# Conservation of Snow Leopard in Western Bhutan

TECHNICAL REPORT

MARCH 2018


**Submitted By:**

Kinley Tenzin

www.moaf.gov.bt

kinleytenzin32@gmail.com


**Submitted To:**

Rufford Small Grants Foundation

2018

**Table of Contents**

**Executive summary**

Snow leopards (*Panthera unica*) are keystone species in the mountain ecosystem. Their presence in the mountains maintains the healthy mountain ecosystem. Snow leopards are one of among the large carnivores which are vulnerable to human activities, as they require larger areas of habitat, which are overlapped by the herders and the high mountain dwellers. Survivals of snow leopard are threatened by retaliatory killings, poaching, a decline of prey species, and habitat degradation. The problem is becoming severe with snow leopard predating on livestock and retaliatory killing of the predator by people.

Snow leopard conflict with the yak herders in Bhutan is also a major issue. Although conflict between human and snow leopard has been studied some parts of Bhutan, knowledge on this aspect in the Jigme Khesar Strict Nature and its Buffer zone in western region is still rudimentary. The proposed research presented here is crucial to generate better, more detailed information extent of conflict between herders and snow leopard, which will lead to reduction in conflict and more effective conservation of snow leopard and thus healthy mountain ecosystem.

The project on **Conservation of Snow Leopard in Western Bhutan** was primarily designed to generate, detailed information on extent of conflict, herders perception on snow leopard conservation and its conflict and generation of snow leopard depredation on yak hotspot areas for further conservation focus and initiatives. To investigate human-snow leopard conflicts, conducted herders interviews about livestock depredation, overall attitudes towards snow leopards. Result found that herder's livelihood was impacted by yak depredation by wild predators. Total of four predators were involved and Snow leopard was on the top, which caused major conflict with yak herders. Annually significant numbers of yaks are lost to predation by Snow Leopard and their even reports of Snow Leopard being killed by poisoning on the carcass. Majority (90%) of the herder percept that Snow Leopard is not beneficial and they don't support the conservation of Snow Leopard. The major conflict with snow leopard was concentrated in the northern part of Jigme Khesar Strict Nature Reserve. Herders were more happy and willing to support Snow Leopard conservation when they are provided with the incentives like tarpaulin. Recommend a multi-pronged conservation program that includes compensation, insurance programs and integrated conservation development programs (ICDP).

## Problem statement

The iconic snow leopard species of central Asian mountain regions are least know because of its elusive nature and secretive habitat. Snow leopards are considered as an apex predator, whose survival depends on the healthy population of its prey species. Survival of prey species depends on the good quality rangeland; quality of range land are determined by the extent of livestock grazing and human interference (Mccarthy & Chapron, 2014). Snow leopards share their range with pastoral communities who also require healthy rangelands to sustain their livestock and livelihoods. Population of Snow Leopard is believed to be declining due to killing by herders as livestock predator, poaching for fur and loss of habitats (Brunton & Barraclough, 2016).

Bhutan is one of the habitat ranges of Snow leopard. Study on snow leopard and its interaction with human is very limited in Bhutan. In 2014, Bhutan initiated population senses of Snow Leopard in Bhutan and accounted to be around 96 individuals of snow leopard in Bhutan and 9 individuals were estimated from Jigme Khesar Strict Nature Reserve. Presence of snow leopard in present study has been confirmed through camera trap survey and the livestock depredation cases reported by the Yak herders (Mccarthy & Chapron, 2014). There is information gap in extent of livestock depredation by Snow Leopard, its implication on livelihood of the herders and their attitude and perception towards Snow leopard conservation. Therefore, this study will determine the extent of livestock depredation by Snow Leopard and its implication on livelihood of the herders, attitude and perception of the herders towards Snow Leopard conservation, produce livestock depredation site map for future mitigation measures and provide a Tarpaulin to the herds as token of appreciation for their harmonic co-existence with Snow Leopard.

## Goals and Objectives

**Goal:** Conservation of Snow Leopard in its Harmonic co-existence with the Yak herders.

Snow leopards share their home range with the Yak herders and both demands same kind of geographical and climatic characteristics. Their existence in a same range creates interaction or conflict in terms of livestock depredation by the Snow Leopard and diminishing its prey species by excessive grazing by the Yaks. Therefore, it is pivotal to ensure their co-existence in harmony in same range through strategic intervention actions.

**Objectives:**

1. To assess the extent of Human-Snow Leopard conflict.
2. To analyze attitude and perception of Yak herders towards Snow leopard conservation.
3. To produce human snow leopard conflict presence map.
4. To provide a Tarpaulin to herders.

The first objective was to determine the degree or significance of livestock depredation by Snow Leopard and its implication on the livelihood of the herders. Survival of viable Snow leopard population will be influenced by the attitude and the perception of herders. If the livestock depredation and negative implication on their livelihood is significant, there are high probability of killing of snow leopard in retaliation and poaching to earn amount lost to depredation by selling the snow leopard parts. Second objective is to analyze the attitude and perception of the herders towards Snow leopard conservation. Third objective will determine the depredation sites, which will help to focus the intervention actions towards that particular problem site. Fourth objective will be carried out to appreciate the herders for their co-existence with Snow leopard till date, in form of incentive. Providing tarpaulin as token of appreciation will help them to provide herd cover for their yaks, especially calf and which will make them to feel the presence of Snow Leopard conservation benefits.

