

Final report on

Engaging local communities in Musk deer conservation in Manaslu Conservation Area,
Nepal

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Summary

The Musk deer is classified as an endangered species, and its population has decreased drastically as a result of commercial demand for musk, causing its loss from several components of its initial habitat in Afghanistan, Pakistan, India, China, Bhutan, Myanmar, as well as Nepal. The project concentrated on the conservation efforts for the endangered Musk deer species in Nepal, particularly in the Manaslu Conservation Area. It highlighted the different risks encountered by the Musk deer, such as habitat loss, forest fires as well as drying of springs bringing about a decrease in their population. The project carried out different tasks embarked on to resolve this trouble, consisting of conducting a set of questionnaire studies, raising awareness amongst local people and school children regarding the conservation of Musk deer, carrying out habitat surveys, arranging forest fire reduction recognition programs, releasing a children's content book on Musk deer, and dispersing it to schools as well as communities to increase awareness. The project stressed the value of spreading awareness programs together with involving local communities in conservation initiatives to reduce threats to Musk deer.



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1. Introduction

Musk deer are solitary and territorial animals, with males' territories overlapping with those of females. They seek rest or shelter under sloping trees, piles of tree branches, or rocks where they can evade predators (Baskin and Danell 2003). Shy by nature, they are most active during dawn and dusk (Huffman 2004).

They were once found throughout the Himalayas, spanning from Afghanistan to Pakistan, India, China, Nepal, Bhutan, and Myanmar (Green 1986). However, recent observations indicate that these species are now confined to isolated habitat patches. The commercial demand for musk has led to the disappearance of the species from many parts of its original distribution (Green and Kattel 1997). In Nepal, the Musk deer population is dwindling rapidly in its natural habitat.

In Nepal, they are found in the sub-alpine and alpine vegetation of the Himalayan region, ranging from 2,200 meters to 4,300 meters above sea level (Jnawali et al. 2011). Musk deer found in Nepal are classified as globally Endangered (EN) species by the IUCN Red List of Threatened Species, and CITES has listed these species in Appendix I. The National Parks and Wildlife Conservation Act (1973) of Nepal protects the Musk deer under Section 10 and designates it under Schedule-1. According to the act, poaching of Musk deer is prohibited and punishable.

Nepal's springs are drying up, aridifying the forest and grasslands. This dryness has resulted in forest fires breaking out in various parts of Nepal (Nepalitimes 2021, Kathmandupost 2022), including the Manaslu Conservation Area.

At higher altitudes, fires may be accidentally ignited by local people during *Cordyceps sinensis* (Yarsagumba) collection or by porters disposing of burning cigarettes (<https://bit.ly/3qV7sQ7>). In the forest fires of the Manaslu Conservation Area, numerous wildlife, including Musk deer, have tragically lost their lives.

Local communities remain unaware of the status of wild animals and the legal consequences of engaging in illegal wildlife activities. It is crucial to raise awareness among local residents, government bodies, porters, herders, and school children to foster conservation efforts and mitigate threats to Musk deer from all fronts.



2. Objective

- ❖ Conduct questionnaire survey to know their information about the Musk deer
- ❖ Raising awareness among local communities and school children about the conservation of Musk deer and find out the change in awareness level
- ❖ Survey the habitat of Musk deer and find out the habitat condition in MCA
- ❖ Conduct awareness about forest fire to the local people

3. Activities

3.1 Project permission

Following the release of funds from The Rufford Small Grants, the necessary approvals for our project were initiated. On October 14, 2022, we obtained permission from the Department of National Park and Wildlife Conservation (DNPWC). Subsequently, approvals were secured from the Social Welfare Council (SWC) on December 5, Manaslu Conservation Area - National Trust for Nature Conservation (MCA-NTNC) on December 22, and the local government of Chumnumbri Rural Municipality on December 29.

Upon receiving approval from all authorities, our team proceeded with project activities in the area. However, challenges such as landslides during the monsoon season and delays in completing the children's book on Musk deer necessitated additional time. Consequently, we applied for and received an extension of permission from DNPWC on November 6, 2023, and from MCAP-NTNC on December 14, 2023.

3.2 Team orientation

Prior to conducting the awareness campaign and fieldwork, the team members underwent orientation sessions. They were briefed on information regarding the Musk deer, including its significance and the various threats it faces. Additionally, they were provided guidance on their individual roles and responsibilities during both the awareness program and fieldwork to ensure clarity and minimize confusion in the field.



3.3 Habitat survey

For the initial survey, our team explored the two primary habitats of Musk deer within the MCA, namely the Kaltal area of Nubri and the Mugumba area of Tsum Valley, during December 2022 to January 2023. We assessed the habitat conditions and identified the threats to Musk deer in these regions. In the subsequent fieldwork, we conducted a habitat survey in the Sarang Gumba and Samagaun area of Nubri during December 2023 to January 2024.

Compared to the previous survey, there was a reduced amount of snow in the area, and the frequency of snowfall had also decreased. This change may be attributed to the effects of climate change, which have likely impacted the Musk deer population to some extent.

3.4 Forest fire mitigation awareness program


We organized a forest fire mitigation awareness program in different areas of MCA, primarily targeting local community members, particularly women's and youth groups actively engaged in conservation efforts and other community activities. In addition to these groups, we also educated guides, porters, and herders on forest fire prevention and the small actions they can take to mitigate forest fire risks.

Given the mobile nature of guides, porters, and herders, it was challenging to gather them collectively for group awareness sessions. Instead, we engaged with them individually during encounters along our fieldwork routes or at resting points. We conducted awareness sessions and group discussions on forest fire mitigation for the residents of Philim, Tsum valley, Nyak, Lho, and Samagaun areas.

3.5 Video capture

While on our field expedition, we filmed footage of Musk deer, their habitats, local perspectives from residents and local government officials on Musk deer conservation efforts, threats faced, and the issue of forest fires. Compiling this footage, we created an informative video on Musk deer, which we have made freely accessible online for all.

In an effort to reach a wider audience, we plan to screen this video for school children and local residents within and outside the Manaslu Conservation Area. This marks our inaugural attempt at creating an informational video using our own footage. The video is narrated in Nepali, supplemented with English subtitles, with the aim of disseminating information about Musk



deer and its significance to a broad audience. We aspire to convey the importance of Musk deer to each and every individual through this visual medium.

3.6 School awareness program

We organized school awareness programs about the Musk deer for students in both the Manaslu Conservation Area (MCA) and surrounding regions. These programs were held in various schools across Gorkha, Bhaktapur, and Kathmandu districts, totaling twelve schools thus far. While some of these schools were situated outside the Musk deer habitat area, we believed it was important to extend our outreach. Our goal was to ensure that not only the children within the Musk deer habitat area but also those outside it should be aware of the significance of Musk deer and other wildlife. We emphasized that even small contributions from students could aid in mitigating illegal activities affecting Musk deer and other wildlife populations.

During these programs, we provided students with Musk deer posters and brochures. Additionally, we distributed booklets featuring information on various wild animals, previously published by SMCRF. These booklets were available in Nepali and English and contained digital photographs of the species.


In addition to the awareness sessions, we encouraged students to express their conservation thoughts through essays, stories, or poems about the Musk deer.

3.7 Published the Musk Deer book

Following the completion of our school awareness program on Musk deer, students enthusiastically expressed their newfound knowledge through poems, stories, and essays dedicated to Musk deer conservation.

Artworks from 22 students and written content from 42 students were selected for inclusion in the book. Upon collecting submissions, we thoroughly checked language, combining them with captivating artworks for publication in a vibrant book. A total of 1000 copies were printed, showcasing the diverse contributions of students, featuring their drawings, stories, essays, and poems centered around Musk deer.

Including Musk deer drawings and essays from children from the first Rufford Grant program, the collaborative efforts of students from various schools in the Gorkha district resulted in the creation of the book titled 'Mriga ra Kasturiharu.'



To ensure a formal record, an ISBN was acquired from the Central Library of Tribhuvan University, securing the book's presence in the database. Additionally, two hard copies were presented to the Central Library for archival purposes.

3.8 Post awareness through book

As an incentive for content creation, we awarded stationery items and copies of the book 'Mriga ra Kasturiharu' to all contributing students, choosing this approach over direct wages to encourage their writing efforts. Rather than awarding first, second, and third prizes, we opted to give equal recognition to every content writer, as each of them made a unique contribution. Their dedication to producing content for the Musk deer book represents their initial step in conservation efforts. The rationale behind equal prize distribution is to inspire them further in the realm of conservation and to encourage others to engage in similar activities.

Utilizing the newly released book 'Mriga ra Kasturiharu' alongside previously distributed posters and brochures, we organized follow-up awareness programs on Musk deer within and outside the project area. After the awareness sessions, we invited selected students to independently share what they had learned about Musk deer.


The primary objective of extending Musk deer awareness programs beyond the project area was to educate children from various regions about the species' current situation and the importance of conservation efforts.

In addition to awareness activities, we expressed gratitude to the schools by providing tokens of appreciation and copies of 'Mriga ra Kasturiharu' for their libraries, ensuring easy access for all students.

Overall, 585 students received detailed information about Musk deer directly, while over 500 more were indirectly informed through the distribution of posters, brochures, and the book 'Mriga ra Kasturiharu'. We witnessed the effectiveness of these awareness programs even in schools outside the Musk deer habitat area, prompting us to consider similar initiatives in other schools beyond the project period.

3.9 Questionnaire survey

Pre and post knowledge assessment about Musk deer was done before and after the awareness program respectively. Forest fire questionnaire was conducted to the local people, herders,



porters and guides to know the information about the occurrence of forest fire, management by the local people and the impact of forest fire in their area.

We assessed what people knew about Musk deer before and after our awareness program through questionnaire surveys. We also asked questions to local residents, herders, porters, and guides about forest fires. We wanted to find out about how often they happen, how locals manage them, what affects the fires have on the area, and what they expect to minimize the forest fire in the area.

3.10 Flex replacement in the information board

The two information boards, installed as part of the first Rufford Grant project in 2019, have faded. We replaced the previous flex of the boards with UV vinyl stickers. The UV print on these stickers has a long lifespan and will remain visible for around a decade. These boards will continue to remind people about the importance of Musk deer and the ongoing conservation efforts.

3.11 Distribution of Musk deer books

We distributed the book 'Mriga ra Kasturiharu' to various schools, communities and hotels in Gorkha and other districts, providing people with the opportunity to learn about Musk deer. Additionally, we distributed the book to individuals interested in Musk deer and biodiversity conservation. In our effort to spread awareness about the importance of Musk deer to a wider audience, we showcased and distributed the 'Mriga ra Kasturiharu' book at the Owl Festival 2024 in Parbat district, the Second Bird Fair 2024 in Nawalparasi district, and the World Pangolin Day 2024 events in Dhading, Lamjung, and Sindhuli districts.

4. Results

4.1 Questionnaire survey information

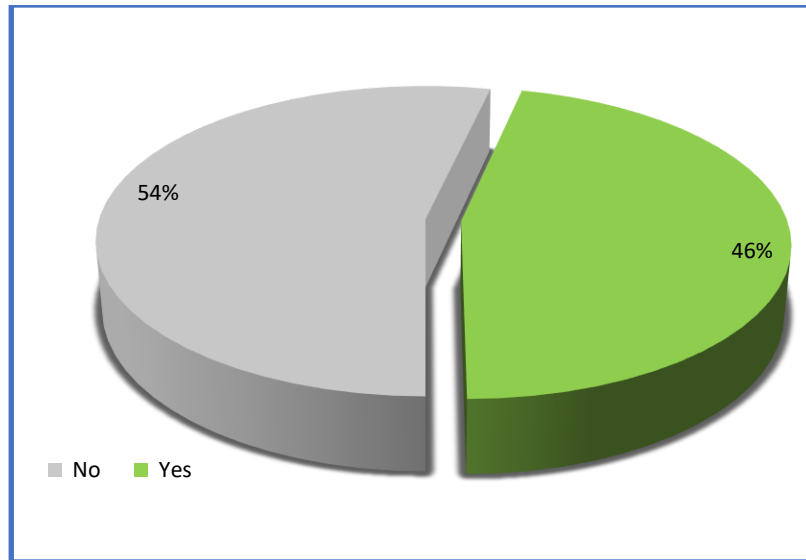


Figure 1: Musk deer sightings data by respondents

The pie chart (Figure 1) shows the data of Musk deer sighting by the respondents, which divides observations into two categories: “Yes” for Musk deer sightings and “No” for lack of such sightings. In all 54% of respondents said they did not observe any musk deer while 46% reported seeing them. This information shows that there were many cases when no musk deer were seen even though their sighting was reported.

