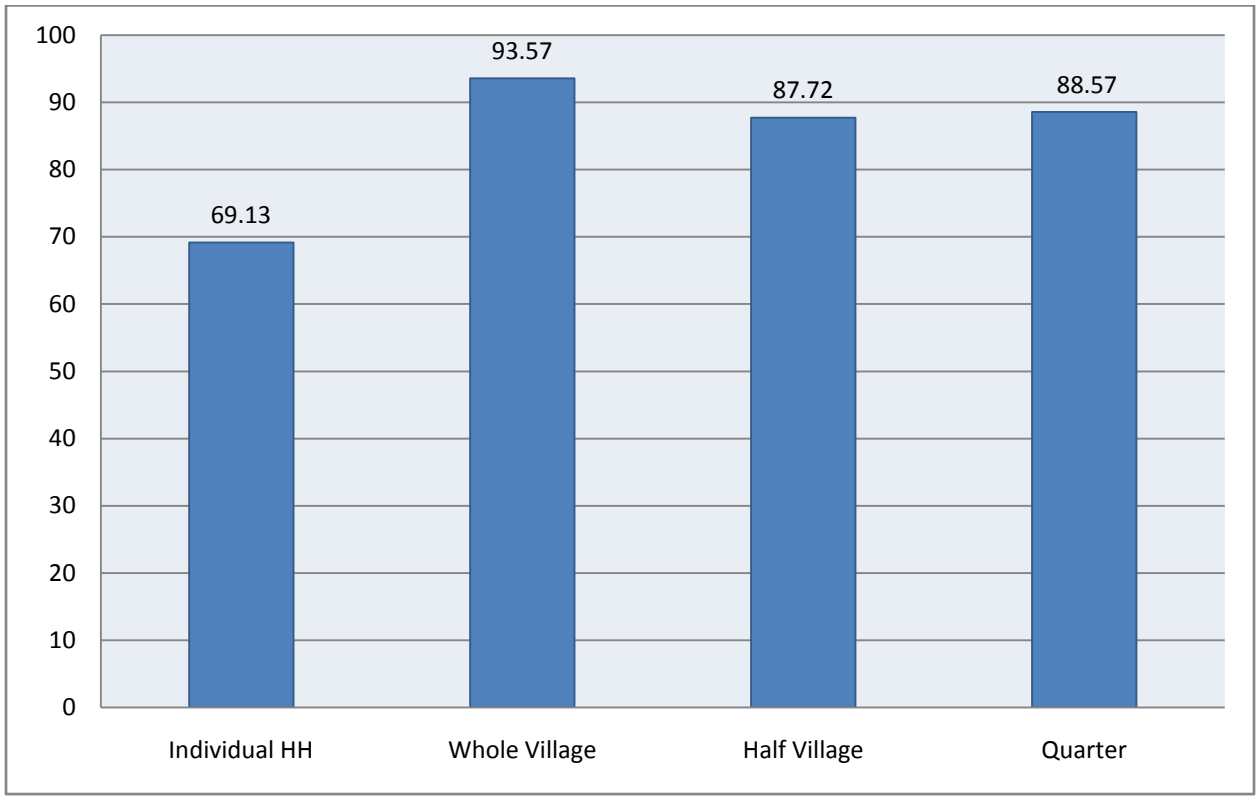
4.1.10 Average willingness to pay across different categories

During the survey, the respondents were asked about their willingness to pay for the conservation of Snow leopard as an individual house hold (as trend setter for others) when there are no others willing to pay, they were further asked that how much they would like to pay when the whole village decided to pay for program after trend set by the initial house hold then any change in the payment stated earlier by the individual household? Whether the house hold will increase or decrease its initial stated willingness to pay in the presence of whole village?

Then the households were questioned about their willingness to pay when half of the village decided to join the proposed program and half of the village remained silent. In such case, what will be their willingness to pay, whether increase or decrease in the initial stated payment?

Finally they were requested to show their willingness to pay when only 25 percent of the village decided to favor the program and so on (Figure 4.1.10).

Figure 4.1.10 Average Willingness to Pay (WTP) in Rs. of the Sampled Households for the Conservation of Snow- Leopard



These results suggested that the average willingness to pay for the conservation of snow leopard in case of individual household category was Rs. 69.13. But as the number of household increased and took the form of whole village, the average willingness to pay reached up to peak with Rs. 93.57. Finally, in case of *half* Village and *quarter* of the village, the average willingness to pay was Rs. 87.72 and Rs. 88.57 respectively.

4.2 Econometric Analysis

The main purpose of the current study was to find out the determinants of willingness to pay for the conservation of snow leopard and to capture those variables that have strong effect on the people's willingness to pay. For the said purpose, logistic regression was applied. Numerous regressions were applied with different specifications in order to check the robustness of different models and particular models were selected with expected relation to response variable, significance level and maximum likelihood technique was used.