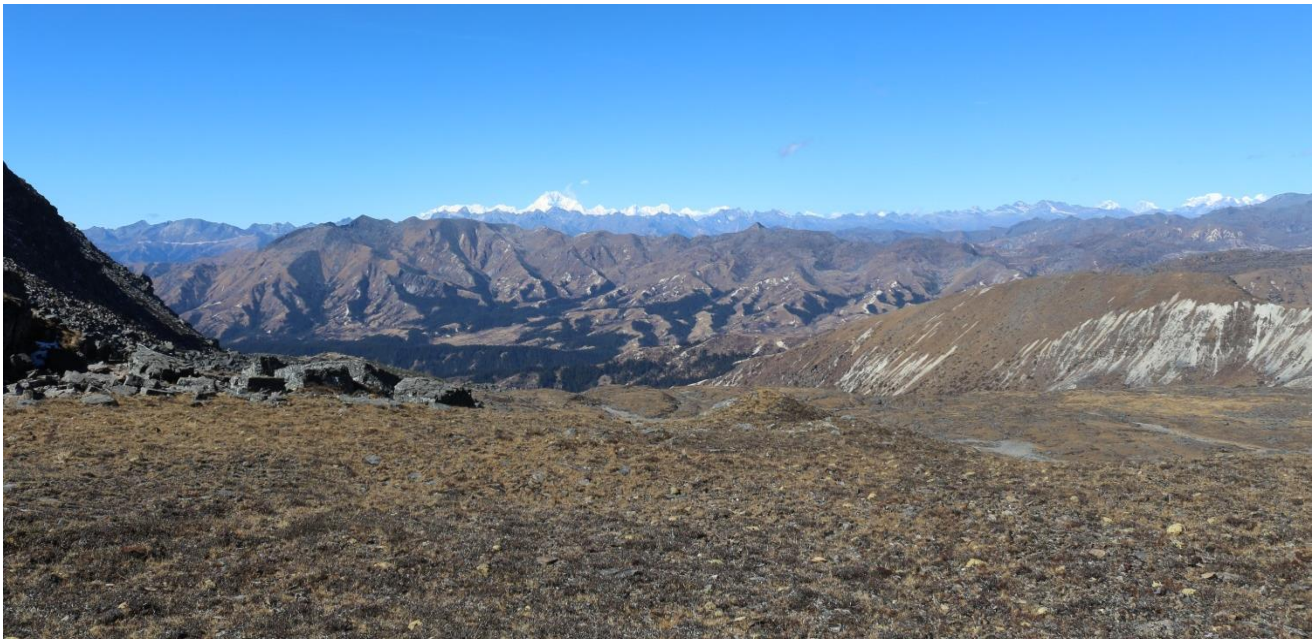
## Materials and methods

### Study area

Study area is located between latitude of 27°11'58.97"N & 27°34'28.40"N and longitude of 88°54'29.41"E & 89°16'4.71"E. Study area is within Jigme Khesar Strict Nature Reserve (renamed from Toorsa Strict Nature Reserve in 2014) and its periphery buffer zone, which is located in extreme west of Bhutan, sharing its boundary with India and Tibet. Study area covers an area of 957.30 sqkm of which 825 sqkm are suitable habitat of Snow Leopard which is above 3000 meters above sea level (Figure: 1). During summer, it receives average of less than 650 mm of rain and during winter 70% of its area is covered by the snow.

Jigme Khesar Strict Nature Reserve was declared in 1993 but was not put under function until 2010. From 2010 it started to function with its conservation management plan from 2010 till 2017. There is no permanent settlement within the Reserve but there are around 56 itinerant Yak herders moving within the Reserve and its buffer zone. These itinerant yak herders depends their living on Yak rearing, most of their family are residing in the semi-urban area of Haa district. Children education and all the expenses are met through incomes from rearing of Yak. Illegal trade route from Bhutan to Tibet passed through this study area and it is extensively used by the illegal traders.

Many cases of yak depredation by Snow Leopard have been reported by the itinerant yak herders in current study area. Moreover, no study on snow leopard human interaction has been carried out in the present study area. Hence, this study area has been selected to assess the human Snow leopard conflict and its implication on herder's livelihood and conservation of Snow Leopard.