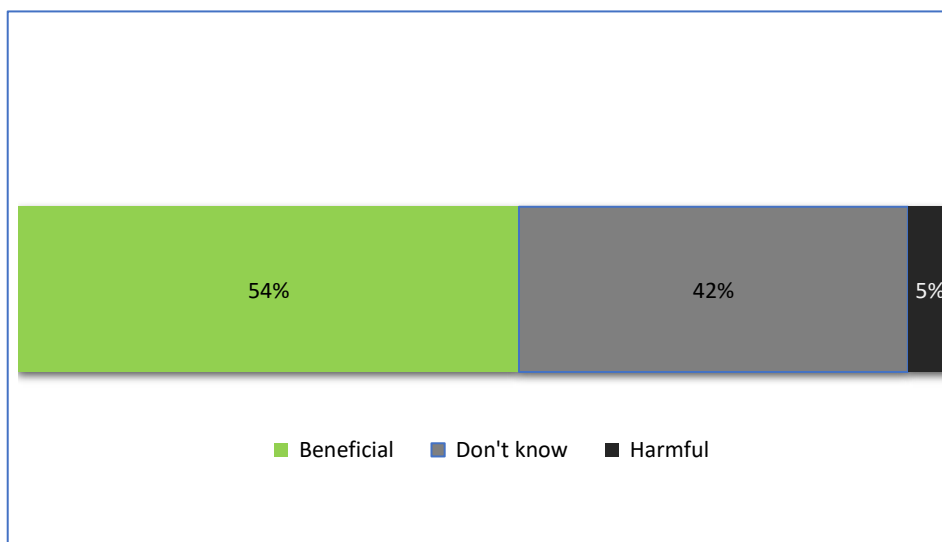


Figure 2: Respondents view about Musk deer

The bar graph (Figure 2) showed people’s understanding of the Musk deer. This was done by categorizing the view into three groups, the beneficial ones, those who had no idea and finally,

the harmful. 54% of all respondents said that Musk deer are beneficial. Over 42% of them did not know if this animal is good or bad for us. While a small percentage (5%) thought it was harmful. Most respondents considered Musk deer as beneficial species. The result shows that most interviewees are positive about Musk deer.

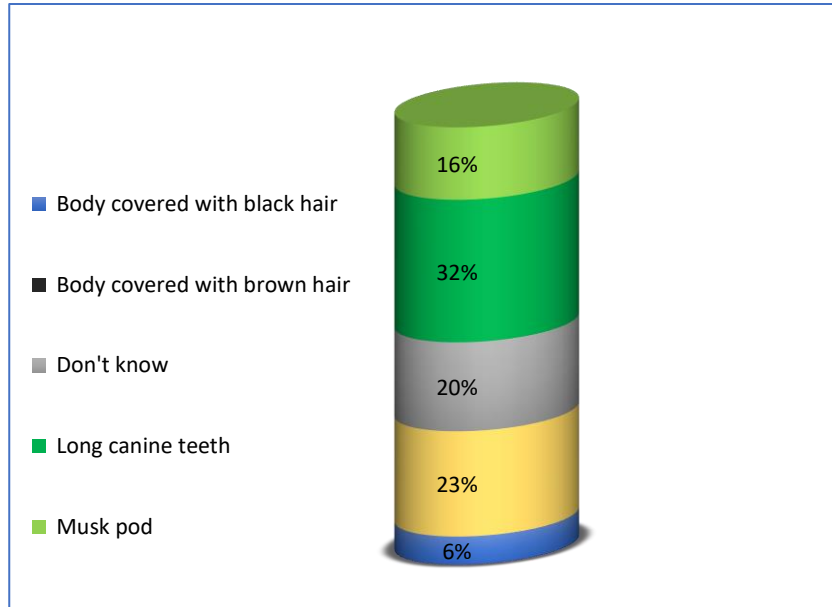


Figure 3: Knowledge on features of Musk deer

The graph (Figure 3) provided outlines the respondents' awareness of various characteristics associated with Musk deer. About 6% of the total, indicated knowledge of body covered with black hair. Another 23% of the total, mentioned knowing that Musk deer have brown hair. Besides that, other 20% showed any lack of certainty regarding specific attributes like that of Musk deer. Furthermore, around 32% were found to know that Muck deer have long canines. The findings also show that about 16% were aware that musk pods are present in these animals. According to this data we can say many respondents had an idea that Musk deer has a brown coat and long canine teeth. Nonetheless, a good number also seemed unsure on what to say as per features relating to a Musk Deer.

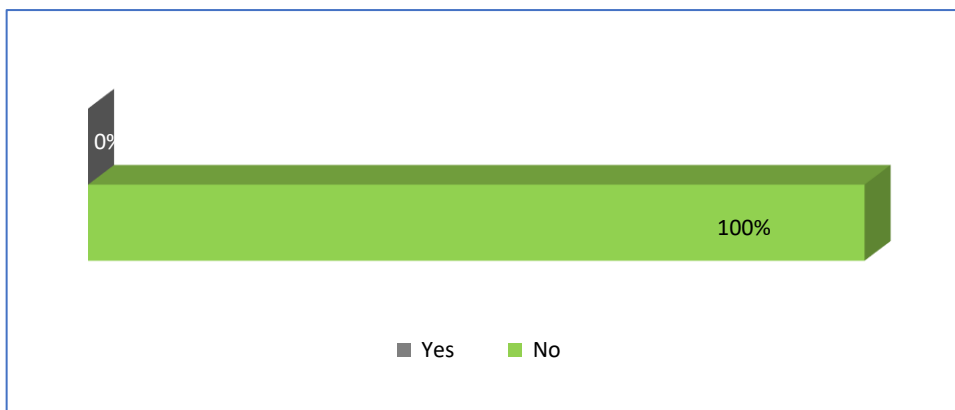


Figure 4: Respondents knowledge about harm caused by Musk deer

The data (Figure 4) could be inferred that a no harm caused by Musk deer as per the respondents' view. This indicates positive perception or lack of bad experiences concerning Musk deer.

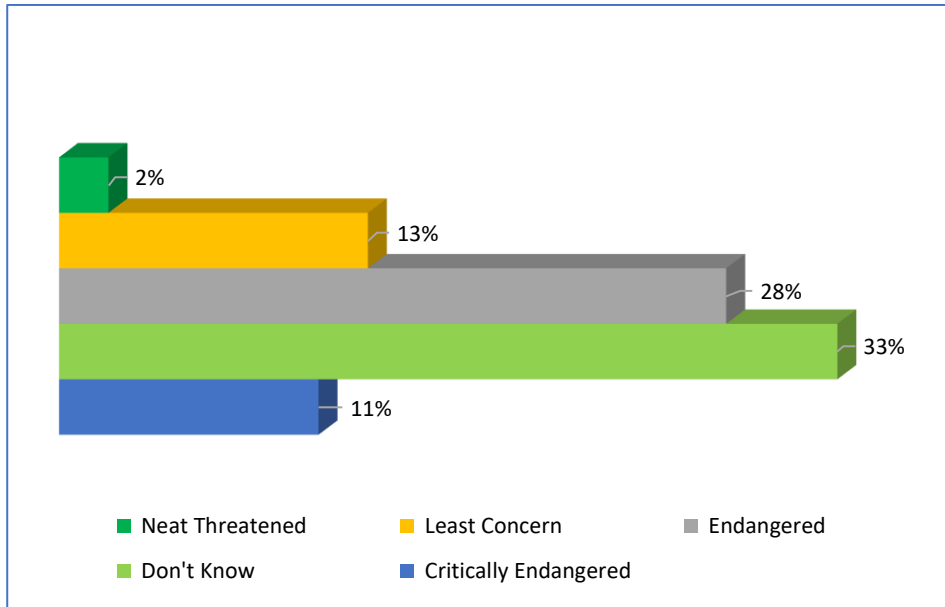


Figure 5: Respondents knowledge on Musk deer status

The graph (Figure 5) shows how the respondents perceived the status of Musk deer. 28% of respondents rated this deer species as “Endangered”, others were not sure whether they are Endangered or Least Concern. This implies that people have different views regarding the conservation status of a Musk deer.

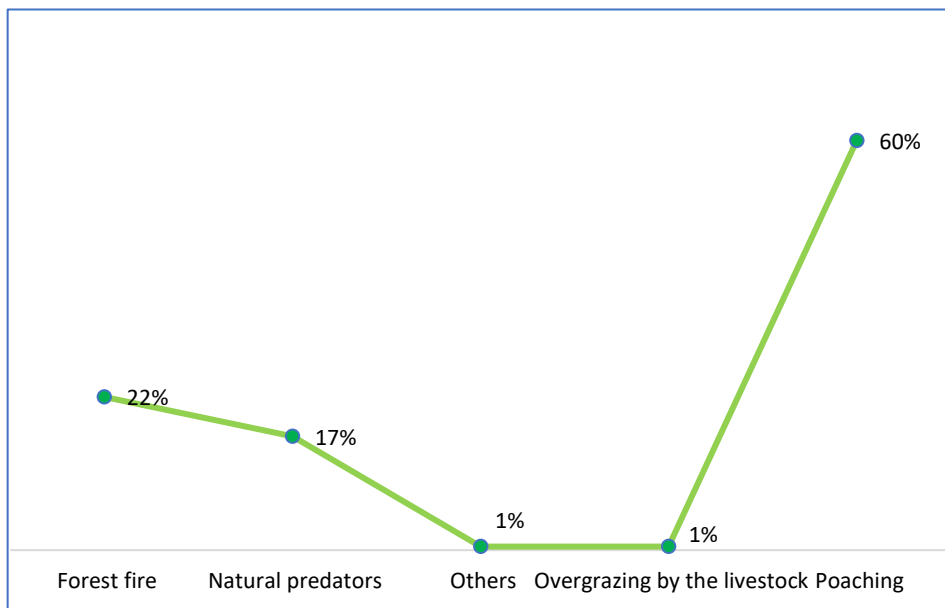


Figure 6: Respondents knowledge on harm caused to Musk deer

The graph (Figure 6) represents the views shared by respondents on what are the threats responsible for harming Musk deer. According to 22% of all, wildfire was identified as one major cause of harm directed at Musk deer. Approximately 17% of all detected that natural predators impacted negatively on Musk deer's life. Another 1%, blamed grazing by livestock for causing harm to these animals. The other group of respondents (60%) believes that poaching contributes more towards harming these species than any other factor does; hence it is taken as their leading cause among others listed here. The data also suggests that poaching is considered by most respondents as the major threat to musk deer besides fire outbreaks.

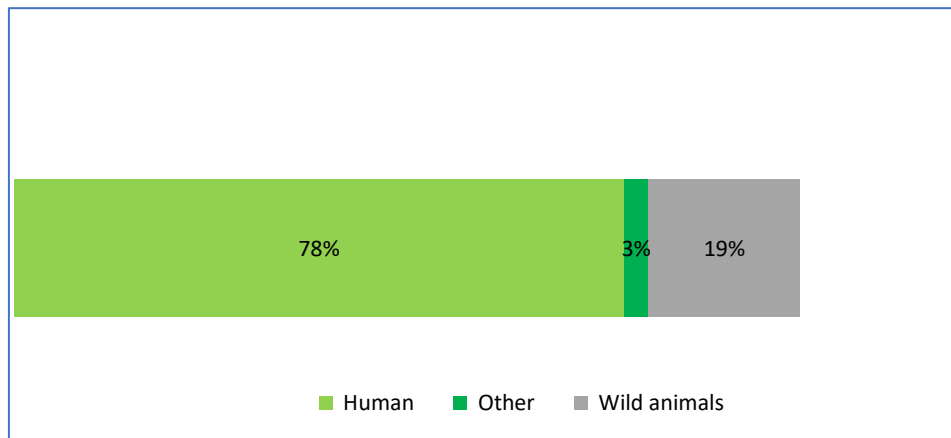


Figure 7: View of respondents on enemy of Musk deer

The graph (Figure 7) outlines respondents' perceptions of the dangers to Musk deer. It can also be seen that 78% of the total, identified humans as the primary enemy or threat to Musk deer. In addition, about 3% of the total, labeled other factors as enemies or threats to Musk deer. Furthermore, 19% of the total believed that wild animals were enemies or threats to Musk deer. From this piece of information, it is then clear that most respondents consider human beings as the biggest menace for this species and majority feels so.

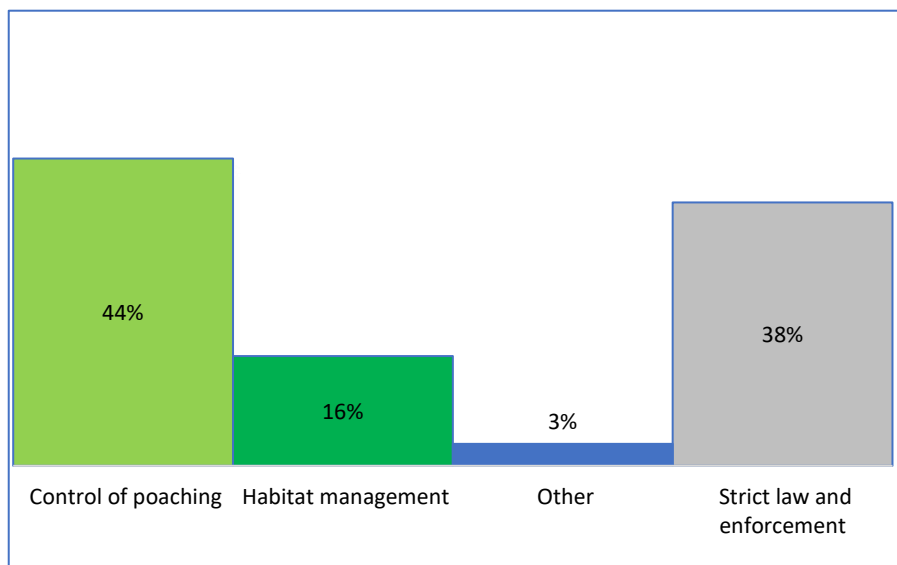


Figure 8: Respondents view on conservation approach of Musk deer

This chart (Figure 8) shows how interviewees responded to questions concerning ways they thought could help in saving Musk deer populations. From this data, it can be concluded that 44% suggested that controlling poaching is crucial for conserving Musk deer populations but 16%, on the other hand, emphasized on habitat management for conserving musk deer. Similarly, approximately 3% proposed alternative conservation measures whereas 38%, called for strict laws and their enforcement as a must-do thing. Therefore, according to this data most interviewees prioritize measures such as; controlling poaching and implementing strict laws in order to conserve these species which should be implemented. The others appreciate habitat management as a form of conservation methods too.