The following is the functional form of the model:

$$WTP = \beta_{0+} \beta_1 (MGI) + \beta_2 (R) + \beta_3 (HEF) + \beta_4 (FI) + \beta_5 (FOLV) + \beta_5 (DCLSWLP) + \beta_6 (DCLSSLP) + \beta_7 (ICLSWLP) + \beta_8 (ICLSSLP) + \beta_9 (WLLSD) + \beta_{10} (DCLSD) + \beta_{11} (IETA) + \mu_i \quad \text{.....} (5.1)$$

WTP= Household's willingness to pay for the conservation of Snow leopard (Yes=1, No=0)

MGI=Membership in Gross root Institution (Membership=1, No-membership=0)

R= Region, (Conservational Area=1 and Non-Conservational Area=0)

HEF=Highest Education of the Family in rupees

FI=Family Income in rupees

FOLV=Family owned livestock value in rupees

DCLSWLP=Death Cost of Livestock due to Wildlife Predation in rupees

DCLSSLP=Death Cost of Livestock due to Snow leopard Predation in rupees

ICLSWLP=Injury Cost of Livestock due Wildlife Predation in rupees

ICLSSLP=Injury Cost of Livestock due to Snow leopard Predation in rupees

WLLSD=Weight Loss of Livestock due to Diseases in rupees

DCLSD=Death cost of Livestock due to Diseases in rupees

IETA= Income from Eco-tourism Activities in rupees

Among the following three different models (Table 4.2), model A is the base line model comprised of all variables. Except "ICLSWLP and ICLSSLP", all the others are the key variables of the model A.

Table 4.2 Logistic Regression Model: Determinants of Willingness to pay (WTP) for Snow leopard's Conservation.

Regressors	Model A		Model B		Model C	
	Odd Ratios	**Std. Err.**	**Odd Ratios**	**Std. Err.**	**Odd Ratios**	**Std. Err.**
Household characteristics						
Livestock value (in Rs.)	(-ive) 0.99*	1.93	(-ive) 0.99*	0.99	(-ive) 0.99	1.88
Highest education of the family (in Years)	1.184***	0.08	1.18**	0.07	1.15**	0.07
Family income (in Rs.)	1.00*	9.89	1.00*	9.89	1.00	
Community Characteristics						
Informal Institution (Membership =1)	4.39***	1.91	4.38***	1.89	4.47***	1.92
Region (Conservational Area= 1)	3.34***	1.52	3.33**	1.51	3.48	1.56
Income from Ecotourism Activities (in Rs.)	1.00**	0.00	1.00**	0.00	1.00**	3.91
Wildlife Characteristics						
Injury Cost from Wildlife Predation (in Rs.)	1.00	0.00	1.00	0.00	-	`-
Injury Cost from Snow leopard Predation (in Rs.)	1.00	0.00	-	-	1.00	0.00
Death Cost from Wildlife Predation (in Rs.)	(-ive) 0.99**	0.08	(-ive) 0.99**	0.99	(-ive) 0.99**	1.89
Death Cost from Snow leopard Predation (in Rs.)	(-ive) 0.99***	0.00	(-ive) 0.99***	0.99	(-ive) 0.99***	4.82
Impact on Livestock due to Diseases						
Weight Loss of Livestock (in Rs.)	1.00*	0.03	1.00**	0.00	1.00**	0.00
Death Cost of Livestock (In Rs.)	1.00**	0.00	1.00**	0.00	1.00**	2.09
Log likelihood	-72.317485		-72.320024		-73.532406	
Pseudo-R-Square	0.4224		0.4224		0.4127	
LR chi²	105.79		105.79		103.36	
Prob > chi2	0.000		0.000		0.002	

* - Significant at 10 % ** - Significant at 5 % *** - Significant at 1 %

4.2.1 Determinants of willingness to pay

The odd ratio by logistic regression showed that the variable membership in gross root institution (MGI) had significant positive impact upon WTP for the conservation of snow leopard and those who had membership in any kind of gross root or informal institutions were 4.39 times more willing to pay for the conservation of snow leopard as compared to those people having no-membership in any kind of informal institutions.

The results further showed that the conservational areas also had significant positive impact on the people attitude towards the conservation of snow leopard. Because the people from the conservational areas showed 3.34 times more willingness to pay for the conservation of snow leopard as compared to the people belonging to non- conservational areas. Because the people in the conservative areas were more motivated towards conservation due to on-going conservation activities, hence changed behavioral patterns of the people as compared to the people on the other side of the coin.

The variable highest family education (HFE) showed significant positive impact on willingness to pay. The odd ratio suggested that one year increase in the education of the family raises the odd in favor of willingness to pay by 1.18 times because the highest family education affects the decision pattern of the family accordingly. This means that as the family education increases, the conservational attitude and behavior also increases and becomes positive.

The family income (FI) was also statistically significant and had positive impact on the WTP. The result showed that one unit increase in the income of the family person / member increases the decision making of the family by 1.00 times in favor of the snow leopard's conservation through expressing its willingness to pay. Increase in household's income increases the willingness to pay for the conservation with equal rates.

The variable family owned livestock (FOLV) was significant and had negative impact on the willingness to pay for the conservation of snow leopard. The odd of the family having livestock revealed that the probability of willingness to pay for the conservation of snow leopard was low among those who belong to the livestock keeping families and high for those families having no livestock. So, livestock keeping affects the willingness to pay negatively. The variable family

livestock ownership (FOLV) decreased the odd in favor of willingness to pay by 0.99 times as compared to the family having no livestock at all.

The results for death cost of livestock due to wildlife predation (DCLSWLP in rupees) variable showed that the wildlife depredation on domestic livestock of the local people had significant negative impact upon the community willingness to pay for the conservation of snow leopard. It showed that the wildlife depredation of domestic livestock decreased the odd in favor of willingness to pay by 0.99 times. The results further suggested that those families were reluctant to pay for the conservation of snow leopard that faced the losses due to attack of wildlife (Lynx, Wolf and Brown bear) on their livestock. Although these losses were due to the wildlife (other than snow leopard) but they also considered the snow leopard as the member of the wildlife hence reluctant to save this specie.