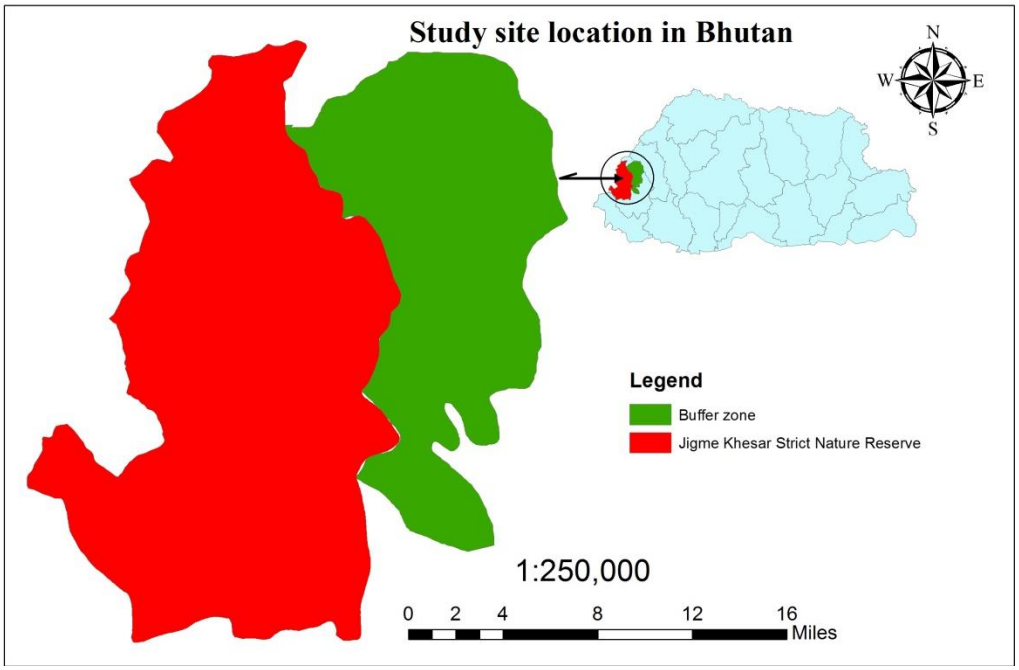



**Figure 1.** Study area location

**Research design and data analysis**

Goal of this project was to conserve Snow Leopard in harmonic co-existence with the Yak herders. Four objectives have been strategically framed to achieve the goal of this project. To fulfill first two sequential objectives, it involved collection or gathering information from the itinerant yak herders. Target population of the project was the yak herders and all the yak herders were selected for enumeration for the precise and accurate data collection, which helped in generating reliable and authentic result of the project.

Semi-structured questionnaires were developed to collect the information. Majority of the questions were in the form of close ended, which eased the interviewee to conduct interview survey and helped in quantitative analysis, however, multiple or the closed ended questions were framed in respect to information required and relevancy to the study. Interview was carried out by

visiting every yak herds. Field staffs from Jigme Khesar Strict Nature were deployed conducting questionnaire survey (Figure: 2).

**Figure 2.** Questionnaire interview with the herders

Before going for the field, survey enumerators were trained on data collection methods, survey protocols, survey needs and overview of the project.

Location points of yak depredation by Snow Leopard were collected through interview and livestock depredation site map were produced using the Google earth and ArcGIS 10.3.1.

Every herder was provided with Tarpaulin as appreciations for their harmonic co-existence with snow leopard and let them feel the benefits of conserving Snow leopard.

Data collected from the field were coded and entered in Microsoft excel. Data analyses were carried out using Statistical Package for Social Science (SPSS 23.00).

# Result and Discussion

### Socio-demographic characteristics of respondents

Data were collected from 56 yak herders. There were total of 77 households holding yak in Haa district and few households keep combined herds and there were only 56 itinerant yak herders in residing in Jigme Khesar Strict Nature and its buffer zone (Figure:3). Out of 56 respondents, 53.6% ($n$ = 30) were men and 46.4% ($n$ = 826) were women. Each herd was having average of 2 people living with the yak. The oldest person with the herd was 68 years old man and the youngest was 18 year old boy. Yak herders were from three geogs (Blocks) were raring yak in the study site. Out of total respondent 10.7% (n=6) were from Eusu, 21.4% (n=12) from Katsho and 67.9 (n=38) were from Bji geog. Bji geog is located in the northern part of Haa district and Eusu in the lower part. Number of household's raring yak had drastically decreased in all the geog when compared in past five years.

**Figure 3.** Shifting yak herd

**Livestock holding characteristics of Yak herd.**

Beside Yak, yak herders also keep horse for transportation of food and stationaries to the herd and dogs to guard their herd. The mean annual yak holding per herd was 78 (*SD* ± 27). Total of 6916 yaks were raring the 56 yak herders in Jigme Khesar Strict Nature Reserve and its buffer zones. Among the yak category highest was with milch Yak with 24.7% followed by dry yak, bull yak and heifer with medium and lowest with bread bulls (Table: 1). This indicates that Yaks were mainly kept for milk and bulls for breading and bullocks for meat. There is a system of killing one bullock annually to perform ritual to appease their local deity but with increase in population and demand for yak meat, few herders also kill few yaks annually for commercial cash (Figure:4).

**Table 1.** Yak category composition

| Category | No | % |
|---|---|---|
| Calf one year male | 730 | 10.60% |
| Calf one year female | 820 | 11.90% |
| Heifer | 1006 | 14.50% |
| Milch | 1706 | 24.70% |
| Dry | 1021 | 14.80% |
| Breed Bull | 268 | 3.90% |
| Bull | 978 | 14.10% |
| Bullock | 387 | 5.60% |

**Figure 4.** Yak meat sold at local market

Each yak herd was keeping mean of 5.49 (*SD* ± 3.07) horses for transportation purposes (Figure:5) and mean of 2.37 (*SD* ± 1.39) dogs for herd guarding. 49% of the horses were local male horse with 26.7% local female. They were also keeping mule and very less of improved breed horse. Local male horses were most preferred by the herders.

**Figure 5.** Horses used for transportation of good.

**Income source and livelihood of the yak herders**

All the 56 herders were itinerant, they move from place to place for herding to get enough grazing. During summer the entire herders move down to low lands up to 2300 masl and in the summer they move up in the high alpines and meadows. All the herders own their permanent

houses at semi-urban valley of Haa (Figure: 6). Families at villages are all looked upon by the income generated from the sale of Yak products and Yak. They also do subsistence farming in the permanent houses. First option of rearing yak is for income and second is for food.

The result revealed that there were four major types of problems faced by the Yak herders. Depredation of Yak by the wild predators topped the rank followed by disease outbreak and labor sortage to look after the Yaks. They were also facing the problem of feral dogs attack on their Yak and human too. Some of the herders were also facing the pasture competition pressure with Yak herders from Tibet in the boarders like Shaktoe (Table: 2). Majority of the herders (69.6%) report that there is no grazing competition among the herds or with other wild animals like blue sheep but 30.4% asserts that they were having grazing competition.