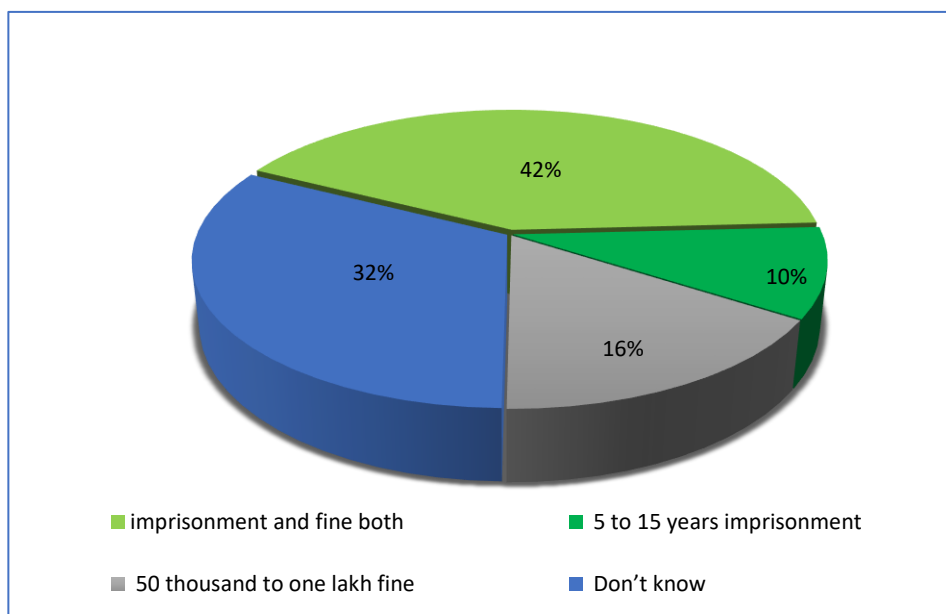


Figure 9: Respondents knowledge on punishment for harming Musk deer

The graph (Figure 9) contains data on how well respondents know the punishment for hurting Musk deer. 42% of all, are aware of the legal consequences that include imprisonment and fines as punishment for poaching Musk deer. 10% of all people think this would lead to a jail term of between five to fifteen years respectively. 16% of all participants think the punishment as fifty thousand to one lakh rupees, while 32% didn't know about appropriate punishment for it. These data shows that people have different knowledge levels about punishments for harming Musk deer.

4.2 Pre and post knowledge asesement

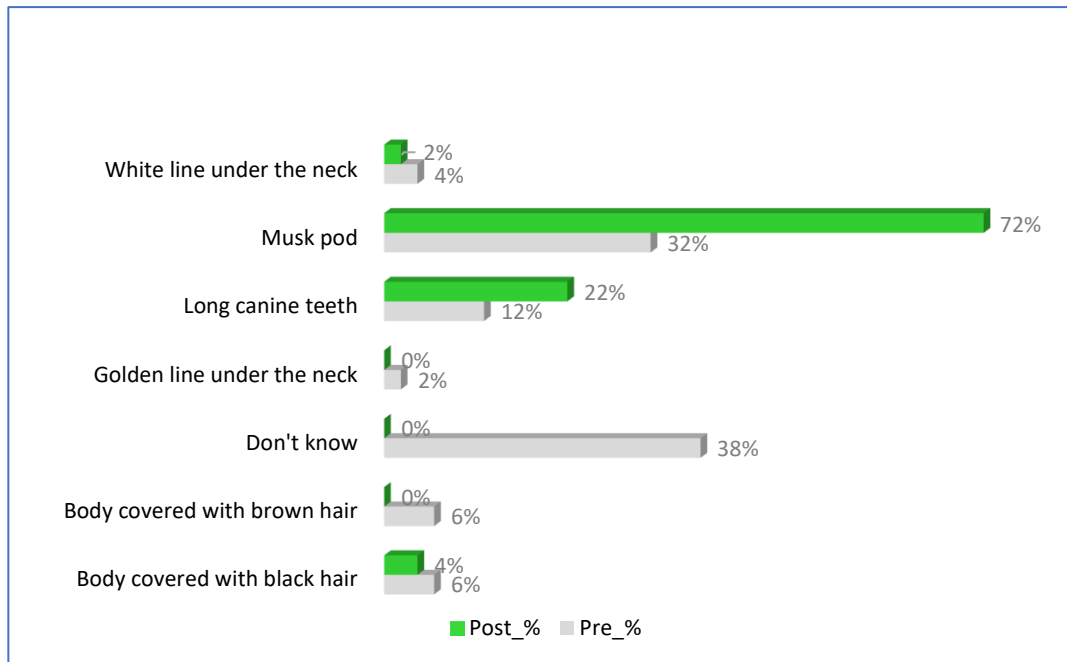


Figure 10: Pre and post knowledge of participants on special features of Musk deer

The graph (Figure 10) shows the change in knowledge of the participants about the Musk deer before and after the awareness program. Before being informed about the unique characteristics of the Musk deer, 38% of respondents were unsure or had no idea about any specific features. All previously confused individuals (38%) now have knowledge of the special features after getting informed. The most obvious change was in relation to “Musk pod.” Before receiving information, 32% believed it was a special feature; this figure increased to 72%. Furthermore, there was an increase in the perception that “Long canine teeth” constituted a special feature from 12% before information and increased to 22%. In sum, these data indicated that information on special features of the Musk deer specifically “Musk pod” and “Long canine teeth”, had enhanced recognition and awareness among respondents.

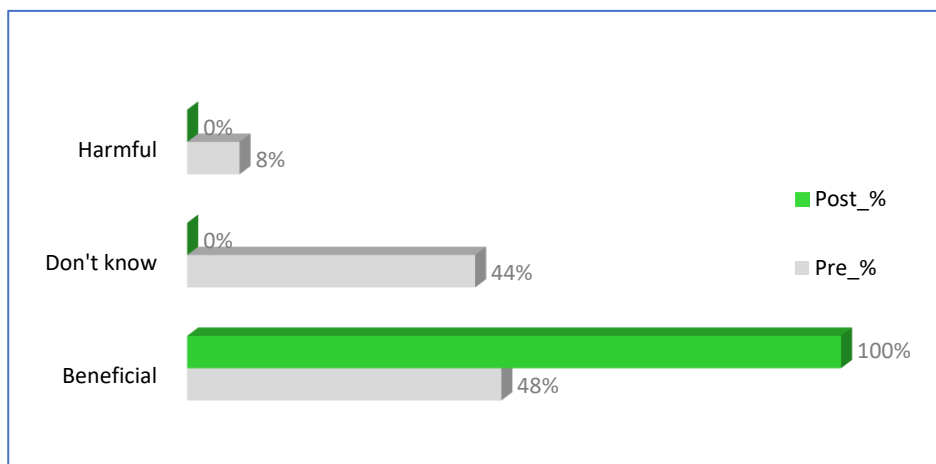


Figure 11: Pre and post knowledge of participants on view on Musk deer

The graph (Figure 11) shows the perception of the participants about the Musk deer before and after the awareness program. Prior to the awareness program, there were 48% participants who said musk deer is beneficial and 8% who said it as a harmful. After receiving information, the percent who felt it was good rose from 48% to 100%, whereas those who considered it bad fell down to zero. In summary, this graph indicates that after the awareness program every individual acquired awareness concerning the Musk deer.

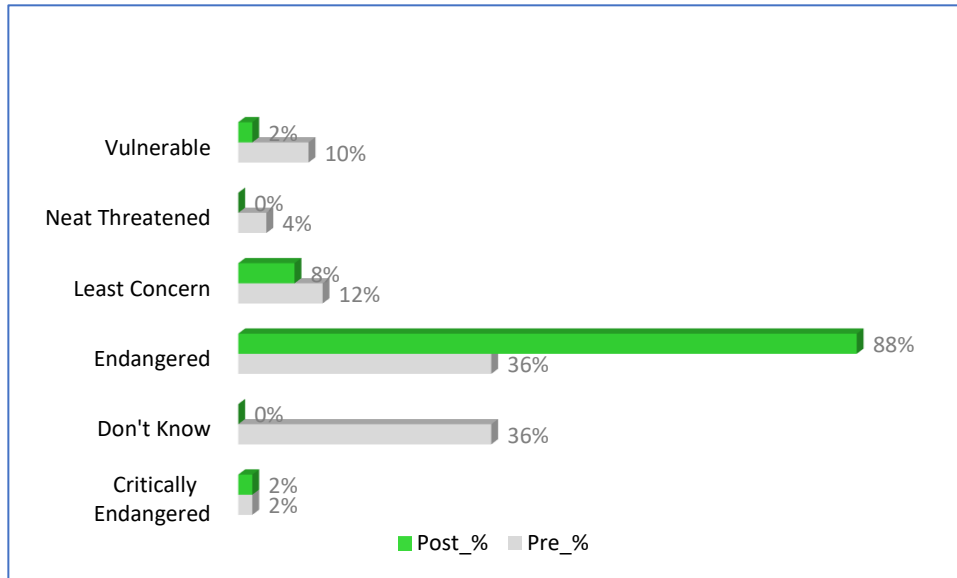


Figure 12: Pre and post knowledge of participants on Musk deer status

The perception of Musk Deer status (Figure 12) among the participants was not known by a 36% before being informed. However, after acquiring the information, all who were previously uncertain about its status now understand it to some extent. The greatest shift happened in perceiving of "Endangered" as the status type for Musk deer. This also indicates that only 36% of the participants had heard of this species as endangered prior to learning about Musk Deer. This increased tremendously upon receipt of information to 88%. In general, the figure illustrates a high level of effectiveness in making people aware about its condition.

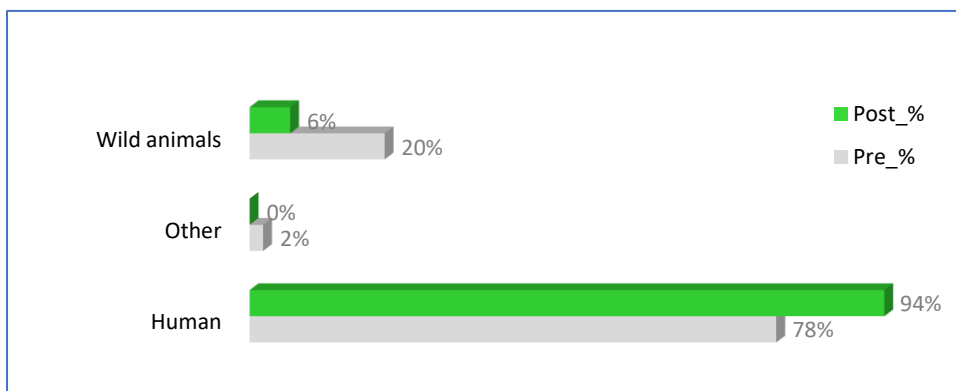


Figure 13: Pre and post knowledge of participants on whom they think the enemy to the Musk deer

Figure 13 shows 78% of the participants believed that human beings could be potential enemies before they were given any information about Musk Deer, while 20% thought that wild animals could be their enemy. Only 2% viewed other things as potential enemies. After being given information however, the perception of humans as threats slightly increased from 78% to 94%, this means an increased realization of humans as dangers to Musk Deer. This was noted by a decrease in the perception of wild animals as enemies, which fell by 14%. Possibly this shows that participants re-evaluated the risks posed by wild animals after learning more about Musk Deer. In essence, it is clear from the data that respondents overwhelmingly identified humans as Musk deer's key enemy.

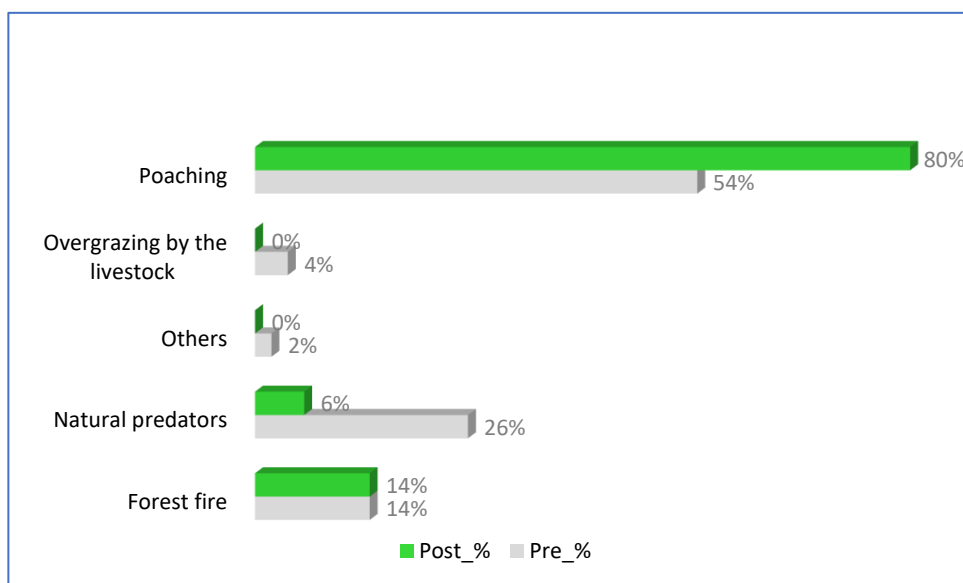


Figure 14: Pre and post knowledge of participants on who harm most to the Musk deer

More than half, 54%, had identified poaching as the factor most injurious to musk deer before receiving information (Figure 14). Other factors mentioned before hearing this included natural predator (26%), forest fires (14%) and overgrazing by livestock (4%). Once participants got informed, the perception on the most harmful factor moved from poaching being 54% to having 80%. The results show that people became more conscious about Musk Deer after they were given more insight into what it really means when poachers kill animals of this species. There was a significant reduction in perceiving natural predators as the worst threat from 26% to 6% after information was received by participants. This implies that people reconsidered whether natural predators are more dangerous than poaching. On the whole, these figures emphasize how critical it is to combat poaching as its main enemy among Musk deer since it stood out as an opponent both before and after being enlightened by data.

