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RESEARCH PAPER
Title

Effect of Anthropogenic Activities and Climatic Factors on the Conservation of Endangered (Threatened) Faunal Diversity of Kalatop- Khajjiar Wildlife Sanctuary of Chamba District of Himachal Pradesh

---Submitted by---

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❖ **Abstract:**

Chamba district is the northernmost district of Himachal Pradesh and situated at an average elevation of 1,006 metres (3,301 ft). The Kalatop-Khajjiar Sanctuary spread in 30.69 km² situated at the distance of 36 Kms from district headquarter and 10 kms from Dalhousie and 16 Kms from Khajjiar the world-famous tourist destinations. The sanctuary area is well laid-out for trekking trails both at Kalatop and Khajjiar.

This wild-life sanctuary is a house for Pheasants, Serow, Black Bear, Musk Deer and more than 110 species of birds. Among pheasants Koklas, Kaleej, Cheer pheasant and Monal (earlier State Bird of Himachal Pradesh) were recorded. Some of the species, like; vulture species — Himalayan Griffon (Gyps himalayensis), Musk Deer (Moschus moschiferus), Hiamalayan Gray Langur (Semnopithecus ajax) also called *Chamba Sacred Langur*, Large billed crow (Corvus macrorhynchos) has confirmed their presence in this sanctuary.

Habitat degradation, over exploitation, environmental change, increased anthropogenic activities have made their survival tough and threatened and their sight is rare now. Official spotting of Musk Deer (Moschus moschiferus) in the sanctuary has been reported through a trap camera after about 20 years along road side in the way to Lakkarmandi–Kalatop rest house in the month of June 2019 and August, 2021.

The paper is an attempt to document the efforts of wildlife department, Chamba to conserve all these species in general and the threatened species inhabiting in this sanctuary in particular. Among the efforts; installation of trap cameras, awareness and participation of local people, professional monitoring, use of social media to promote conservational practices, technological advancements, restrictions of human activities etc. are few to count. It has been noticed by the researcher that with such interventions, the survival and conservation of faunal diversity of this sanctuary has increased.

- **Keywords**: Endangered, Kalatop- Khajjiar wildlife sanctuary, Chamba, Himachal Pradesh, anthropogenic, Musk Deer, Lakkarmandi, Himalayan Gray Langur, Himalayan Griffon Vulture, Serow.

Himalayan Goral

Barking Deer

❖ Introduction:

The International Union for Conservation of Nature (IUCN) Red List of Threatened Species (also known as the IUCN Red List or Red Data Book), founded in 1964, is the world's most comprehensive inventory of the global conservation status of biological species. It uses a set of criteria to evaluate the extinction risk of millions of species and subspecies. These criteria are relevant to all species and all regions of the world. With its strong scientific base, the IUCN Red List is recognized as the most authoritative guide to the status of biological diversity. The IUCN Red List Categories and Criteria are intended to be an easily and widely understood system for classifying species at high risk of global extinction. It divides species into nine categories: **Not Evaluated, Data Deficient, Least Concern, Near Threatened, Vulnerable, Endangered, Critically Endangered, Extinct in the Wild** and **Extinct** specified through criteria such as rate of decline, population size, area of geographic distribution, and degree of population and distribution fragmentation.

Extinct (EX): Beyond reasonable doubt that the species is no longer exist; Extinct in the wild (EW): Survives only in captivity, cultivation and/or outside native range, as presumed after exhaustive surveys; Critically endangered (CR): In a particularly and extremely critical state ; An **endangered species** is a species which has been categorized as very likely to become extinct in the near future. Endangered (EN), as categorized by the International Union for Conservation of Nature (IUCN) Red List, is the second most severe conservation status for wild populations in the IUCN's schema after Critically Endangered (CR) ; Vulnerable (VU) : Meets one of the 5 red list criteria and thus considered to be at high risk of unnatural (human-caused) extinction without further human intervention ; Near threatened (NT) : Close to being at high risk of extinction in the near future ; Least concern (LC) : Unlikely to become extinct in the near future ; Data deficient (DD) ; Not evaluated (NE)

Chamba district is the northernmost district of Himachal Pradesh. It has an average elevation of 1,006 Metres (3,301 ft). **Kalatop-Khajjiar Sanctuary** is a 30.69 km² wildlife sanctuary at Kalatop and Khajjiar in the Chamba district of Himachal Pradesh, India. The sanctuary area is well laid out for trekking trails both at Kalatop and Khajjiar. There is a dense Deodar and fir forest covering 19.63 km² of the sanctuary, which is about 10 km from Dalhousie. Pheasants, Leopard, Yellow Throated Marten and Himalayan Black Bear are some of the common animals found here.The sanctuary lies in the path of the Ravi River, and is surrounded by coniferous and oak forests. Latitudinal range- 32°02′ to 32°04′ N, Longitudinal range- 76°01′ to 76°06′E, Altitude- 1185 to 2768 m, Temperature- 10 to 35 °C, Mean annual rainfall- 672.3 mm.