**Figure 6.** Yak herders permanent houses at low lands

**Table 2.** Yak raring problems faced by herders

| Problem category | Number | % |
|---|---|---|
| Predators | 24 | 42.90% |
| Disease | 11 | 19.60% |
| Pasture pressure at border with Tibet | 3 | 5.40% |
| Feral domestic dogs | 7 | 12.50% |
| Labor shortage | 11 | 19.60% |

## Livestock depredation

### Yak depredation by wild predators

Yak herders were keeping horses and dogs with yak and all three species were lost to wild predators in last five years. This predation was caused by major four wild predators. Total of 430 animals were lost to these predators in last five years. Yak was highest (92.8%) with very less of horse and dogs. This is because Yaks were the major component of composition and their exposure to depredation risk is also high (Figure: 7).

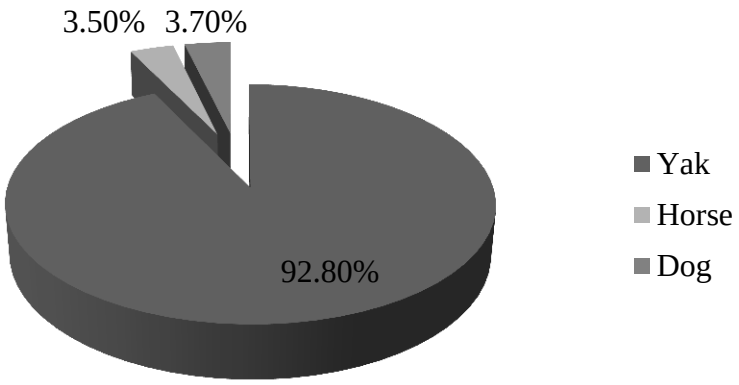



**Figure 7.** Livestock depredation composition of herders

Herders lost their yak to four predators and maximum depredation to yak was caused by Snow Leopard with 78.7% followed by dhole with 18.3% and very less by black bear and common leopard (Figure:8) . Young ones of the Yak are highly vulnerable to depredation by Snow leopard (98.5%) and they are rarely attacked by common leopard (.3%). Adults Yaks are more lost to dhole with 75% followed by Snow Leopard with 17.9%. Heifer yaks are also vulnerable to both Snow Leopard (56.6%) and dhole (37.7%). Only one young yak was lost to common leopard in last five years by 56 yak herds, thus it proves that Yaks are negligibly lost to common leopards (Table:3).

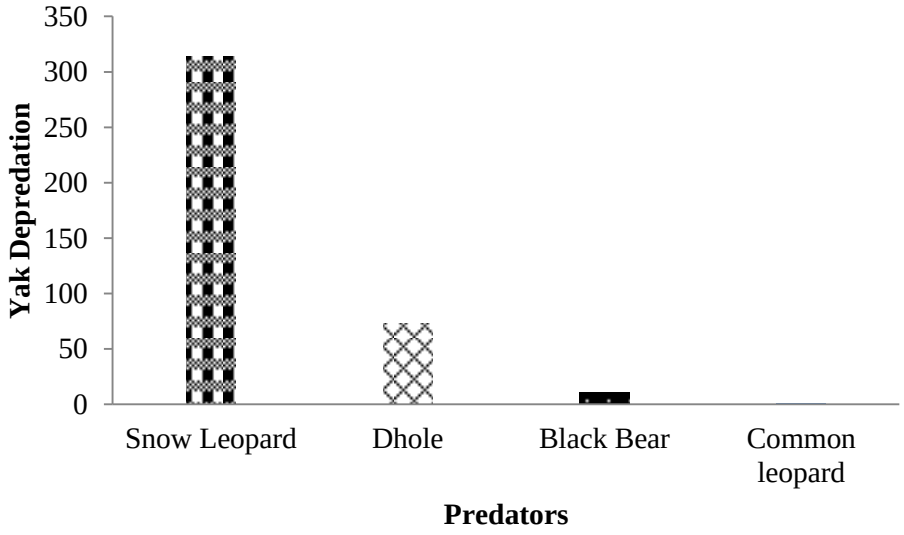



**Figure 8.** Yak depredation composition by wild predators

**Table 3.** Age category of yak depredation by wild predators

| **Predators** | **Young** N (%) | **Adult** N (%) | **Heifer** N (%) |
|---|---|---|---|
| Snow Leopard | 273 (94.5) | 10 (17.9) | 30 (56.6) |
| Dhole | 11 (3.8) | 42 (75) | 20 (37.7) |
| Black Bear | 4 (1.4) | 4 7.1) | 3 (5.7) |
| Common leopard | 1 (.3) | | |

**Yak depredation by Snow Leopard**

Total of 314 Yaks were lost to Snow Leopard by 56 yak herders in last five years. Majority of the Yak depredation by snow leopard was young (85.8%) yaks followed by heifer (9.40%) and very less of adult (3.10%) yak (Figure: 10). 60.5% of the yak depredation by snow leopard has happened in summer followed by spring (24.1%) and very less in winter and autumn, this is because during winter and autumn seasons, yak herds come down to low lands and only in early spring they move up to high mountains and stay there for whole summer (Figure: 11). Majority of the yak depredation by snow leopard was carried in night with 76.4% and only 22% during the day time (Figure: 12).49.8% of the yak depredation by snow leopard was confirmed through pugmark, 28.9% of the herders saw snow leopard killing yak and 19.7% of the herders confirmed yak kill by snow leopard by looking at type of kill by snow leopard (Figure: 13).