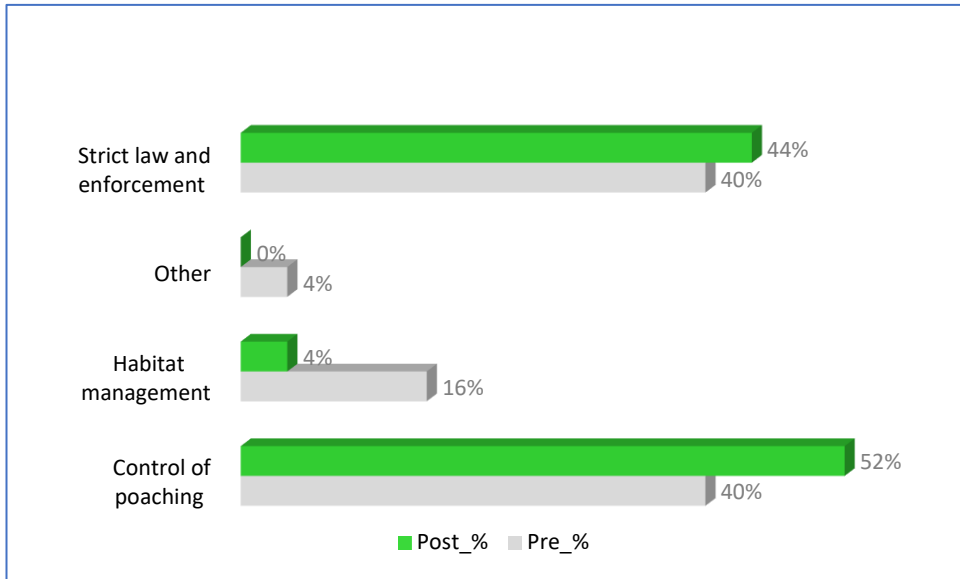


Figure 15: Pre and post knowledge of participants on what to do for conservaion of Musk deer

Two actions were considered equally important in conservation before information was received: “Control of poaching” and “Strict law and enforcement,” each attracting 40% of the participants (Figure 15). Also, 16% of participants identified “Habitat management” while a small fraction (4%) named “Other” as measures for conservation. However, after awareness program, some marginal increase in perception on both “Control of poaching” and “Strict law and enforcement” being important tools for conservation; hence percentages rising to 52% and 44%. In general, the graph recognizes the significance of dealing with poaching by enforcing strict laws before it conveys information to them. Moreover, this indicates how crucial is the law enforcement agency along with anti-poaching methods in Musk Deer conservation attempts.

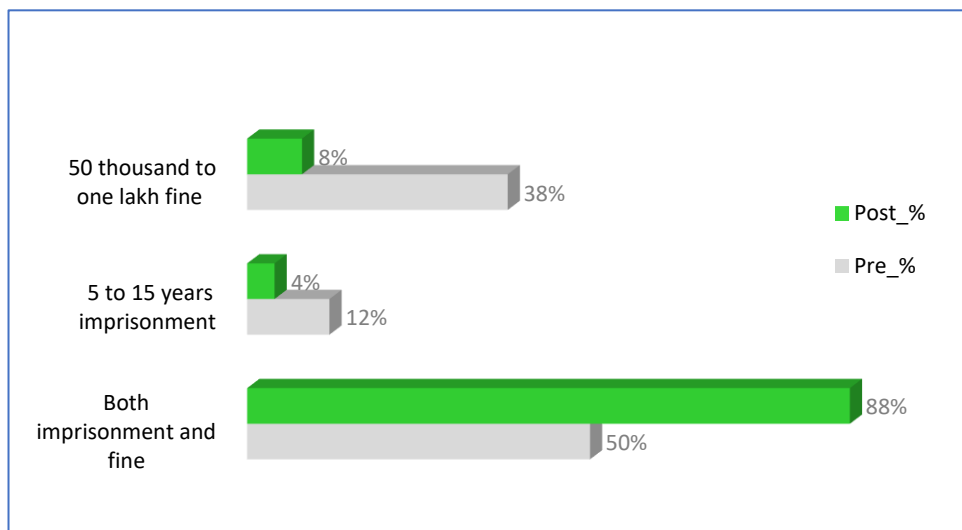


Figure 16: Pre and post knowledge of participants on law against crime to Musk deer

There was a 50% percentage of all respondents who had knowledge about the fact the punishment for Musk Deer crimes is either imprisonment or fine (Figure 16). Similarly, 38% of the participants believed that a penalty of between 50 thousand and one lakh was given in form of a fine to those found guilty whereas 12% thought imprisonment for a period ranging from five to fifteen years. In any case, after learning, the number of people aware that a criminal could be given imprisonment or fine rose from 50% to 88%. However, the proportion who considered such fines as ranging from 50 thousand to one lakh decreased by information intake from 38% to just about 8%. When these people received information, their position shifted slightly from believing that imprisonment lasts between five and fifteen years (12%) through a slight decline numbering only four percent (4%). The overall picture presented is that there is an appreciable increase in understanding about Musk Deer crime consequences once informed.

4.3 Habitat survey

Table 1: Habitat features of Musk deer of the survey sites

Variable	Min	Max	Range	Description
Elevation	2839m	4194m	-	Range of elevation in meters.
Aspect	-	-	NE, E, SE, S, N, NW	Directions of slope aspects.
Slope	0°	38°	-	Range of slope angles in degrees.
Canopy Cover	0%	75%	-	Percentage of area covered by tree canopy.
Ground Cover	Low	Medium	-	Level of ground coverage by vegetation or bare ground.
Litter Condition	Low	High	-	Level of litter accumulation.
Soil Color	-	-	Brown, Dark, Black, Yellow	Colors indicating soil composition.
Soil Texture	Fine	Coarse	-	Texture affecting water retention and root penetration.
Soil Condition	Dry	Wet	-	Moisture level in the soil.
Dominant Vegetation	-	-	Shrub, Acacia, Betula, Quercus, Rhododendron, Dhupi	Major plant species observed.
Distance to Settlement	200m	500m	-	Distance from human settlements in meters.
Presence of Animals	-	-	Chauri, Cat species, Tahr, Horse, Thar, Blue sheep, Mule	Species observed in the habitat.
Anthropogenic Activities	-	-	Grazing, Logging, Fire incidents, Sheds	Human-induced activities noted.

The informational provides an extensive review of the ecological features of a Musk deer habitat in survey areas (Table 1). It includes varied elements consisting of altitude, slope, canopy cover, ground cover, litter condition, soil properties such as color and texture, moisture levels in soil, dominant vegetation types, proximity to human settlements, presence of various animal species, and anthropogenic activities.

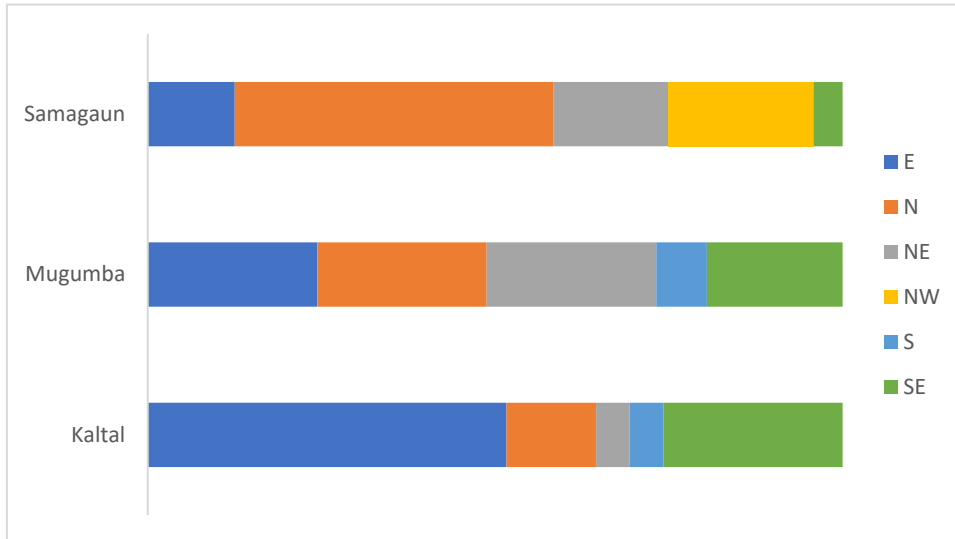


Figure 17: Aspect value in different habitat

The graph (Figure 17) shows the aspect value in Musk deer sign present areas: Kaltal, Mugumba and Samagaun. In Kaltal, most of the aspects were observed towards the east and south, with many facing southeast. Conversely, multiple aspects such as east, north and northeast showed up frequently in Mugumba. Samagaun had aspects almost rivaling north but including northeast and northwest also.

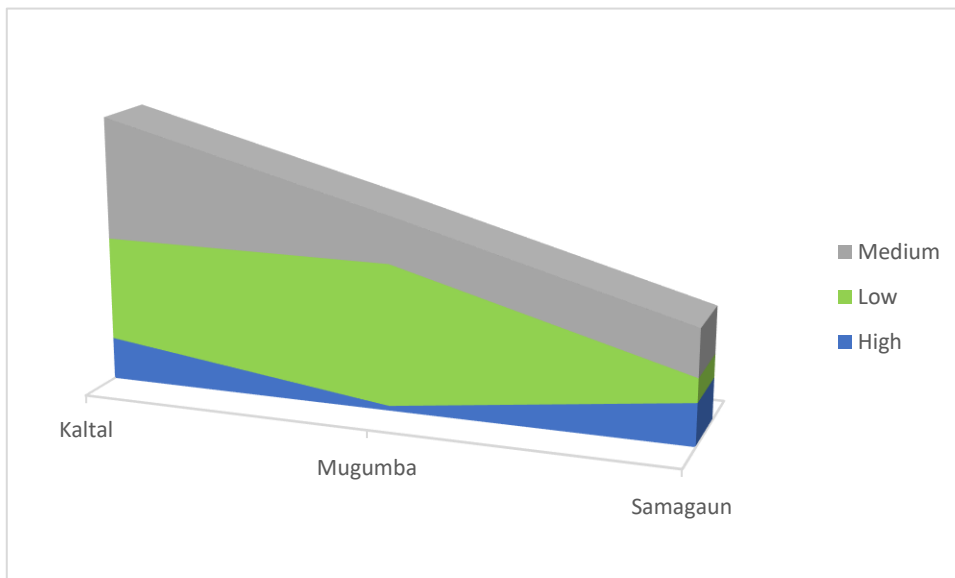


Figure 18: Litter condition in different habitat

This graph (Figure 18) presents the litter conditions classified into depth categories (low, medium, high) over various locations. In Kaltal, there are 9 cases where the litter condition has

been categorized as high, 22 cases as low and 26 cases as medium. In Mugumba, there is one instance where the condition of litter is described as high for Mugumba with 30 instances stating low and another set of 10 indicating middle. Samagaun has 9 instances that have high litter condition level with five placed at its lowest litter condition and ten sites with medium litter condition. In all sites combined, nineteen sites have high state of litter condition. Fifty-seven refers to low state of litter condition. Forty-six sites have high state of litter condition.

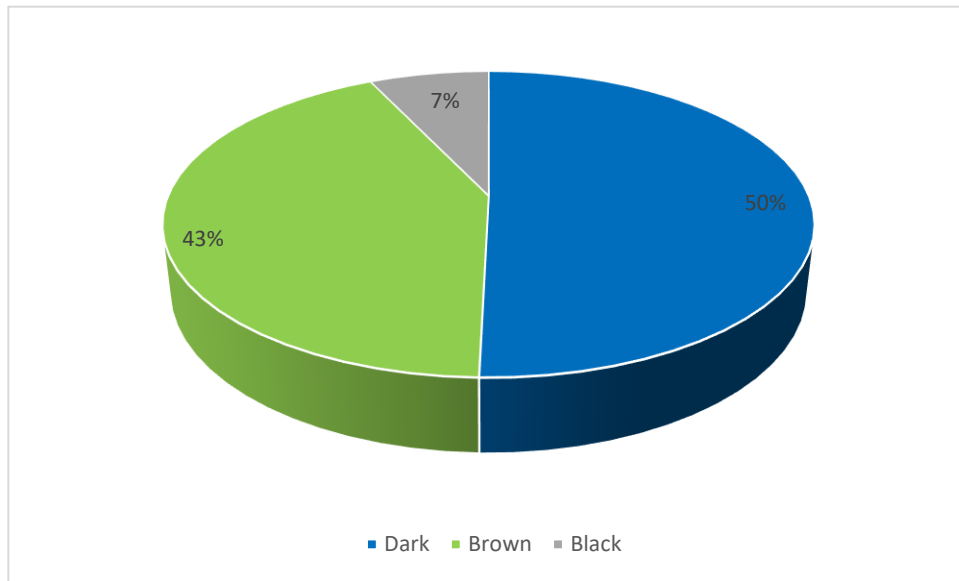


Figure 19: Soil color in different habitat

The graph (Figure 19) demonstrates the distribution of soil colors in the Musk deer's sign observed sites. There are 50% of the sites where dark colour of the soil were observed. Brown soil colour accounts for 43%. Black soils representing 7% of total number of sites. Most of the soil samples were described as dark followed by brown while black was the smallest number among those presented.