Thick Deodar foliage, a plethora of wildlife, snow capped mountains, carpets of verdant grasslands and easy on the eye streams of fresh water make up the Kalatop-Khajjiar Wildlife Sanctuary. It is located in the picturesque hilly Chamba district of Himachal Pradesh,India. The name Kalatop means 'Black Cap', which probably refers to the thick black forest cover on the highest hilltop in the sanctuary. The well laid out trekking and hiking trails in the Kalatop Khajjiar Sanctuary offer a pristine, mesmerizing experience with nature

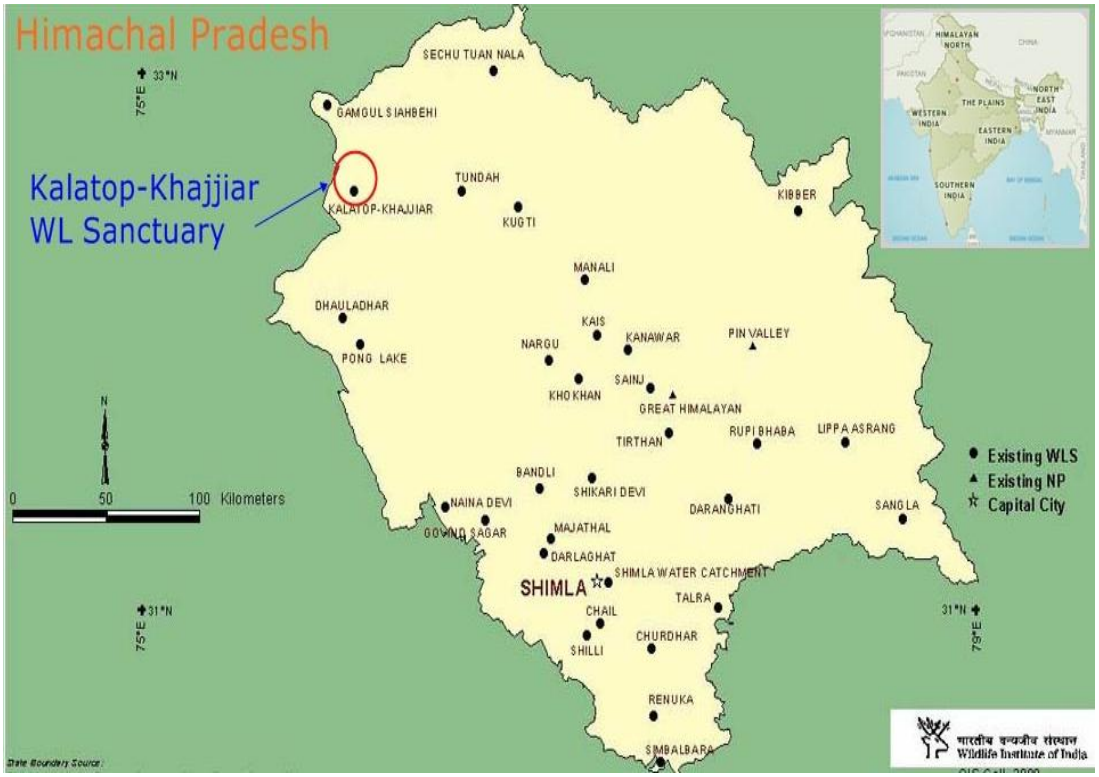
and are arguably the best means to explore the beautiful untouched forests of the park area. The exotic wildlife sanctuary holds a great diversity of flora and fauna. Animals that reside in the forest area include the Leopard (Panthera pardus), Asiatic Black Bear (Ursus thibetanus), Himalayan Goral (Naemorhedus goral), Himalayan Serow (Capricornis thar), Musk Deer (Moschus moschiferus), Barking Deer or Indian Muntjac (Muntiacus muntjac), Indian Porcupine (Hystrix indica), Rhesus Macaque (Macaca mulatta), Leopard Cat (Prionailuris bengalensis), Yellow Throated Marten (marte flavigula), Hiamalayan Gray langur (semnopithecus ajax) etc. The Kalatop Wildlife Sanctuary is an ornithologists' paradise, with a plethora of aviary species such Chestnut- Billed Nuthatch, White-cheeked Nuthatch, Oriental Turtle Dove, Spotted dove, Black headed jay, Eurasian jay, Rufous sibia, Himalayan Griffon Vulture, Russet sparrow, Ultramarine fly catcher, Common Hoopoe, Koklas Pheasant, Kalij Pheasant, Himalayan Monal, Dark sided flycatcher, White- throated laughing Thrush, Spotted forktail, Rock Bunting, Hill Patridge etc.