Similar is the case with the variable DCLSSLP in rupees (Death cost of livestock due to Snow leopard predation only). The variable showed significant but negative relationship with the dependent variable (WTP). The results showed that death cost incurred by the local peoples due to the depredation of snow leopard on their livestock decreased the probability of the conservation of snow leopard. The odd ratio suggested that those families who experienced the snow leopard depredation on their livestock were 0.99 times less willing to pay for the conservation of snow leopard as compared to those families faced no cost at all due to snow leopard.

Only two variables ICLSWLP and ICLSSLP (injury cost of livestock due to wildlife and snow leopard predation in rupees respectively) remained insignificant but showed positive relationship with dependent variable (WTP). The reason may be that when any wildlife predator or especially snow leopard attacks on domestic livestock, it usually kills the prey species then leaving it injured.

The weight loss of the domestic livestock due to different kind of diseases (WLLSD in rupees) showed significant positive impact upon the willingness to pay for the conservation of snow leopard. The odd ratio suggested that the families who experienced losses in terms of rupees from different kind of Zoonotic diseases are 1.00 times more willing to pay than the others. The result suggested that those families who faced weight losses due to diseases showed flexible

behavior and positive attitude towards snow leopard conservation as compared to those families who experienced losses from wildlife attacks, according to these people the diseases are more problematic. Similarly, the variable death cost of livestock due to diseases (DCLSD in rupees) has also significant and positive impact upon the dependent variable (WTP) and positive relationship. The odd ratio showed that these households who experienced death cost of their livestock due to diseases (not from wildlife or Snow leopard) increases the probability of the conservation of snow leopard by 1.00 times.

The income generated through eco-tourism activities variable had also significant impact on and positive relationship with the willingness to pay for the conservation of snow leopard (dependent variable). The families whose source of income was generated from eco-tourism activities were likely to favor the conservation of snow leopard by 1.00 times as compared to those families belonging to the other side of the story because these people are keen observer of the natural environment due to their interaction with it.

4.3 Informal Survey Results

This section highlights the results of the informal survey conducted from different selected areas constituting focus group discussion (FGD) and information from key Informants (KIS) through participatory rural appraisal (PRA) tools and techniques.

4.3.1 Key informants survey (KIS)

The purpose of such kind of information was to conformed the results obtained from the formal survey and to evaluate of the personal views of the informants in their own words. Such kind of information had been collected from different people having rich knowledge about the area and especially about the conservation directly or indirectly. The information collected from the key informants had been quoted against their names, as follows:

1. Ahmed Nawaz

Mr. Ahmed Nawaz is a teacher at middle School at the village of Ginjerate-Koh valley which is one of the non-conservative areas. He is a graduate passed and serving in this village for the last four years.

"I am a school teacher here from the last 4 years. The area lies near to the Afghan border. Most the people here are un-educated and their livelihood depends upon livestock keeping and natural resources. In the area some people are attached to the business of killing the bear, as its fats and the oil extracted from the body of Bear are sold in the market in attractive prices.

According to the villagers, in the past the Snow leopard has been used to attack the livestock in the pens during winter seasons and in the open grassy land and meadows during the summers. As a result, there have been many attempts made by the locals to kill the species.

Keeping in view the overall situation, Mr. Ahmed Nawaz further suggests that education can play an important role in changing the attitude of the villagers but at the same time, it is necessary to create alternative income opportunities for the villagers so that the dependence on the natural resources and ecosystem can be reduced to its best."

2. Sub. Sheren

Subedar Sheren is an Ex-counselor and local leader of the Torkhow Valley. He is attached to the day-to-day activities of the area.

"Most of the old people especially in the remote areas believe that snow leopard should not be killed. My father told me that in the past one of our relative one day found the snow leopard had been trapped in his livestock's pen. In fact the snow leopard came there in search of food but couldn't went back as the walls of the pen were enough high to trap the snow leopard. Then our relatives killed the snow leopard. The whole family ruined due to economic difficulties and they became poorer day-by-day because the snow leopard was innocent at that time. The whole situation get worsen due to their act of cruelty".

Mir Haleem Khan

Mr. Mir Haleem Khan is one of the eminent religious leaders of the community. After his father (who was also one of the eminent religious Scholar), he has been serving as Pesh-e-Imam in the Mosque of Seardor.

"Allah hasn't created anything without a purpose. Wildlife is no doubt one of the precious gifts of Allah Almighty. Wildlife like snow leopard are playing a vital role in the ecological balance as truly saying that our existence is hidden in the survival of wildlife because wildlife is important to maintain the specie of certain animal to a limit and also have economic value because of the visitors coming to the district to see this unique creator of Allah Almighty. So it must be conserved in the best favor of our country. Otherwise this wildlife especially snow leopard is posing threat and has great risk of hunting from the local people who are unaware of its importance."

4. Muhammad Nabi (90 years old villager)

Mr. Muhammad Nabi is 90 years old and one of elder persons in the area. He belongs to the Seen village. He has a lot of knowledge about the past and present events regarding the eco-system and climate change.