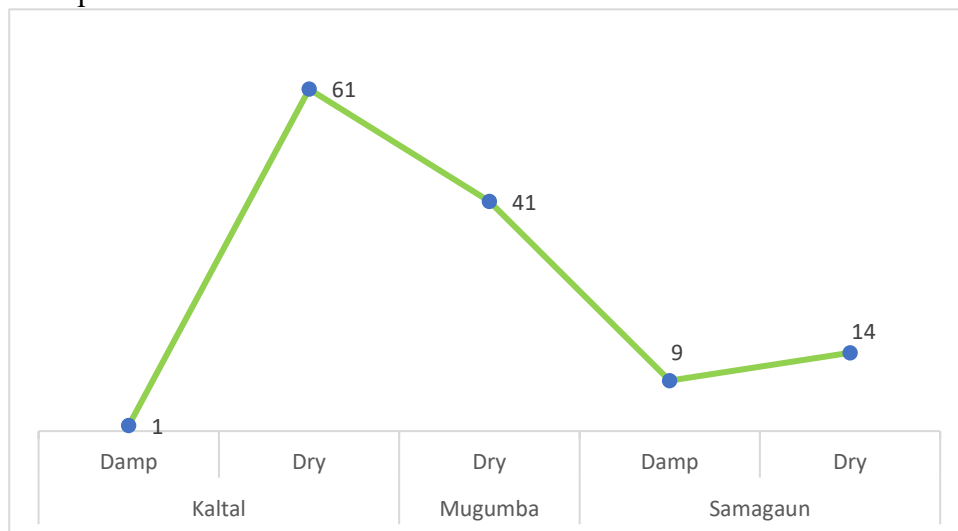


Figure 20: Soil moisture condition in different habitat

The graph (Figure 20) shows the different soil moisture conditions in the Musk deer's sign observed sites. There are total of 61 data points where soil conditions were dry and one point with damp soil condition. Mugumba has 41 data points with the dry soil condition. Samagaun has 9 data points with little bit damp soil condition and fourteen data points with soil condition as dry. In summary, this information shows how different places have different types of soils with Kaltal having mixed type (moist and dry), Mugumba with dry soils and Samagaun which has both moist and dry soil in the presence sign of Musk deer.

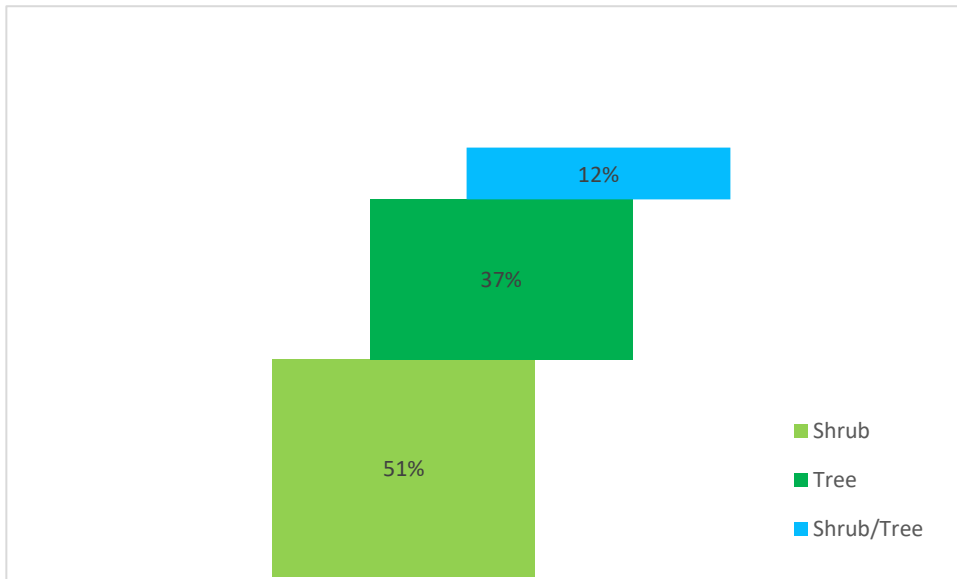


Figure 21: Vegetation type in different habitat

This graph (Figure 21) shows the distribution of vegetation types in Musk deer presence area. Shrubs represent 51% of all vegetation units counted. Trees accounting for 37% of all vegetation units tallied. Shrubs and trees exist simultaneously represents twelve percent of the total vegetation counted. Thus, most of the region's plants are comprised by shrubs followed by trees, with a few having combinations.

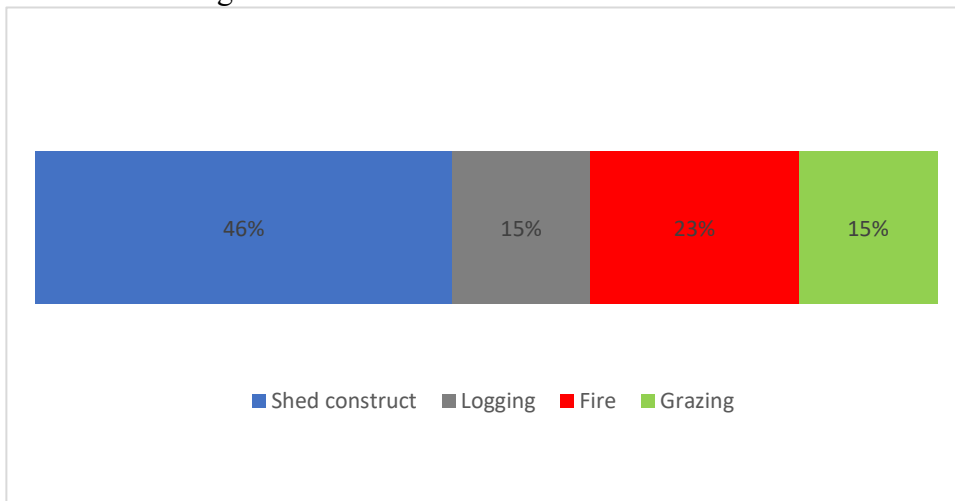


Figure 22: Anthropogenic activities in the Musk deer habitat

The graph (Figure 22) shows different anthropogenic activities in the habitat of Musk deer. Shed construction in 46% of all the anthropogenic activities. Logging contributing 15% of all the activities. Fire-related activities representing 23% in total. Grazing making up 15% of all anthropogenic activities. In other words, the main anthropogenic activities identified in those areas were shed construction, followed by fire, logging and finally grazing in decreasing order of occurrence.

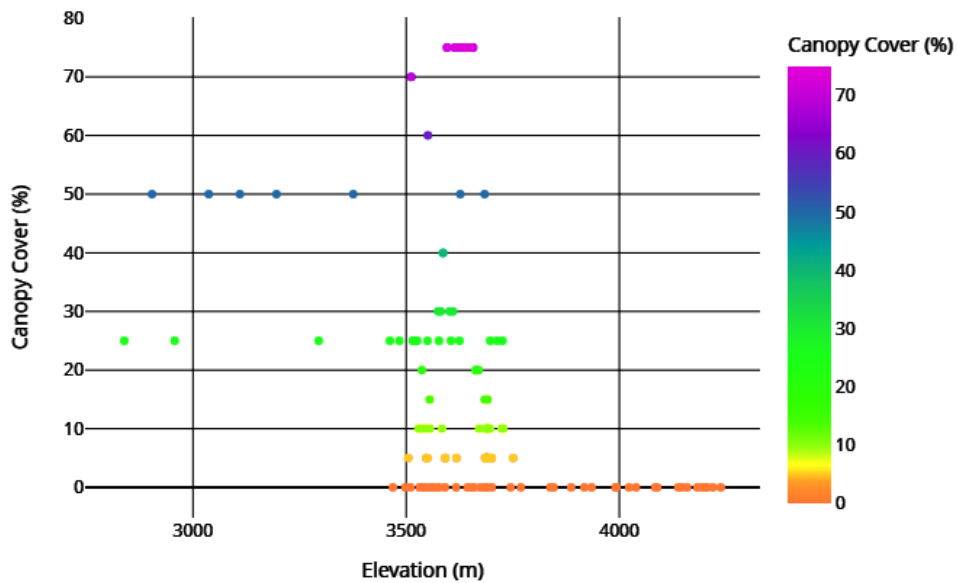


Figure 23: Relation between elevation and canopy cover in different habitat

The plot (Figure 23) reveals numerous points scattered around various heights in different habitat of Musk deer, this implying that the area under investigation has a variety of elevation. Where certain elevational ranges are more favorable for dense vegetation. Elevation alone is not an absolute determinant of canopy cover; meaning that other factors such as soil type, aspect, or human activities could be significant too. This analysis shows how elevation affects vegetation patterns and canopy cover in the study area.

4.4 Forest fire questionnaire

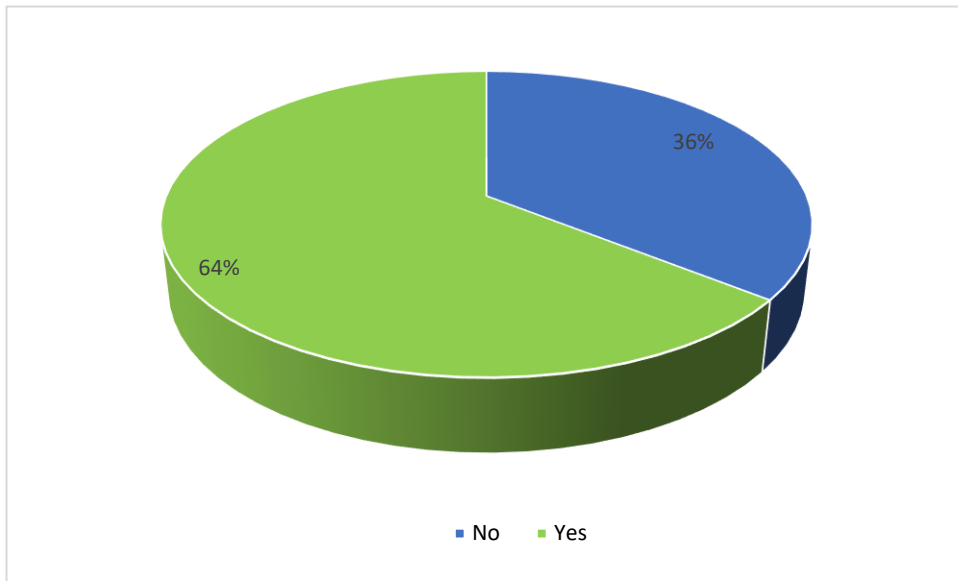


Figure 24: Respondents view about forest fire

This information on graph (Figure 24) shows that a bulk of the questionnaire people shared issue concerning forest fire with 64% of them suggesting that they do worry about forest fire in their area.

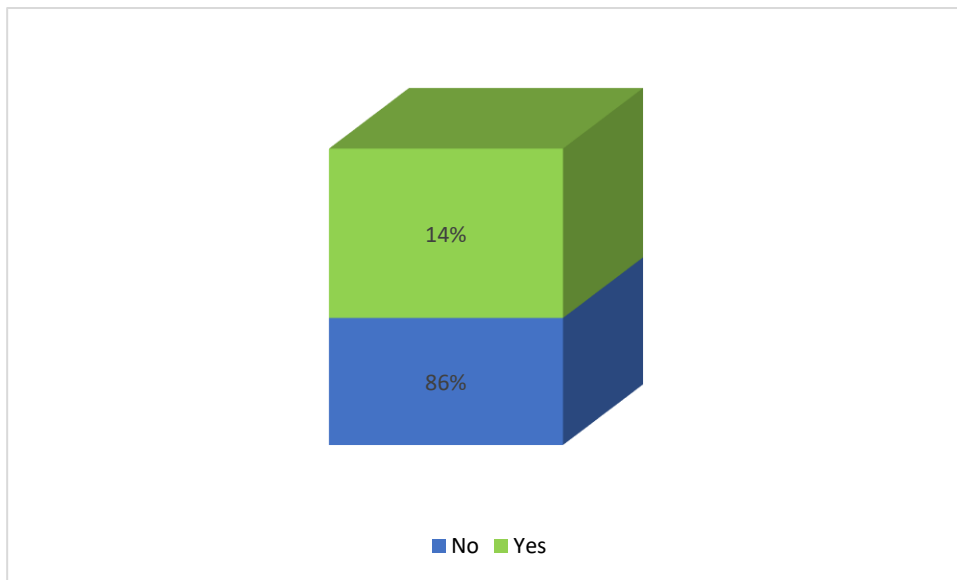


Figure 25: Respondents participation on previous forest fire education

This information (Figure 25) recommends that a big bulk (86%) of the questionaired people have actually not gone to any kind of programs connected to forest fires while just a little percent (14%) have actually participated in such programs. This suggests just a little portion have actually got education concerning forest fire.