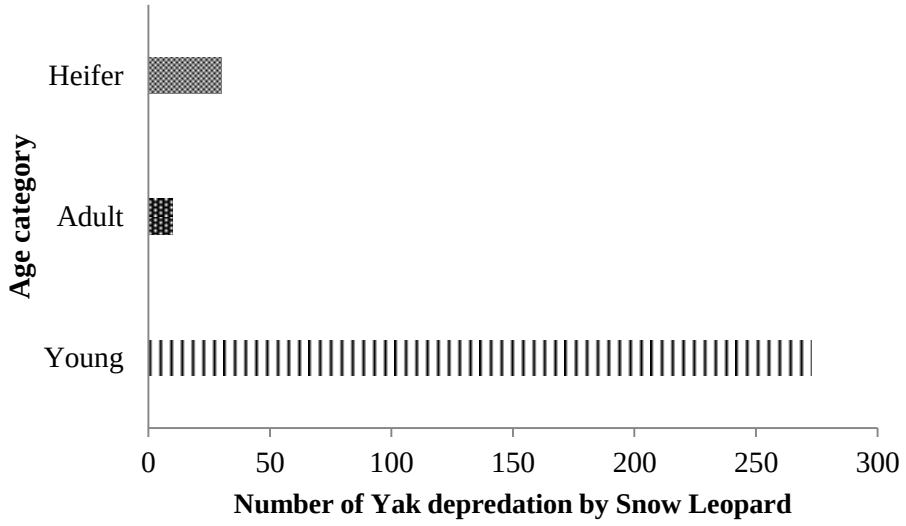



**Figure 9.** Age category of yak depredation by Snow Leopard

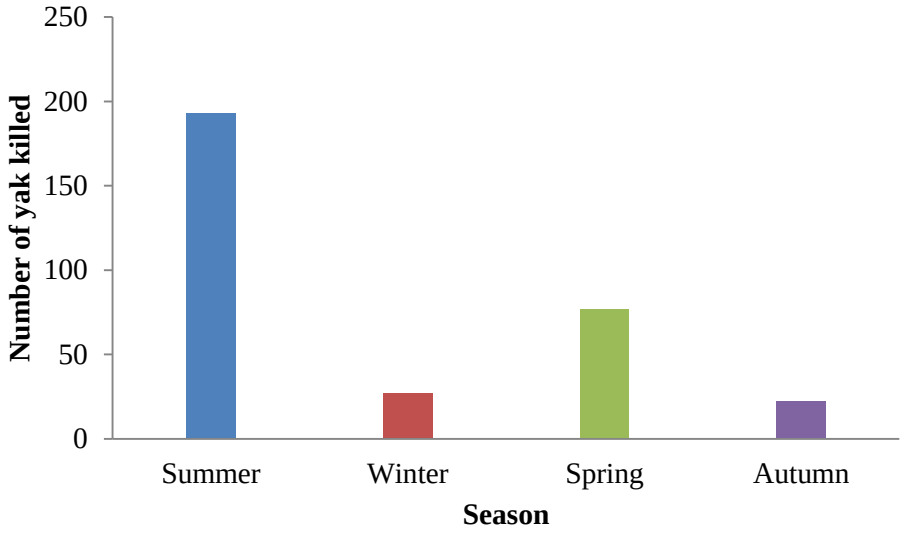



**Figure 10.** Seasonal preference of yak depredation by Snow Leopard

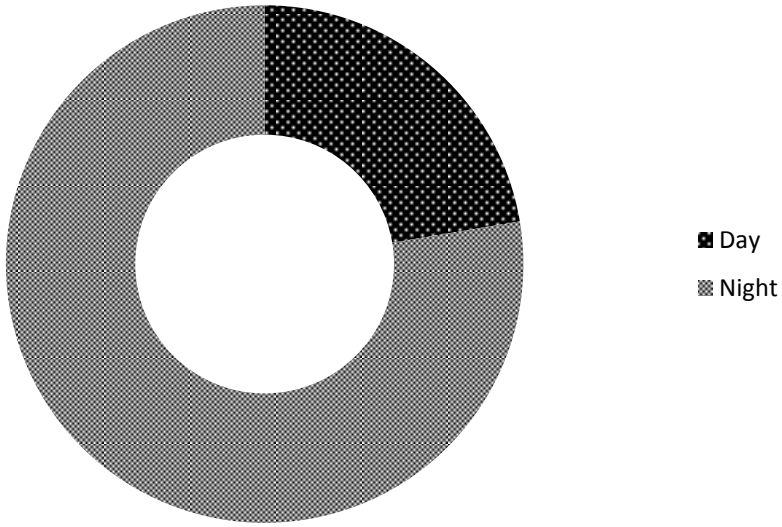



**Figure 11.** Yak depredation timing preference of Snow leopard

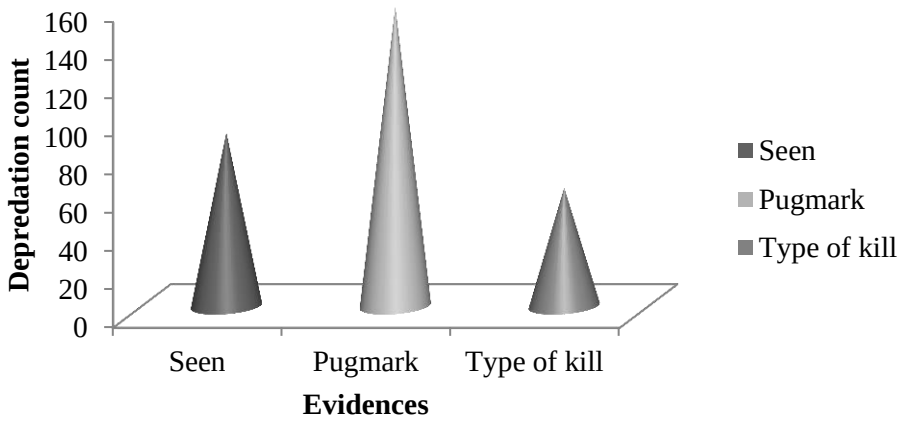


**Figure 12.** Yak depredation identification evidences types

## Herder's perception and tolerance towards Snow Leopard Conservation

Herder's attitude and perception towards snow leopard determines the survival of snow leopard. All of the herders said that they know snow leopard, when they were asked about "do you know snow leopard?'. Majority of the herders (78.6%) had sighted snow leopard and 12.5% of the herders had known by seeing in the television and 8.9% had heard from others (Table: 4).