"We are thankful to all the organizations who are working in our area for the conservation of our eco-system. The people of the village are united through the *Village Conservation Committee* (VCC) which is working under the umbrella of Snow Leopard Foundation (SLF). Before the implementation of the conservational activities in the area, the situation was at its worst as people were engaged in the hunting of wild animals like Markhor etc. The situation get worsen again when the snow leopard started attacks on the domestic livestock in the absence of its primary prey which has been hunting by the people for joy and pleasure hence conflict arises between snow leopard and the locals. But now the situation is better after the implementation of the conservational activities in the area through community involvement and confidence building. Now the community is enjoying the fruit full results in the form of protection to the community's livestock and other benefits from SLF. Also the hunting of wildlife i.e. markhor and retaliating killing of snow leopard has been declared as illegal in the area from government and the community also helps the agencies in the said responsibility."

5. Ajaz Ahmed

Mr. Ajaz Ahmed is a community development Officer at Forest department, Chitral. He did his Masters in Forestry and currently working in Chitral.

"I believe that the following are the major conservational issues that the snow leopard in particular and other wildlife in general are facing: Retaliatory Poisoning, over grazing, huge livestock in upper pasture areas in Chitral, lack of awareness and lack of the knowledge about importance of wildlife especially loss of habitat, forest degradation, erosion, habitat fragmentation weak law enforcement, out dated wildlife act of KPK government, traditional values and myths and the consideration of wildlife as an enemy etc.

He further said that, if we succeed to overcome these problems then we can be able to save the Snow leopard in well-manner."

4.3.2 Focus group discussion

In the study in order to gauge and evaluate the knowledge and attitude of the people in the area qualitative analysis has been considered and Focus Group Discussion (FGD) is one of these qualitative tools and techniques which are basically used for the conformation of results obtained through qualitative type of formal surveys. Further more such kind of discussion is basically very useful for researchers in the field of marketing because through quantitative customer they can easily and precise data and information and FGD are no more a special case (Gulzar, 2012).

In similar manner, in our study a few families (living in the area from past a minimum of 50 years) have been targeted for FGD from selected areas both from conservative and non-conservative areas

4.3.2.1 Focus group discussion (FGD) in conservative area

According to the people in the said area, *"They are very happy with the intervention of conservational activities in their geographical area. They also expressed their satisfactory feelings with the initiatives like snow leopard enterprises, medical facilities to combat against Zoonotic diseases among livestocks etc. According to locals the participatory approach adopted*

by the implementing agencies may have fruit ful results as it helped to build the confidence of the local community. But a few of the people pointed out that the compensation payment by the donor agencies should be distributed smoothly and timely."

4.3.2.2 Focus group discussion (FGD) in non-conservative area

Similarly in the non-conservative area few native households were brought together and approached to evaluate their view point regarding the bio-diversity and the conservation of the Snow leopard in their area. And it has been noticed that the communities from the non-conservative areas have mixed approach towards bio-diversity and conservation of the snow leopard.

According to the local people of the area, "*The Snow leopard used to attack our livestock from time to time especially in the winter season in the absence of enough food to feed it in the forest area hence the snow leopard moves towards the villages. Most of our income and livelihood depends on the forest area especially the livestock. If it can attack on ours domestic livestock and then it can definitely attack on human beings also but almost all of the attacks made by the Snow leopard are on the livestock.*

At the same time the villagers put a proposal that if government promises for the compensation of affected livestock and implement the conservational activities in their area then they can work parallel to help the government for the smoothly carrying-out the activities.

Few of the people especially the religious preachers/leaders and educated persons told that it is an act of sin to kill any creation of Allah Almighty as it is the natural cycle created by God having dependency of one thing on another. In fact, it is our fault that we go in to the forest and hunt the prey specie of snow leopard as a result it attacks on our livestock."

CHAPTER V

SUMMARY, CONCLUSION AND POLICY RECOMMENDATIONS

5.1 Summary

The study examines the determinants of the willingness to pay for the conservation of endangered species of snow leopard in Pakistan generally and specifically in Chitral. The major objective of the study is to measure the non-market benefits of the snow leopard conservation in Chitral based on the local resident's preferences to help the policy makers to make better policies. In-order to achieve the objectives of the study, the primary data has been used both for qualitative and quantitative study. For the qualitative study, the data has been collected through well structured questionnaire and a sample size of 196 respondents representing their households. Participatory Reflection and Action (PRA) tools have been applied for qualitative study data.

By using econometric model (Logit), the study shows that those who have membership in any kind of gross root or informal institutions are more willing to pay for the conservation of snow leopard as compared to those people having no-membership in any kind of informal institutions. The reason is that the presence of informal institutions creates awareness among the people through effective communication and various dialogues. It is also evident that the household belong to the conservancy area shows more positive attitude towards wildlife especially Snow leopard as compared to households belong to non-conservancy area. Furthermore, it is also found that promotion of eco-tourism activities in the area also affects the conservation initiatives positively. Because the families whose source of income is generated from eco-tourism activities are likely to support for the conservation of snow leopard as compared to those families belonging to the other side of the story, as these people are keen observer of the natural environment due to their interaction with it.

5.2 Conclusion

The higher education level (Bhandari and Heshmati, 2010) and higher income households (Hailu et al., 1996) were willing to pay higher amount for the conservation of snow leopard in the area.

Those families who owned more livestocks as a source of livelihood and also incurred losses in-terms of death costs of livestocks by the wildlife in general or specifically by snow leopard predation in the past or currently are more reluctant to conserve snow leopard (Jackson et al., 2003) in the area. Hence, creates hurdle in the conservation of snow leopard in the area by non-participation and non-cooperation. But the households who incurred losses in terms of weight loss and death cost due to Zoonotic diseases are diseases showed flexible behavior and positive attitude towards snow leopard conservation as compared to those families who experienced losses from wildlife attacks. According to them, the diseases are more problematic as the losses from diseases are always there and vice versa.