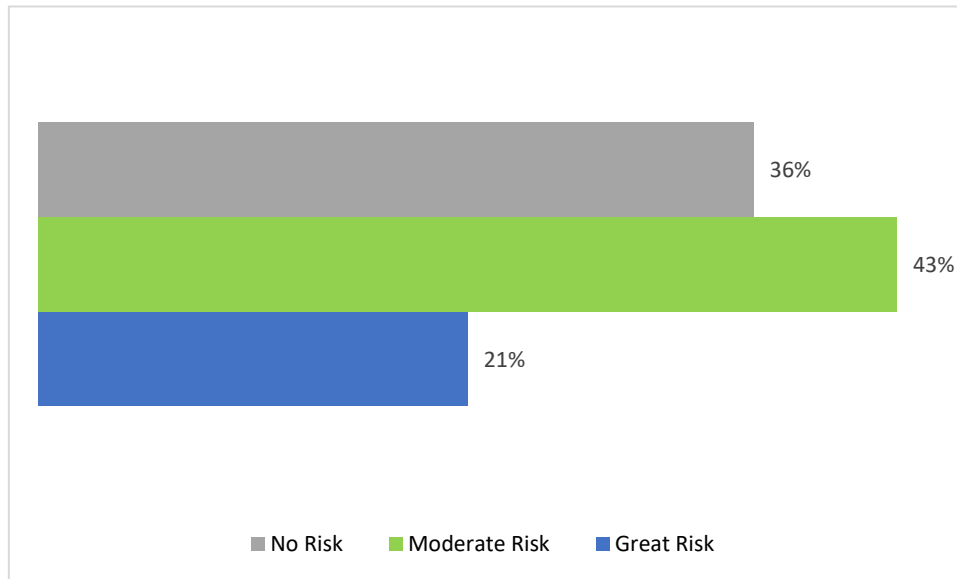


Figure 26: Respondents view on how risk is the forest fire

The graph (Figure 26) shows the respondents view on the risk of forest fire in their area. Most of respondents suggested the "Moderate Risk" making up 43% of the overall. "No Risk" complies with 36% and "Great Risk" has the portion at 21%.

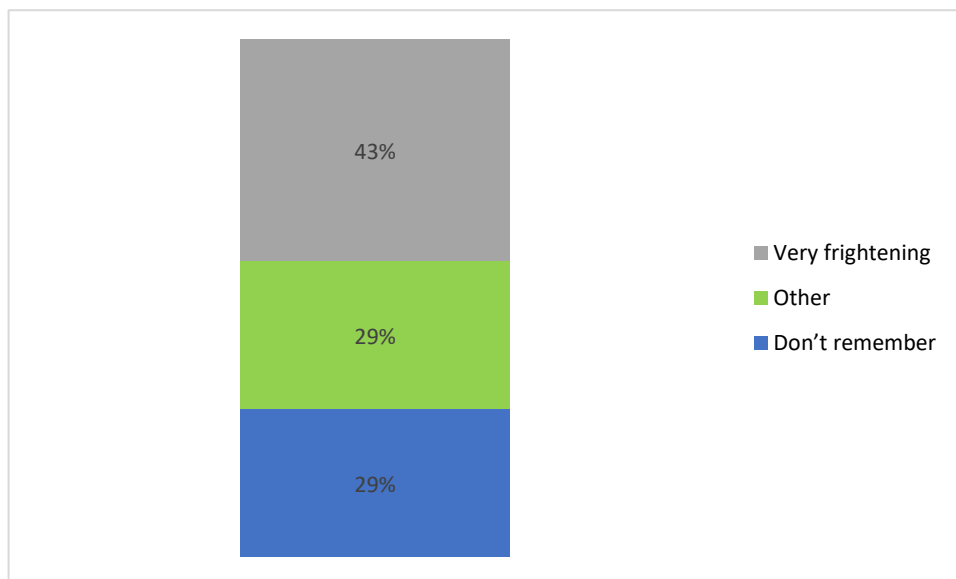


Figure 27: Respondents memories on forest fire

The graph (Figure 27) shows the respondents memory of the forest fire. The highest portion of participants (43%) reported their memories of forest fire cases as "Very frightening". Both "Don't remembers" as well as "Other" groups have the very same portion (29%) of participants. This details supplies understanding right into the variety of experiences as well as responses people might have in the direction of fire cases with a substantial part remembering them as really frightening.

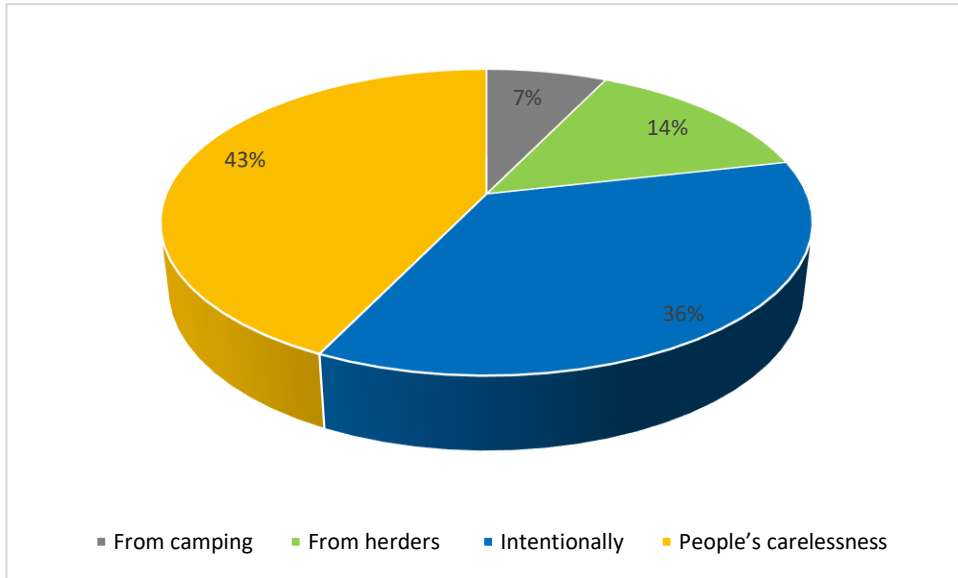


Figure 28: Respondents view on how forest fire starts

The graph (Figure 28) shows the respondents view on how the forest fire starts. According to the respondents the highest possible percent of wildfires (43%) were credited to people's carelessness complied with by wildfires began intentionally (36%). Wildfires triggered by herders as well as outdoor camping are much less usual making up 14% and also 7% of circumstances respectively. This information recommends that a substantial section of wildfires is avoidable and also are commonly as a result of human activities.

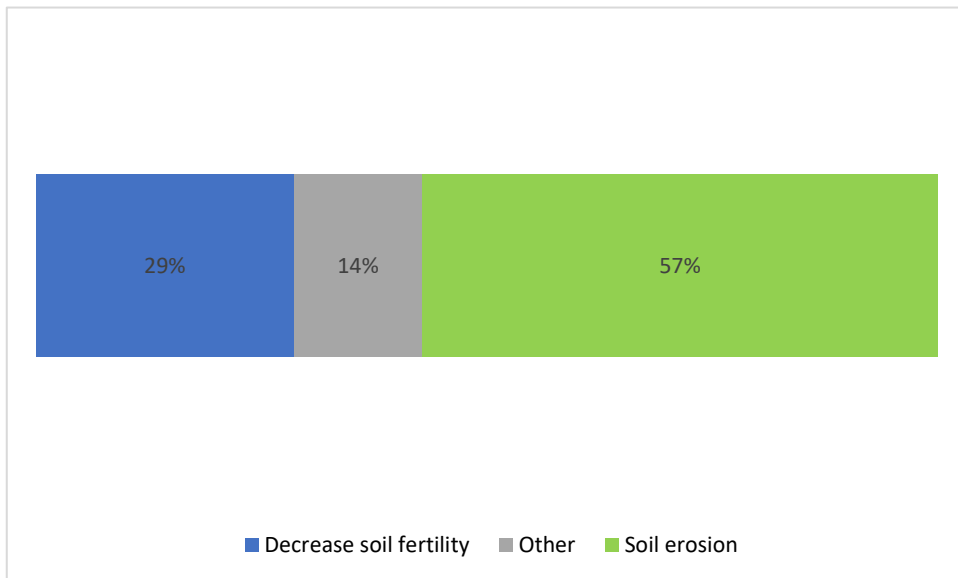


Figure 29: Respondents view on how forest fire affect soil

The graph (Figure 29) shows the respondents view on how the forest fire affect the soil. Most of participants (57%) reported that forest fires influence soil erosion. This recommends that soil erosion is a substantial worry adhering to forest fires. Decrease in soil fertility was reported

by 29% of participants, showing an additional considerable influence. Other impacts were discussed by 14% of participants although this classification is much less defined. This information emphasizes the relevance of thinking about the ecological influences of forest fires especially on soil.

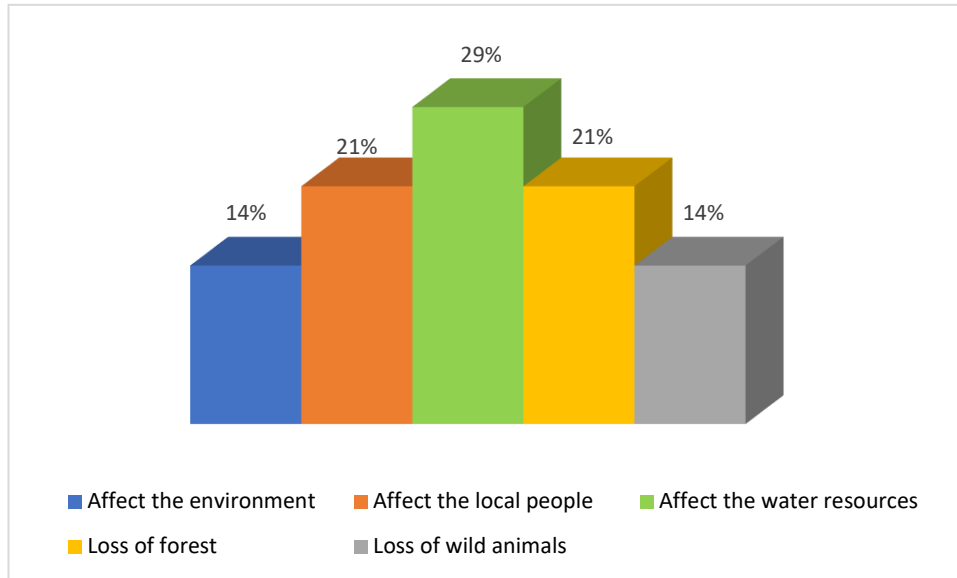


Figure 30: Respondents view on how forest fire affect forest resources

The graph (Figure 30) shows the respondents view on different influences of forest fires on the forest. One of the most generally reported affects is the result on water sources, with 29% of participants discussing it. Complying with 21% of participants reported that forest fires influence the local people plus cause the loss of forest. Influencing the environment along with triggering the loss of wild animals were each making up 14% of circumstances. This information highlights the diverse affect of forest fires on forest communities.

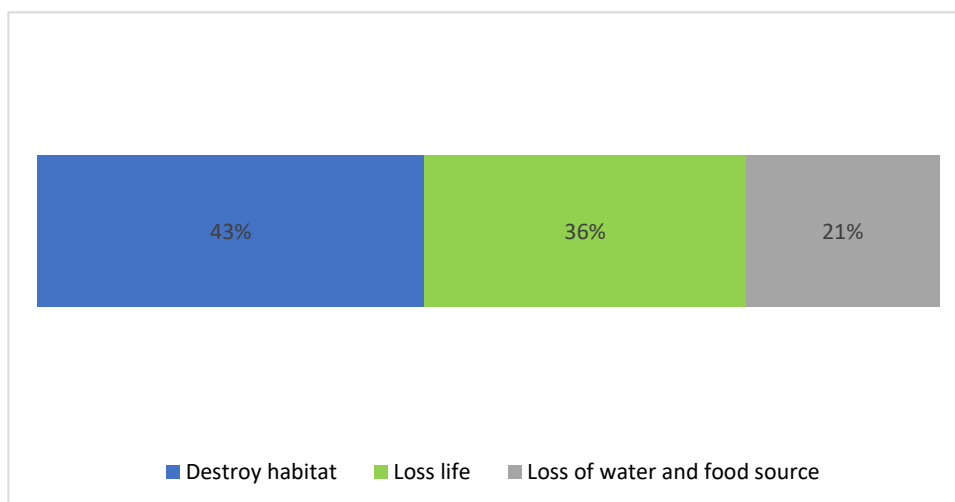


Figure 31: Respondents view on how forest fire affect wildlife

The graph (Figure 31) shows the respondents view on numerous considerable affects of wildfires on wild animals. The most reported view by respondents is destroy of habitat, making up 43% of circumstances. Loss of life amongst wild animals adheres to 36% and loss of water together with food resources was standing for 21% of circumstances. This information suggested the protection of wild animal's environments as well as taking care of forest fires are essential for protecting biodiversity as well as community wellness.