**Table 4.** How do you know Snow Leopard?

| Evidences | Number | % |
|---|---|---|
| Sighted | 44 | 78.60% |
| Saw in television | 7 | 12.50% |
| Heard from others | 5 | 8.90% |

When the herders were asked about the population trend of Snow leopard, 52% of the herders believe that snow leopard is increasing and 37% believes that population is remaining same. While 11% believes it is decreasing (Figure: 14). Most of their perception on snow leopard population is driven by the extent of yak depredation by snow leopard. Herders, who lost their yak to snow leopard frequently, believe increase on the population.

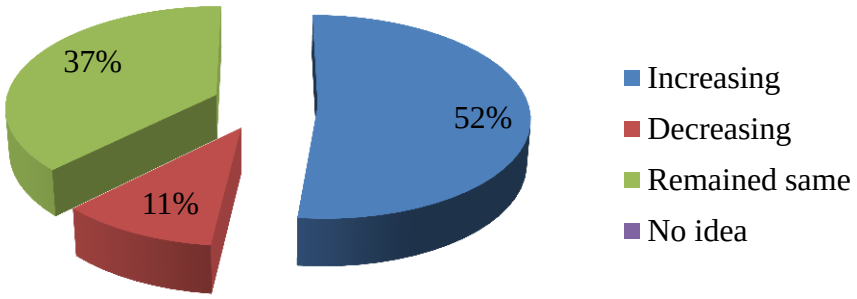



**Figure 13.** Perception on Snow Leopard trend

Majority (55.4%) of the herders believes that snow leopard conflict with the herders is severe and 44.5% percept that its problem is moderate (Figure: 15). This indicates that snow leopard conflict with the yak herders is prevailing and causing major threat to the yak herders. When the herders were asked about their perception on the benefit of snow leopard existence, maximum herders (73.2%)

believes that snow leopard is very harmful and only minimal (7.1%) believes it is beneficial to our ecosystem (Figure: 16). Majority (71.1%) of the herders was not in favor of conservation of the snow leopard and only 7.1% are in favor for conservation of snow leopard and rest 21.4% are neutral in this perception (Table: 5).

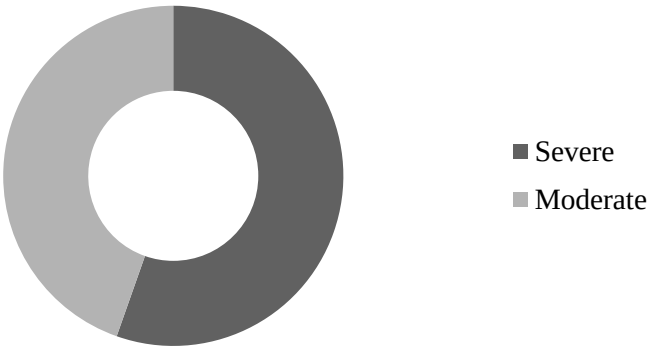



**Figure 14.** Perception of herders Snow Leopard conflict

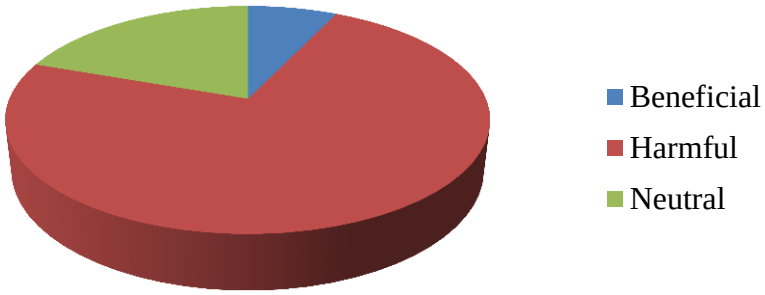



**Figure 15.** Perception on benefit of Snow Leopard

**Table 5.** Attitude towards Snow Leopard conservation

| Category | Count | N % |
|---|---|---|
| Agree | 4 | 7.10% |
| Do not agree | 40 | 71.40% |
| Neutral | 12 | 21.40% |

Herders were interviewed about their idea of reducing conflict and majority (50%) of the herders said that compensation scheme followed by integrated conservation development programs or incentives will help to reduce the herder- snow leopard conflict. Few (10%) said that by proper management and looking after the yak would help to reduce herder's conflict with snow leopard. Herders were even saying that killing of snow leopard by hunting (10.7%) and poisoning (8.9%) will reduce their conflict with snow leopard, which indicates that people were not happy with existence of snow leopard with herders (Figure: 17).