Finally, a very interesting result of the study is injury cost of livestock due to wildlife and snow leopard's predation remained insignificant but showed positive relationship with dependent variable (WTP). The reason may be that when any wildlife predator or especially snow leopard attacks on domestic livestock, it usually kills the prey species than leaving it injured. Furthermore, sustainable ecotourism activities help in the justification and payment for the conservation of cultural and natural resource (Nuva et al., 2009) through the provision of financial benefits for the local hence minimizes the negative impact on natural resources.

5.3 Policy Recommendations

On the basis of formal and informal survey results obtained through bivariate analysis, it is concluded that the main hurdles in the way of the conservation of snow leopard in Chitral District is the predation of the domestic livestocks by the wildlife in general and snow leopard in particular. So this situation needs an attention from the policy makers related to Natural Resource Management (NRM). The following points are the policy recommendations evaluated by the help this study and needs attention.

1. Although the signs of the mobility of the snow leopard have been found almost in all valleys (Gol) of Chitral district expect a few one. So it is also necessary to extend the "Community-Based Snow leopard Conservation" program to other valleys to engage and involve those people (currently living in non-conservancy area) in conservational activities.

2. The informal or gross-root institutions plays important role in changing the behavior of the people. The informal institutions create awareness, change the behavior and empower the local communities (especially the female). Hence, it is suggested to strengthen these informal institutions through various initiatives (Vaccination, Enterprises and training etc) in-order to bring fruit ful results in the conservation of natural resources in general and snow leopard in specific.
3. The promotion of eco-tourism plays an important role both in conserving the natural resources and at the same time helps in enhancing the livelihood of local inhabitants which results in positive attitude towards natural resources, ecosystem and specially the conservation of endangered species i.e. snow leopard. So, it is suggested to promote sustainable and innovative eco-tourism patterns specifically in Chitral and generally in Pakistan.
4. The "Confidence-Building" of community is another important thing to carry-out the conservation process smoothly. So, there is a need of adoption of "Bottom-Up Approach" in the form of "Community-Empowerment" on part of Government organizations especially.
5. The abundance of wild prey species for the snow leopard can also increase the tolerance of community towards endangered species especially snow leopard. This step can help in two ways: Firstly, the predation of domestic livestocks by snow leopard can be reduced to its best level and secondly, it can provide incentives to the community in the form of "Trophy-Hunting".
6. "Environmental Education" can play a significant role in the conservation of snow leopard. It is suggested to build the capacity of communities through use of alternative media for awareness raising, formation of youth clubs at school and college levels, celebration of "Snow leopard Day", and finally the arrangement of trainings and workshops on the importance of wildlife in general and snow leopard in particular may help to achieve the goals of sustainable conservation of snow leopard.

5.4 Future Vision

Though in current study the various determinants of the snow leopard's conservation in Chitral district have been taken into consideration hence such type of study can be conducted at the

National level also. While at the same time, other variables affecting the conservation of snow leopard can also be added to the current study i.e. seasonal variations, herding and grazing patterns at the study area. While at the same time it is also possible to study more than one endangered species at the same time through the inclusion of sequencing and adding-up property in the CVM applications.

References

1. Ahmed, J., and S. Hussain (1998) "Community-based natural resource management in northern Pakistan" International CBNRM Workshop, Washington, D.C., May1998. IUCN: The World Conservation Union Gland, Switzerland.
2. Anabeth L. Indab., (2008) "Willingness to pay for Whale Shark Conservation in Sorsogon, Philippines", *EEPSEA,* pp. 55-75.
3. Baral, N., Gautam, R., Timilsina, N. and M.G. Bhat (2007) "Conservation implications of contingent valuation of critically endangered white rumped vulture in South Asia" *International* journal of Biodiversity Science and management. Vol. 3, No. 3. pp 145-156.
4. Baig, M. B., and F.S. Al-Subaiee (2009) "Biodiversity in Pakistan: Key issues" Biodiversity [Online]. Vol. 10, No.4. pp 20-29.
   Available at: http://dx.doi.org/10.1080/14888386.2009.9712858
   [Accessed 18 March 2012]
5. Baker, Joni (2012) "The international wildlife conservation regime and the convention on international trade in endangered species" Human Dimensions of wildlife: An International Journal [Online]. Vol. 4, No. 3. pp 18-39
   Available at: http://dx.doi.org/10.1080/10871209909359155
   [Accessed 17 December 2012]
6. Bhandari, A.K and A. Heshmati (2010) "Willingness to pay for Biodiversity Conservation" Journal of Travel and Tourism. Vol. 27, No. 6. pp 612-623.
7. Blamey, R. K., Bennett, J. W., Louviere, J. J., Morrison, M. D., and J. C. Rolfe (2002) "Attribute causality in environmental choice modeling" Environmental and Resource Economics. Vol. 23, pp 167-186.
8. Brush, S.B., and D. Stabinsky (2006) "Valuing local knowledge: Indigenous people and intellectual property rights" Island press, chapter 8, pp 167-186.
9. Cook, J., Jeuland, M., Maskery, B., and D. Whittington (2011) "Giving Stated Preference Respondents "Time to Think": Results From Four Countries" Environ Resource Econ. Vol. 51. pp 473–496.
10. David, G. Et al., (2008) "Willingness to pay for the conservation of endangered species in four Asian countries". Singapore: EEPSEA.