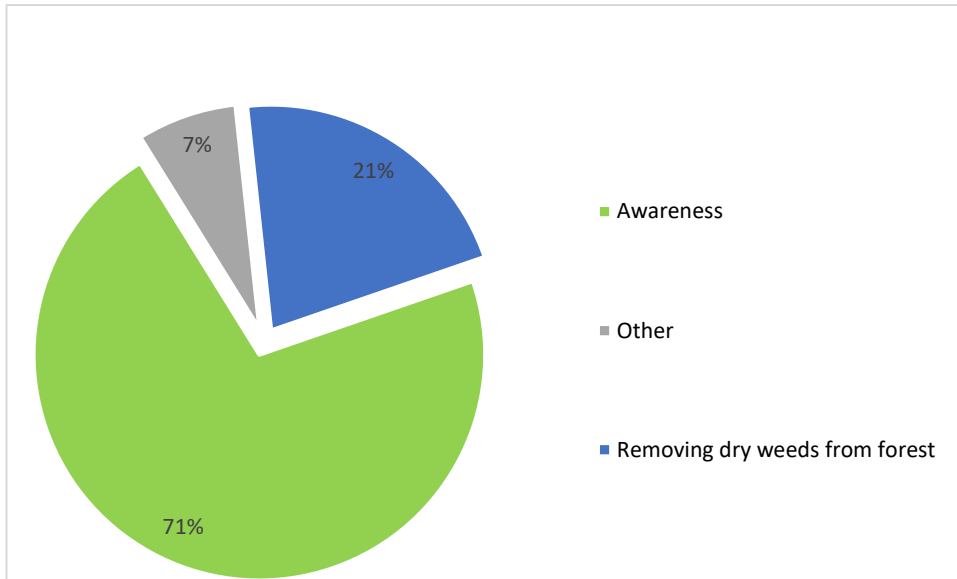


Figure 32: Respondents view on how to prevent forest fire

The graph (Figure 32) shows the respondents view on preventative procedures for forest fires. One of the most generally pointed out step by respondents were increasing awareness (71%). Eliminating dry weeds from the forest is additionally mentioned as a preventative procedure standing for 21% of circumstances. This information underscores the significance of education and awareness programs in minimizing forest fires together with the worth of plants monitoring techniques such as getting rid of completely dry weeds from forests.

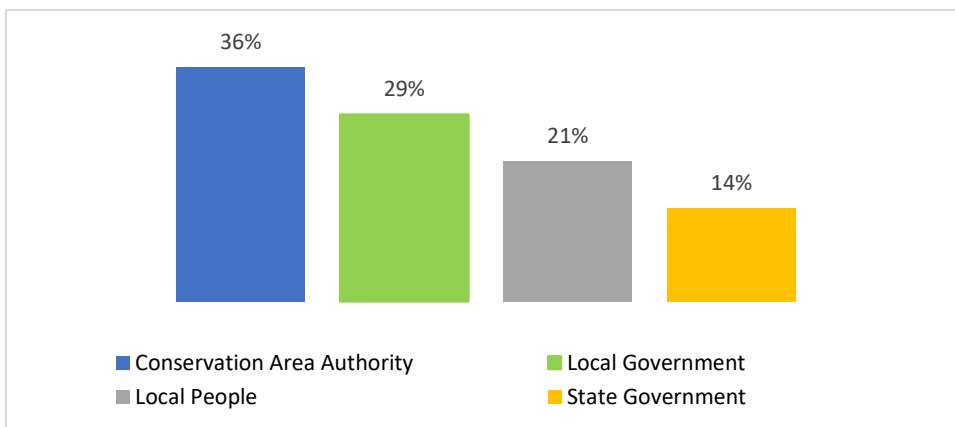


Figure 33: Respondents view on the responsibility of forest fire management

The graph (Figure 33) shows the respondents assumptions relating to responsibility for forest fire mitigation. The highest percent of participants (36%) see the responsibility of the Conservation Area Authority. Local Government is viewed as liable by 29% of participants. As local people's duty by 21% of participants. State Government is considered liable by 14% of participants. This information mirrors varied point of views of respondents relating to responsibility to mitigate forest fire and recommending that there might be common duty amongst numerous entities at different degrees of administration plus local people's participation.

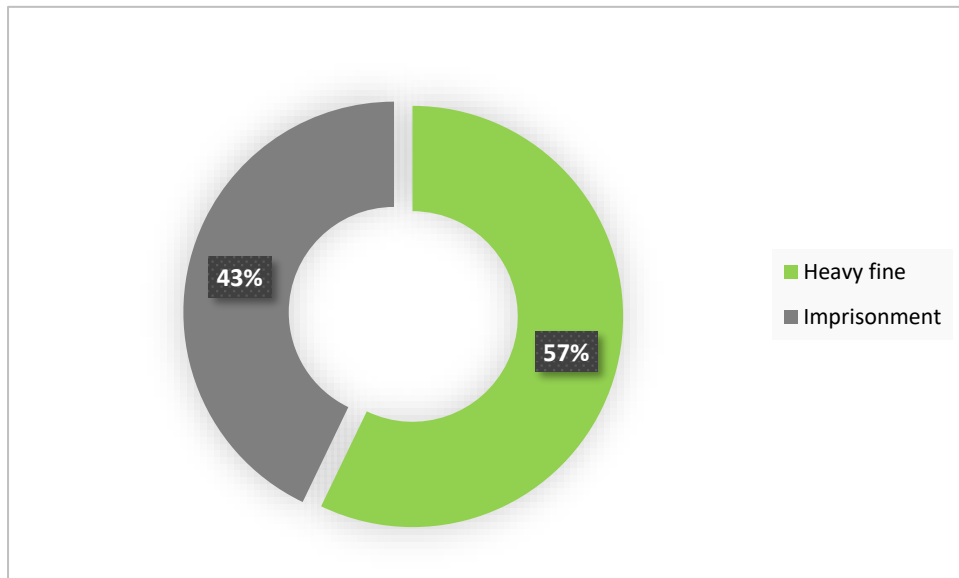


Figure 34: Respondents view on punishment responsible for forest fire

The graph (Figure 34) shows the respondent's concerning viewed penalizations for people in charge of triggering forest fires. Most of respondents (57%) suggested hefty penalties as a punishment. Imprisonment is suggested by 43% of respondents. This information recommends that there are differing viewpoints on the seriousness of penalty for people associated with triggering forest fires, with a noteworthy choice for hefty penalties over imprisonment.

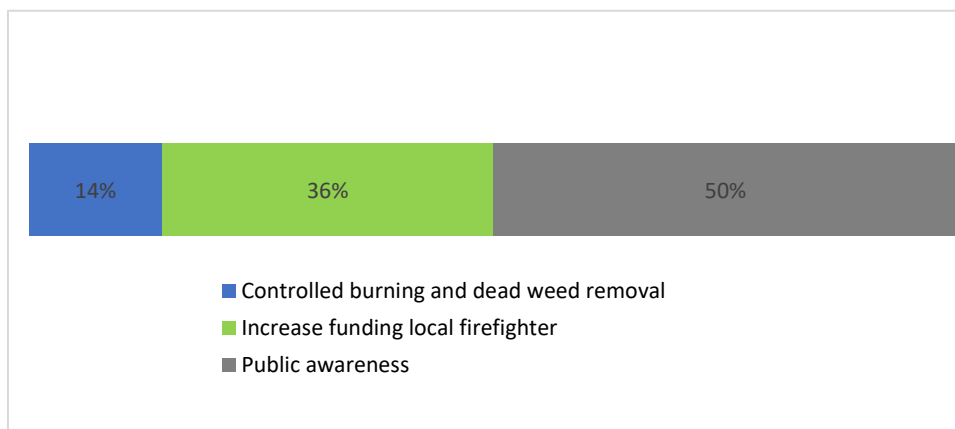



Figure 35: Respondents view on what will help to fight forest fire



The graph (Figure 35) shows the respondents view concerning regarded techniques to aid deal with forest fires. Public awareness is one of the most typically pointed out approach by respondents with 50% of individuals considering it valuable. Increasing funding to local fire fighters is viewed as advantageous by 36% of respondents. Controlled burning as well as dead weed removal are discussed by 14% of participants. This information recommends that while numerous techniques might add to firefighting initiatives, public awareness is regarded as especially effective with raised financing for firefighting sources.

5. Conclusion

Awareness as well as education programs play a considerable role in conservation initiatives for Musk deer in Nepal. Tasks such as conducting habitat surveys, raising awareness among local communities, as well as arranging forest fire reduction programs have actually played a remarkable role in increasing knowledge and understanding concerning Musk deer among local communities. The project highlighted the significance of spreading awareness regarding the endangered status of the Musk deer, the threats it encounters together with the conservation steps required to protect the species. Furthermore, it emphasized the need for strict enforcement of laws and regulations against poaching, along with habitat monitoring to make sure the survival of Musk deer population. The information showed a positive change in understanding amongst communities, recommending that effective conservation initiatives need active participation and also collaboration from local areas, authorities, as well as stakeholders. Spreading awareness as well as engaging local communities will certainly have a substantial impact on conservation campaigns to conserve Musk deer from further decline.

6. Recommendation

1. Enhance public awareness: Increasing awareness among local communities as well as school children regarding the conservation of Musk deer works for both the community together with the conservation. For that reason, it is recommended to continue and expand awareness programs to educate even more individuals concerning the value of Musk deer conservation. This can be accomplished via educational programs, distributing informative materials, as well as arranging awareness events at different discussion forums such as events and fairs.
2. Implement strict fines for forest fire incidents: The majority of participants recommended significant punishment for those in charge of setting off forest fires. Consequently, it is suggested to also apply strict fines for people participated in activities that result in forest fires to deter such activities.
3. Concentrate on forest fire prevention: Public awareness was one of the most typically discussed strategy by participants to assist manage forest fires coupled with boosting awareness and also getting rid of dry weeds as preventive measures. As a result, it is suggested to focus on safety measures such as public awareness program as well as executing techniques to remove completely dry weeds from forests to reduce the incident of forest fires.
4. Improve conservation measures for Musk deer: Controlling poaching, habitat management plus strict enforcement of laws were determined as crucial measures for protecting Musk deer population. For that reason, it is advised to intensify efforts in controlling poaching, managing habitats together with implementing stricter regulations to protect the endangered Musk deer species.
5. Enhance educational programs: The study results suggested that a significant part of individuals had actually not received education and knowledge associated with forest fires. Consequently, it is suggested to enhance educational programs on forest fire prevention as well as conservation initiatives, targeting both local communities and schools to increase knowledge and awareness.

By implementing these recommendations, it is expected that the conservation initiatives for Musk deer in Nepal will certainly be strengthened, resulting in better security of the species and their habitat.

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Appendix I

Table 2: Name list of content writers for Musk deer book

S.N.	Name of content writer	Class	School
1	Aarati Aryal	9	Modern Secondary English School
2	Aasmaya Gurung	10	Shree Buddha Secondary School
3	Aastha Gurung	10	Shree Buddha Secondary School
4	Aatam Gurung	8	Shree Buddha Secondary School
5	Aayuska Dhakal	12	Shree Bhawani Secondary School
6	Anjila Gurung	9	Shree Buddha Secondary School
7	Aryan Bhatta	9	Shree Buddha Secondary School
8	Bhim Bahadur Gurung	8	Shree Jana Jagriti Secondary School
9	Bindu Gurung	8	Shree Buddha Secondary School
10	Chewang Norbu Lama	8	Shree Buddha Secondary School
11	Elena Karki	9	Shree Buddha Secondary School
12	Grishma Rana Magar	9	Shree Shakti Secondary School
13	Inkesh Bagale	9	Modern Secondary English School
14	Karma Sangmo	6	Shree Nubri Basic School
15	Karuna Manvsewa	10	Shree Mahendra Jyoti Secondary School
16	Kavya Gurung	7	Shree Nubri Basic School
17	Lalmaya Gurung	8	Shree Buddha Secondary School
18	Lalmaya Lama	10	Shree Buddha Secondary School
19	Laxmi Gurung	9	Shree Jana Jagriti Secondary School
20	Maya Gurung	10	Shree Bhawani Secondary School
21	Melina Sunar	9	Shree Jana Jagriti Secondary School
22	Mufid Miya	9	Shree Shakti Secondary School
23	Prerana Gurung	10	Shree Buddha Secondary School
24	Raj Kumar Gurung	10	Shree Buddha Secondary School
25	Raj Kumari Gurung	10	Shree Buddha Secondary School
26	Rija Gurung	9	Shree Buddha Secondary School
27	Rinjin Funjo Lama	8	Shree Buddha Secondary School
28	Rojina Gurung	10	Shree Buddha Secondary School
29	Roshan Adhikari	9	Modern Secondary English School
30	Roshan Gurung	10	Shree Bhawani Secondary School
31	Roshni Karki	12	Shree Bhawani Secondary School
32	Samikshya Thapa	9	Modern Secondary English School
33	Sidar Lhaymu	7	Shree Nubri Basic School
34	Sunita Gurung	8	Shree Buddha Secondary School
35	Sunita Gurung	6	Shree Nubri Basic School
36	Sunmaya Gurung	10	Shree Buddha Secondary School
37	Sushmita Sirmal	9	Shree Shakti Secondary School
38	Tenjing Hise Lama	8	Shree Buddha Secondary School
39	Tenjing Lama	9	Shree Buddha Secondary School
40	Tshering Dorje Lama	8	Shree Buddha Secondary School
41	Yewang Thile Lama	9	Shree Buddha Secondary School
42	Yuvraj Rai	10	Shree Buddha Secondary School