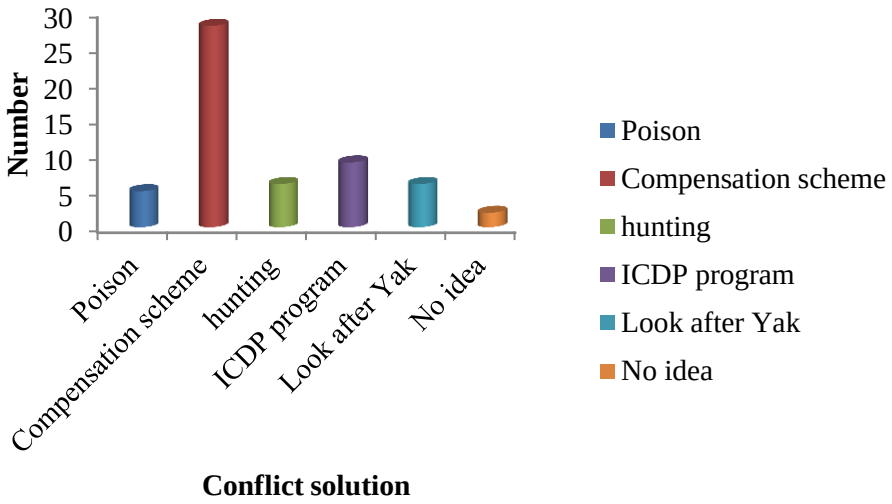



**Figure 16.** Perception on conflict solution

Higher proportion (82.14%) of the herders were aware that the Snow leopard is protected by the Forest and Nature Conservation act and rules of Bhutan rest 17.86% were not aware about the snow leopard being protected by forest and nature conservation acts and rules of Bhutan (Figure: 17). 41.1% of the herders said that it is good that Snow leopard is protected by acts and rules, 25% were neutral in this view, 23.2% are not sure of such protection and only few (10.7%) said that it is not good to protect snow leopard through acts and rules (Table: 6). Majority (73.2%) of the herders are in the urge to kill snow leopard if there is no restriction on snow leopard being protected by acts and rules and 19.6% said that they are not in favor of snow leopard killing even if it is not protected by acts and rules, while 7.1% are neutral in this situation. Their attitude towards snow leopard showed that 73.2% of the respondent doesn't like Snow leopard and 16.1% are in neutral and only 10.7% liked snow leopard (Figure: 18).


**Figure 17.** Awareness about Snow Leopard being protected by FNCA and FNCR

**Table 6.** Perception of existing conservation policy

| Category | Number | N % |
|---|---|---|
| Good | 23 | 41.10% |
| Bad | 6 | 10.70% |
| Neutral | 14 | 25.00% |
| No idea | 13 | 23.20% |

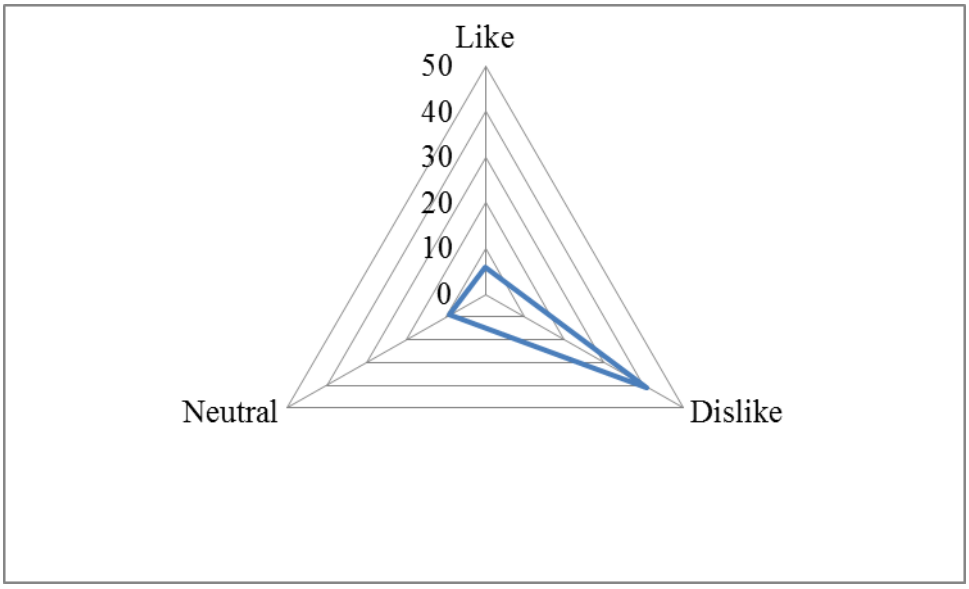
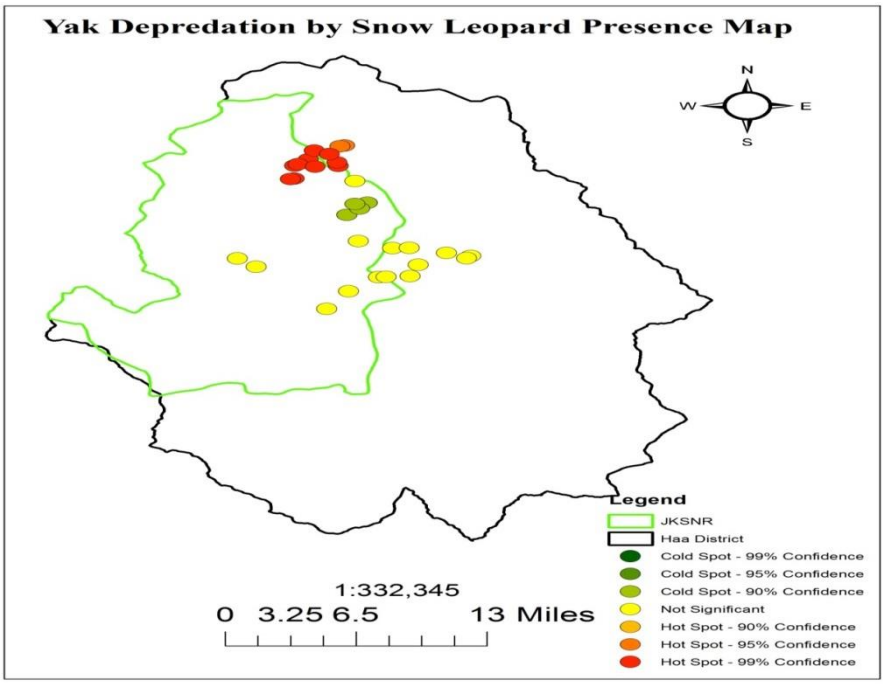
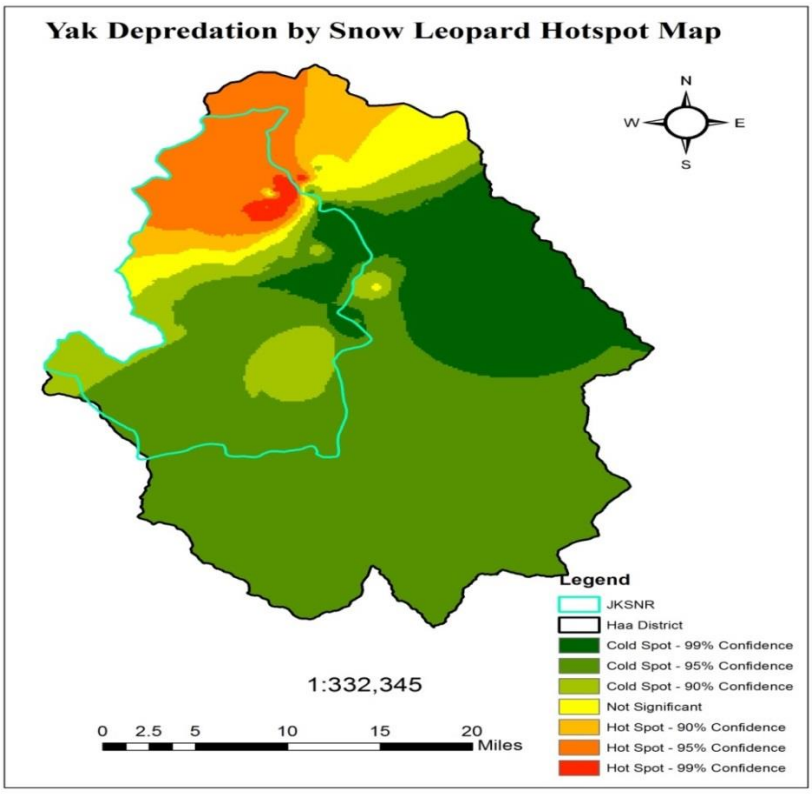