11. Espineira, R. M. and L.K. Hallstorm (2009) "Attitudes towards Wildlife habitat preservation in the management of private woodlots in Cape Breton". Human Dimensions of Wildlife: An International Journal. Vol. 14, pp 25-277.
12. Georgina C. Peard (2007) "Implementing good governance in protected areas: integrating local community needs and rights with conservation objectives in the central Karakoram, Northern Pakistan" Masters. University of East Anglia.
13. Government of Pakistan (2000) "Biodiversity Action Plan for Pakistan: A framework for Conserving our Natural Wealth" Ministry of Environment, Islamabad, Pakistan.
14. Government of Pakistan (2008) "Strategic Plan: Snow leopard Conservation in Pakistan" Ministry of Environment, Islamabad, Pakistan.
15. Hailu, A., Adamowicz, W. L., and P. C. Boxall (2000) "Compliments, substitutes, budget constraints and valuation" Environmental and Resource Economics. Vol. 16, pp 51-68.
16. Hellquist, A (2004) "Are divergent preferences between benefactors and beneficiaries an obstacle to community- based conservation?" Masters. Lund University.
17. Honey, M. (1999). Ecotourism and sustainable development. Washington, DC, Island Press.
18. Hussein, Ashatu (2009). "The use of Triangulation in Social Sciences Research: Can qualitative and quantitative methods be combined?" Journal of Comparative Social Work, Vol. 1, pp 9-10.
19. Hussain, Safqat (2002a) "Protecting the Snow leopard and Enhancing Farmer's Livelihood" Mountain Research and Development, Vol. 20, No. 3. pp 226-231.
20. Hussain, Safqat (2002b) "Nature and Human Nature: Conservation, Values and Snow leopard". In: Snow leopard and Full Moon Night Trekking, Pakistan, *Snow leopard Survival Strategy Workshop.* Seattle, USA May 2002.
21. Israr, Muhammad., Shafi, M.M., Ahmad, N., Khan, N., Baig, S., and Z.H. Khan (2004) "Eco-tourism in the Northern Pakistan and Challenges Perspective of the Stakeholders" Sarhad J. Agric, Vol. 25, No. 1. pp 113-120.
22. IUCN (1994). Guidelines for protected areas management categories, WCMC, Cambridge, UK and IUCN Gland, Switzerland: 261pp.
23. IUCN (2005a) "WPC Recommendation V.16 Good Governance of Protected Areas", in IUCN (2005) *Benefits Beyond Boundaries – Proceedings of the 5th IUCN World Parks Congress,* Durban, South Africa, 8-17 September 2003. pp 175-176. IUCN: Gland, Switzerland and Cambridge, UK.

24. IUCN (2007) "2007 IUCN Red List of Threatened Species - Extinction crisis escalates" Biodiversity, Vol 8, No. 3. pp 17-26.
25. Jacobson, K.M. and A.K. Dragun (2001) "The worth of a possum: Valuing endangered species with the contingent Valuation Method" Environmental and Resource Economics, Vol. 19, No.3. pp 211-227.
26. Jackson, R., Wangchuk, R., and J. Dadul (2003) **"**Local people's attitude toward wildlife conservation in the Hemis National Park with special reference to the conservation of large predators" SLC Field series document No.7, pp 1-29, California: The Snow leopard Conservancy.
27. Jackson, R.M., and R. Wangchuk (2004) "A community-based approach to mitigating livestock depredation by Snow leopards" Human Dimensions of Wildlife: An International Journal, Vol. 9, No. 4. pp 1-16.
28. Jacobsen, J. B., Boiesen, J. H., Thorsen, B. J., N. Strange (2008) "What's in name? The use of quantitative measures verses 'Iconised' species when valuing biodiversity" Environ Resource Econ, Vol 39, pp 247-263.
29. Jin, J., Indab, A., Nabangchang, O., Thuy, T.D., Harder, D., and R.F. Subade (2010) "Valuing marine turtle conservation: A cross-country study in Asian cities" Ecological Economics, Vol 69, No. 2010. pp 2020-2026.
30. Khan, M.S., and S.A. Bhagwat (2010) "Protected Areas: A resource or constraint for local people". Mountain Research and Development, Vol. 30, No.1. pp 14-24.
31. Khan, S.R., Rahman, S.A., and T. Sunderland (2011) "Commons becoming non-commons in the efforts for reconciliation between conservation and livelihoods: A case study of northern Pakistan" Journal of Horticulture and Forestry. Vol. 3, No. 3. pp 63-71.
32. Khatoon, Rukhsana (2010) "Diet Selection of Snow leopard (Uncia Uncia) in Chitral Area." Master of Philosophy. Rawalpindi: Pir Mehr Ali Shah Arid Agriculture University.
33. Labao et al (2008). Do colored photographs affect willingness to pay responses for endangered species conservation? Environmental and Resource Economics, Vol. 40, pp 251-264.
34. Lucherini, M., and M. J. Merino (2008) "Perceptions of Human–Carnivore Conflicts in the High Andes of Argentina" Mountain Research and Development, Vol. 28, No.1. pp 81-85.
35. Manfredo, M., (2008) "Who cares about wildlife? Social science concepts for exploring human-wildlife relations and conservation issues" New York: Springer.