Table 3: Name list of artists for the Musk deer book

S.N.	Name of artist	Class	School
1	Agnish Ghale	8	Shree Bhawani Secondary School
2	Aitman Ghale	8	Shree Bhawani Secondary School
3	Armaya Gurung	7	Shree Jana Jagriti Basic School
4	Bhawana Pariyar	7	Shree Bhawani Secondary School
5	Bipana Dhakal	8	Shree Bhawani Secondary School
6	Bisesh Gurung	5	Shree Shringi Himali Basic School
7	Bishal Gurung	8	Shree Buddha Secondary School
8	Bishnu Gurung	7	Shree Bhawani Secondary School
9	Budhiman Tamang	6	Shree Bhawani Secondary School
10	Dhan Prasad Gurung	8	Shree Bhawani Secondary School
11	Jyoti Gurung	7	Shree Buddha Secondary School
12	Jyoti Lama	5	Shree Shringi Himali Basic School
13	Lakpa Dorje Lama	5	Shree Numbri Basic School
14	Nishan Lamichane	8	Shree Bhawani Secondary School
15	Prakash Gurung	5	Shree Shringi Himali Basic School
16	Rita Gurung	8	Shree Buddha Secondary School
17	Roshan Dhamala	6	Shree Bhawani Secondary School
18	Sobita Rijal	8	Shree Bhawani Secondary School
19	Sonam Lama	4	Shree Numbri Basic School
20	Sunina Gurung	7	Shree Jana Jagriti Basic School
21	Sushila Gurung	7	Shree Buddha Secondary School
22	Sushmita Gurung	7	Shree Bhawani Secondary School

Table 4: Name list of post awareness conducted schools

S.N.	Name of school	Address	Attended Male students	Attended Female students	Total attended students
1	Shree Buddha Secondary School	Philim, Gorkha	26	17	43
2	Jana Jagriti Secondary School	Machikhola, Gorkha	18	25	43
3	Shree Shakti Secondary School	Shaktichowk, Gorkha	20	21	41
4	Shree Mahendra Jyoti Secondary	Durbar Marga, Gorkha	17	52	69
5	Shree Bal Mandir Secondary School	Chhahare, Gorkha	13	18	31
6	Modern Secondary English Boarding School	Haramtari, Gorkha	16	16	32
7	Aadarsha Secondary School	Thimi, Bhaktapur	27	17	44
8	Bhaktapur English Secondary School	Gatthaghar, Bhaktapur	13	12	25
9	Basu Secondary School	Byasi, Bhaktapur	28	17	45
10	The Times International College	Dillibazar, Kathmandu	32	53	85
11	Viswo Niketan Secondary School	Tripureshwor, Kathmandu	66	30	96
12	Shree Okhreni Secondary School	Sundarijal, Kathmandu	18	13	31
Total			294	291	585

Table 5: Name list of plant species in and around Musk deer habitat

S.N.	Common name	Scientific name
1	Balu	<i>Pieris formosa</i>
2	Bhekali	<i>Prinsepia utilis</i>
3	Bhoj patra	<i>Betula utilis</i>
4	Blue primula	<i>Primula denticulata</i>
5	Bugle	<i>Morina polyphylla</i>
6	Chimal	<i>Rhododendron barbatum</i>
7	Chutro	<i>Berberis hamiltoniana</i>
8	Dampate	<i>Thalictrum foliolosum</i>
9	Dhoop	<i>Rhododendron myrtifolium</i>
10	Dhupi bush	<i>Juniperus recurva</i>
11	Dhupi bush	<i>Juniperus squamata</i>
12	Dhupi bush	<i>Juniperus indica</i>
13	Dhupi rukh	<i>Juniperus macropoda</i>
14	Gobre salla	<i>Pinus wallichiana</i>
15	Himalayan fir	<i>Abies spectabilis</i>
16	Kasturi gulab	<i>Rosa moschata</i>
17	Khar	<i>Themeda triandra</i>
18	Khashru	<i>Quercus semicarpifolia</i>
19	Kukur paile	<i>Acer pectinatum</i>
20	Laligurans	<i>Rhododendron arboreum</i>
21	Lekh kattus	<i>Corylux ferox</i>
22	Lekh salla	<i>Larix himalaica</i>
23	Limi chia	<i>Cotoneaster integrifolius</i>
24	Mistletoes	<i>Arceuthobium spp</i>
25	Nigalo	<i>Drepanostachyum falcatum</i>
26	Pansan	<i>Anaphalis sp.</i>
27	Poale	<i>Ilex aquifolium</i>
28	Rukh uneuw	<i>Drynaria sparsisora</i>
29	Saur	<i>Betula alnoides</i>
30	Som lata	<i>Ephedra gerardiana</i>
31	Suga phool	<i>Piptanthus nepalensis</i>
32	Telparo	<i>Sarcococca saligna</i>
33	Thakal	<i>Circium sp</i>
34	Thinghe salla	<i>Tsuga demosa</i>

Appendix II

Photo plates



Serang gumba



Serang gumba with mountains in the background



Buddhist devotees walking around Serang gumba



Himalayan Tahr in Serang gumba



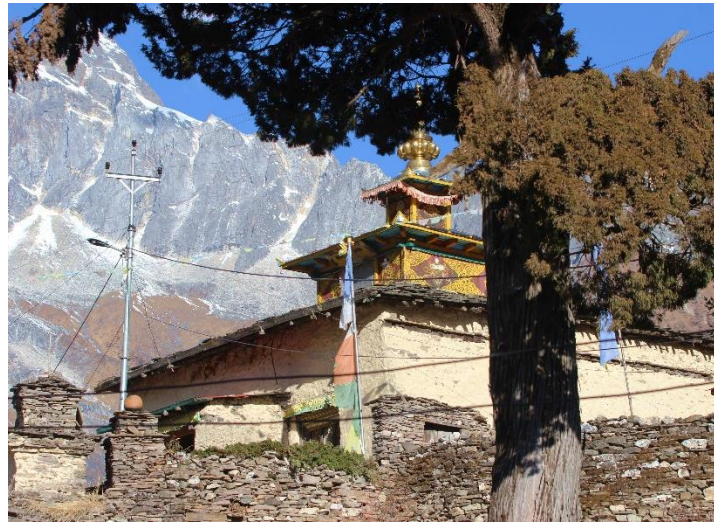
Mt. Manaslu from Lho



Children playing in snow in Samagaun



Mt. Manaslu from Samagaun



Old gumba in Samagaun



Mt. Manaslu in background from Kaltal



A local woman with her child heading home



Prok village from Krak village



Entrance gate in Lhi



Old information board about Musk deer in Philim



Replaced information board about Musk deer in Philim



Old information board about Musk deer in Prok



Replaced information board about Musk deer in Prok



School awareness in Gorkha



School awareness in Bhaktapur



School awareness in Bhaktapur



School awareness in Kathmandu



School awareness in Gorkha



School awareness in Kathmandu



School awareness in Kathmandu



School awareness in Gorkha



Published children's book on Musk deer



Children reading a Musk deer book



A child reading a Musk deer book



Musk deer book presented to the school of Gorkha



Musk deer book presented to the school of Kathmandu



Musk deer book presented to the school of Kathmandu



Musk deer book presented to the school of Gorkha



Musk deer book presented to the school of Gorkha



Musk deer book presented to the school of Gorkha



Musk deer book presented to the school of Gorkha



Musk deer book presented to the school of Gorkha



Musk deer book presented to the school of Gorkha



Collecting data in Musk deer habitat



Collecting data in Musk deer habitat



Collecting data in Musk deer habitat



Collecting data in Musk deer habitat



Musk deer latrine on the snow



Musk deer fresh pellets



Musk deer old latrine site



Musk deer foot prints



Prize distribution to the content writers of the Musk deer book



Prize distribution to the content writers of the Musk deer book



Prize distribution to the content writers of the Musk deer book



Interaction with ward president of Prok village



Interaction with President of Chumubri Rural Municipality



Interaction with Vice-President of Chumubri Rural Municipality



Interaction with the women's group President of Philim



After interaction with women and youth group of Philim



A Musk deer book presented to the President of Chumubri Rural Municipality



Interaction with local people of Samagaun



Students reading the brochure of Musk deer



Students with the brochure of Musk deer



Forest fire in MCA



Scat of cat species in Musk deer habitat



Chauri grazing in habitat of Musk deer



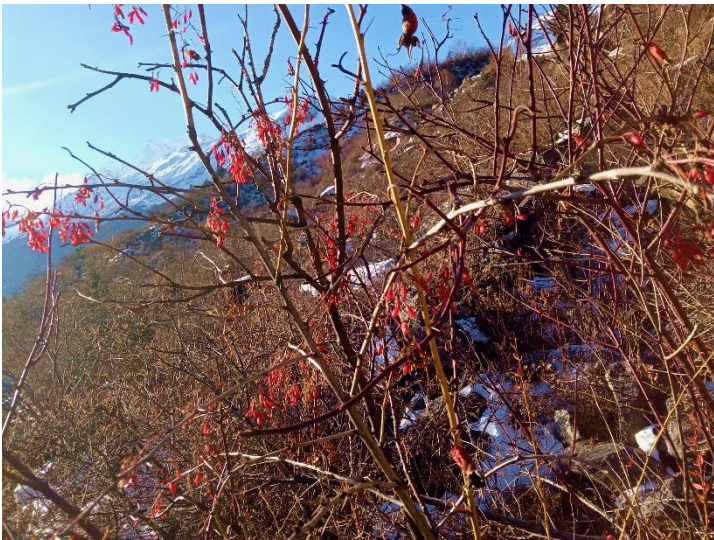
Horse grazing in habitat of Musk deer



Abies spectabilis



Arceuthobium spp



Berberis hamiltoniana



Betula utilis



Cotoneaster integrifolius



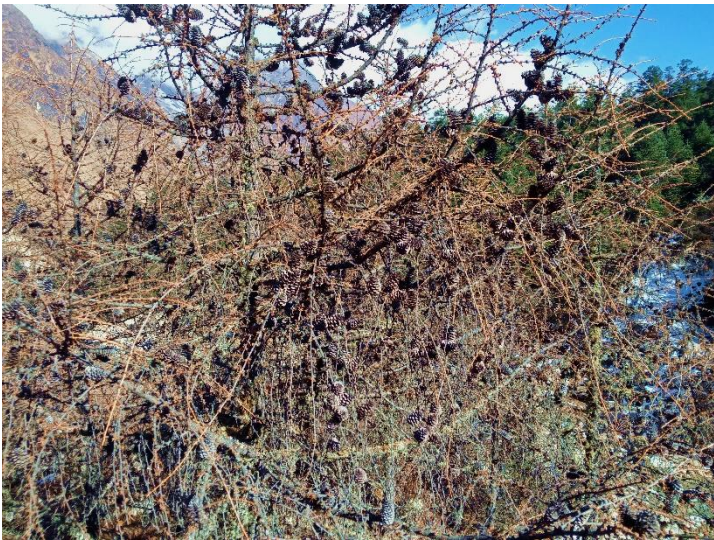
Ephedra gerardiana



Juniperus indica



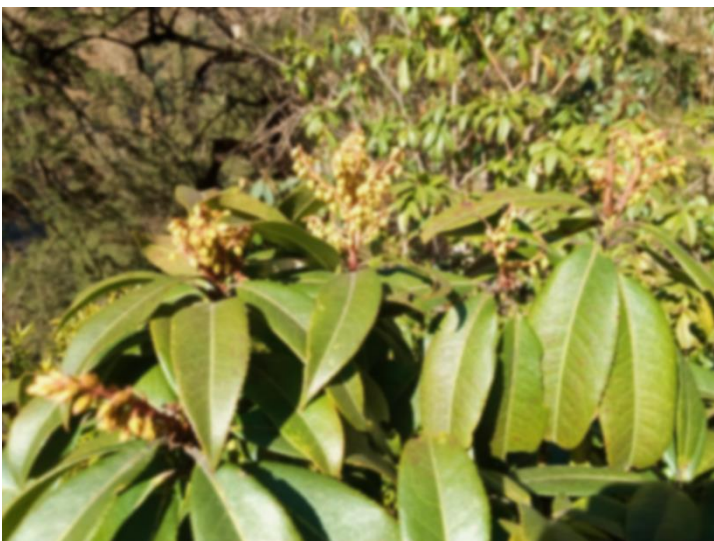
Juniperus squamata



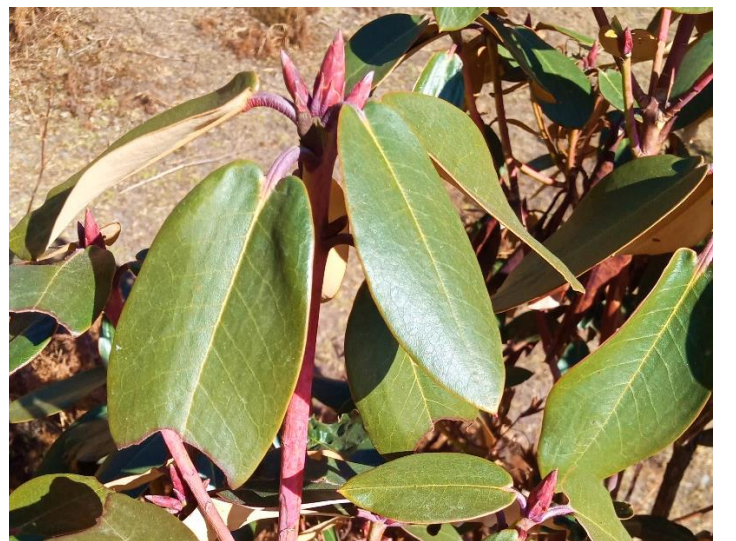
Larix himalaica



Morina polyphylla



Pieris formosa



Rhododendron barbatum