**Figure 18.** Attitude towards snow leopard conservation

## Herders-Snow leopard conflict presence and hotspot map

Severe conflict was located in the northern part of JKSNR and its buffer zones and less was reported from lower parts.






# Integrated Conservation Development Program

**Distribution of tarpaulin to the yak herders.**

Every yak herders were provided with the 18feet by 24feet plastic tarpaulin as their token of appreciation for the harmonic co-existence with snow leopard. Herders were very much happy to receive the tarpaulin as it would help them to protect their calf yaks during summer along with their herd shed. Herders were more interested to avail such incentives and conservation snow leopard through integrated conservation development initiatives.

**Figure 19.** Herders receiving tarpaulin

**Figure 20.** Tarpaulins used for yak calf and herders shed

## Conclusion

Snow leopards are critical in maintaining the mountain ecosystem. Mountain ecosystems are very much pivotal in preventing the climate change vulnerable species from extinction. Snow leopards are vulnerable species and their survivals are threatened by the retaliatory killing, poaching, decline of prey species and habitat degradation. In most of its home range countries, conflict with herders and dwellers is one of the major issues. These issues can be reduced only through intensive research and intervention actions.

Bhutan has a viable population of snow leopard. At present there were estimated to be 96 individuals of Snow leopard thriving. Herders conflict with Snow leopards are one of the major challenges of Snow leopard survival in Bhutan and there are even reports of snow leopard being killed due to retaliation. The extent of Snow leopards conflict with herders in JKSNR is not known and this project has helped to know the extent and distribution of conflict and herders attitude towards snow leopard conservation.

Yak herders in JKSNR are itinerant herders, they move from place to place for pasture. Over the past years, yak herding handholds had decreased. Predation by wild predators was main problem faced by the herders followed by shortage of labor to look after the yak herd. Four predators were involved in predation and snow leopard was the top predator for yak. Snow leopard predation was mostly done during night and was frequent on summer on the young ones of yak. Herders in the study are not willing to support conservation of snow leopard and they lack awareness on conservation significance of snow leopard. Herders suggest the issue of conflict can be reduced only through compensation schemes and integrated conservation development programs. The extent of herder's conflict with snow leopard is severe and herders are not in favor for existence of snow leopard with their yak, therefore it is recommended that further conservation awareness program with integrated conservation development programs like incentives for herders should be initiated, so as to maintain harmonic co-existence between snow leopard and yak herders.

## References

Brunton, D. H., & Barraclough, R. K. (2016). Human-Carnivore Conflict : Ecological and economical sustainability of predation on livestock by snow leopard and other carnivores in the Himalaya, (August). http://doi.org/10.1007/s11625-014-0246-8

Mccarthy, T. M., & Chapron, G. (2014). Snow Leopard Survival Strategy. *ISLT and SLN*, 1–145.