36. Milheiras, Sergio and I. Hodge (2011) "Attitudes towards compensation for wolf damage to livestock in Viana do Castelo, North of Portugal" Innovation: the journal of Social Science Research [Online]. 24:3, pp 333-351.
Available at: http://dx.doi.org/10.1080/13511610.2011.592071
[Accessed 04 January 2013].
37. Misra, S., Maikhuri, R.K., Dhyani, D., and K. S. Rao (2009) "Assessment of traditional rights, local interference and natural resource management in Kedarnath Wildlife Sanctuary" International Journal of Sustainable Development and World Ecology. Vol. 16. No. 6. pp 404-416.
38. Nawaz, M.A and J.U. Din (2011) "Status of Snow leopard and Prey Species in Torkhow valley, District Chitral, Pakistan" The Journal of Plant and Animal Sciences. Vol. 21, No. 4. pp 836-840.
39. Nelson, Fred (2009) "Developing Payments for Ecosystem Services Approaches to Carnivore Conservation" Human Dimensions of Wildlife: An International Journal. Vol. 14, No. 6. pp 381-392.
40. Nuva, R. and M. N. Shamsudin (2009).Willingness to Pay towards the Conservation of Ecotourism Resources at Gunung Gede Pangrango National Park, West Java, Indonesia. Journal of Sustainable Development, Vol. 2, No. 2. pp 173-186.
41. Nyhus, P. J., Osofsky. S.A., Madden, F., and H. Fischer (2003) "Taking the bite out of wildlife damage: The challenges of wildlife compensation schemes" Conservation in Practice, Vol 4, pp 37-40.
42. Nyhus, P. J., Osofsky. S.A., Ferraro, P., Madden, F., and H. Fischer (2005) "Bearing the cost of human-wildlife conflict: the challenges of wildlife compensation schemes" Cambridge University Press, pp 107-121.
43. Rawls, R. P and D.N. Laband (2004) "A public choice analysis of endangered species listings" Public Choice, Vol. 121, No.1. pp 263-277.
44. Rosen, et al (2012) "Reconciling sustainable development of mountain communities with large carnivore conservation" Mountain Research and Development, Vol. 32(3), pp 286-293.
45. Shah, S., A. (2011 a) "Conservation of endangered species in Khyber Paktun Khwa" The journal of Animal and Plant Science. Vol. 21, No. 2 (Suppl). pp 400-404.
46. Shah, M. A, (2011 b) "An evaluation of Biodiversity Management Laws and Practices in Pakistan". International Poster journal of Science and Technology, Vol. 1, No.1. pp 1-5.

47. Simms, A., Moheb, Z., Salahudin, Ali, H., Ali, I., T. Wood (2011) "Saving threatened species in Afghanistan: Snow leopards in Wakhan Corridor". International Journal of Environmental Studies [Online]. Vol 68, No.3. pp 299-312.
48. Sorice, M. G., Haider, W., Conner, J. R., and R. B. Ditton (2011) "Incentive Structure of and Private Landowner Participation in an Endangered Species Conservation Program" Conservation Biology, Vol. 25, No. 3. pp 587–596.
49. Spiteri, Arian and S.K., Nepal (2008) "Evaluating local benefits from conservation in Nepal's Annapurna conservation area" Environmental Management Vol. 42, pp 391-401.
Available at: [http://dx.doi.org/10.1080/00207233.2011.577147]
[Accessed 04 January 2013]
50. Stevens, T. H., More, T. A., and R. J. Glass (1993) "Measuring the Existence Value of Wildlife: Reply" Land Economics, Vol. 69, No. 3, pp. 309-312.
51. Thapa, Kamal (2005) "Is there any correlation between abundance of Blue Sheep population and livestock depredation by Snow leopards in the Phu Valley, Manang District, Annapurna Conservation Area?", annual report 2004-2005, Nepal: International Snow leopard Trust for Annapurna Conservation Area Project, Pokhara.
52. Treves, A., Wallace, R.B., Treves, L.N., and A. Morales (2006) "Co-Managing Human–Wildlife Conflicts: A Review" Human Dimensions of Wildlife: An International Journal. Vol 11, No. 6. pp 383-396.
53. Veisten, et al (2004) "Sequencing and the Adding-up Property in Contingent Valuation of Endangered Species: Are Contingent Non-use Values Economic Values?" Environmental and Resource Economics, Vol. 29, pp 419-433.
54. Wallamo, Kristy and D.K. Lew (2012) "Public willingness to pay for recovering and down-listing threatened and endangered marine species" Conservation Biology. Vol 26, No.5. pp 830-839.
55. World Wide Fund (2006) "The WWF Snow leopard Action Strategy for the Himalayan Region", a Regional Snow leopard Action Strategy Workshop, Paro, Bhutan, March 2005, WWF: Tashi Tshering, Bhutan.

APENDEX A

Survey of District Chitral for the Conservational Value of Snow Leopard

Section 1: *Problems facing the country*

1. Please prioritize the problems facing the Country.

Problems Facing the Country							
	Economic Problems	**Education**	**Health**	**Governance**	**Environment**	**Terrorism**	**Other**
Rank*							

***1 as the most important and 7 as the least important**

2. Please prioritize the issues related to nature and human impact on the natural environment.

Environmental Problems						
	Water pollution	**Solid waste Management**	**Deforestation**	**Biodiversity loss**	**Global warming**	**Other**
Rank*						

*** 1 as the most important and 6 as the least important**

Section 2: *Attitude towards conservation and awareness about Snow Leopard*

3. According to importance and protection, the population of which the following Chitrali species you wish to increase / maintain / reduce / eliminate from your area?

Ranking of Environmental goods in Chitral according to their Importance				
	Brown Bear	**wolf**	**Snow Leopard**	**Lynx**
Ranking*				
Please state the Reason				

*** Increase= 1, Maintain= 2, Decrease= 3, Eliminate= 4**

4. Predation of livestock due to the wild life in the past five years?

		Types of livestock			
		Sheep	**Goat**	**Cow**	**Other**
No, of livestock yours family own					
Value of livestock in Rs.					
Cost in Rs. from different types of attack by wild life	**Slightly injury cost in Rs**				
	Major injury cost in Rs.				
	Death cost in Rs.				
Type of Predator*					
Number of Predations in the past *Five years*					
Mortality Cost due to diseases	**Weight loss in Rs.**				
	Death Cost in Rs.				

*** Codes of predatory animals: Wolf =1, Snow leopard=2, Brown Bear=3, Lynx=4**

5. Would you like to bear the cost incurred by the wild life? **Yes** ☐ **No** ☐

6. Have you ever seen snow leopard? **Yes** ☐ **No** ☐

7. The Snow Leopard is the most endangered species in Chitral and Pakistan.

- ***Yes*** then why.....
- ***No*** then why.....
- ***Don't know***.....

8. Information about Snow leopard.

	Snow leopard does not stay in one place	Snow leopard is an Opportunistic animal	It is beneficial and has important role in the ecosystem	There are real threats to Snow leopard which would wipe the entire population
Yes				
No				
Don't know				

9. The population of the snow leopard is ***increasing*** ☐ **,** ***decreasing*** ☐ **,** ***or constant*** ☐

Section 3: ***Conservation Plan for Snow leopard***

"The snow leopard conservation program means that your household would pay a fixed amount voluntarily every month for few years. This amount will go to the *Snow leopard Fund* to finance the conservation program.

Under this program your livestock will be insured via the *Insurance scheme***.** Through the *Snow leopard enterprise,* trainings will be given especially to the household's female in-order to produce best quality of local products, your family income will also increase. Finally, under the *Snow leopard tourism program*, there will be tourism activities in your area which will help to increase your income also. So, would you like to vote for the conservation program?"

☐ **Yes (Go to number 11)** ☐ **No (Go to number 10)**

10. Please state the reason that why you did not vote for the program?

I don't think the conservation of Snow Leopard is worth doing.	
I don't believe that the money I pay will actually be used for SLC.	
I think that other species are more important than Snow Leopard.	
A lot of poor will be affected	
I prefer giving money to humanitarian cause instead	
I do not earn money that can pay for the Program	
Only the direct beneficiaries from the program should pay for this	
Only those from higher income groups should pay for this	
Others (please specify)	

11. Please state the amount that you would like to pay for the conservation of Snow Leopard.....

12. How much you would like to pay, if the ***whole village*** showed its willingness to pay? Please state the amount.....

13. How much you would like to pay, if ***half of the village*** showed its willingness to pay? Please state the amount.....

14. How much you would like to pay, if ***25percent of the people in the village*** showed its willingness to pay? Please state the amount.....

15. If you voted 'Yes', what was it that convinced you to vote positively for it?

The snow leopard is a special animal and should be protected	
It is right time that people in Chitral should do something concrete	
This initiative can lead to more protection efforts for other endangered species	
Any other reason	

16. Please rank (1, as most important and 6, as the least important) the following according to how effective you think there would be encouraging people to contribute to a Snow Leopard Conservation Fund.

By providing information to public regarding snow leopard problems	
By creating transparency and accountability	
By the use media	
By awareness campaigns	
With the help of informal institutions	
Other	

17. When you decided on your vote, did you believe that Snow Leopard Conservation Program will actually be effective in saving the Snow Leopard?

Yes (Go to 19)	No (Go to 18)	Don't Know

18. If no, why not? Please check the appropriate answer.

The fund may not be used for the conservation program due to corruption	
The funds may be used by the govt; for other uses	
The funds may not be remitted by the collecting agency on time	
Other , please specify	

Section 4: *House hold's Characteristics*

19. Name of respondent....., Age....., Gender....., Sect....., Married ☐ Unmarried ☐

20. Years of Schooling..... **21.** Relationship to the House Hold Head.....

22. House hold member's per age group (Including you)

Family Members	Children (<13 yrs)	Teens (13-17 yrs)	Adults (above 17 yrs of age)	Total no, of Dependents	Married	Unmarried
Male						
Female						

23. Education of the Family (including you)

Family members	Illiterate	Primary	Middle	High School	Graduate	Master's	Vocational	Religious Education	other
Male									
Female									

24. Monthly income of the family (including you)

	Below 10,000	Rs. 10,000-20,000	Rs. 20,001-30,000	Rs. 30,001-40,000	Rs. 40,001-50,000	Rs. 50,001-Above
Male						
Female						

25. Did your household make donations to any charitable causes, in the past? **Yes** ☐ **No** ☐

26. Membership in any environmental / grass root institution.

	Yes (then, please state the nature of organization)	No
Have you membership in any Grass root institution or Environmental organization?		

27. Involvement in the Eco-tourism activities.

	Yes		No
	Type of activities	**Income from activity**	
Have you ever been involved in the eco-tourism activities?			

Thank you very much for your Time