During the rule of the princely states under British regime, the place was famous as hunting and sporting grounds for the Chamba rulers. The area under the Kalatop Khajjiar Sanctuary was notified as a natural reserve during the early 1960's but efforts to protect and preserve the pristine area was undertaken only during the 1970's when it was declared a sanctuary. The lush oasis has always been an open forest sanctuary, meaning that there are no enclosures of any kind and animals are free to move in and out of the area. A lovely bowl-shaped meadow at Khajjiar, with a lake and a ‘floating’ island, is a popular tourist spot. There is a ‘golden’ domed temple at the edge of this meadow, dedicated to the deity ‘Khajji Nag’, from whom the area derives its name. Some 110 species of birds were recorded. Threatened vulture species — Himalayan Griffon (Gyps himalayensis), Musk Deer (Moschus moschiferus), Hiamalayan Gray Langur (Semnopithecus ajax) also called Chamba sacred Langur, Black Serow, Leopard, Asiatic Black Bear, Himalayan Brown Goral have confirmed their presence in this sanctuary.

Leopard

Spotted Forktail

Year of establishment	**1958**
YEAR OF FINAL NOTIFICATION:	(Section 26 WPA, 1972) Notification No. FFE-B-F(6)-11/2005-II/ Kalatop-Khajjiar dated 07.06.2013
AREA:	17.17 Sq Km.
GEOGRAPHICAL LOCATION:	District Chamba, situated within the Geo-coordinates North Lat.32^0 33'58" N & Long 76^0 01'11"E East Lat.32^o 32' 16" N & Long 76^0 04' 00"E, South Lat.32^0 31'27" N &Long 76^0 01'51"E West Lat.32^0 32'16" & Long 76^0 00'36" E
ALTITUDE:	1700m to 2768m
CLIMATE:	Rainfall-400mm to 600mm; Temperature: -10º C to 30ºC
VEGETATION:	Moist Deodar Forest, Western mixed coniferous forest and Ban Oak forest.
REPORTED FAUNA:	Common Langur, Leopard, Giant Indian Flying Squirrel and Indian Porcupine, Yellow throated Marten, Goral, Himalayan Black Bear, Barking Deer, Rhesus Monkeys and Leopard Cat. Some 110 species of birds were recorded. Among pheasants Koklas, Kaleej are both numerous. Cheer pheasant and Monal were also recorded.
CENSUS FIGURES:	Not Available
CONSERVATION ISSUE AND LAND USE:	Livelihoods of local villagers and nomadic grazers dependent on the sanctuary. Heavy tourist influx especially during summer season is also an issue.
ECO-TOURISM SPOTS:	Khajjiar Lake, Kalatop, Dainkund and Palwani Temple.
ECO-TREKS:	Kalatop-Khajjiar-12 Km, Khajjiar-Mandrani-3 Km, Lakkar mandi to Khajroth-5 Km, Lakkar mandi- Palwani Mata-Jot-14 Km, Lakkar mandi to Lakkar mandi-12Km and Kalatop to Dibri-5.5Km.
ACCOMMODATION AVAILABLE:	FRH Khajjiar, FRH Kalatop, Trekker huts Kalatop, Transit Hut Khajjiar , Hotels in Khajjiar, Lakkar mandi, Kalatop and Dalhousie.
HOW TO REACH:	By Road: From Chandigarh to Dalhousie (352 Km) on to Lakkadmanndi (10Km) Kalatop is further 3Km and Khajjiar another 12Km. Alternatively, from Chabma to Khajjiar (25Km). Nearest railhead: Pathankot:90Km. Nearest Airport: Gaggal (Kangra) (130Km).
CONTACT OFFICES:	Range Forest Officer (WL) Khajjiar, DFO (WL) Chamba; Telephone No. 01899-222639. Email Id:- dfowlcha-hp@nic.in & dfowlchamba@gmail.com


Himachal Pradesh
Kalatop-Khajjiar
WL Sanctuary
SECHU TUAN NALA
GAMGUL SIAHBEHI
TUNDAH
KALATOP-KHAJJIAR
KUGTI
KIBBER
MANALI
DHAULADHAR
KAIS
KANAWAR
PIN VALLEY
NARGU
PONG LAKE
SAINJ
KHOKHAN
GREAT HIMALAYAN
TIRTHAN
RUPI BHABA
LIPPA ASRANG
BANDLI
SHIKARI DEVI
NAINA DEVI
DARANGHATI
SANGLA
GOVIND SAGAR
MAJATHAL
DARLAGHAT
SHIMLA WATER CATCHMENT
SHIMLA
TALRA
CHAIL
CHURDHAR
SHILLI
RENUKA
SIMBALBARA
0 50 100 Kilometers
Existing WLS
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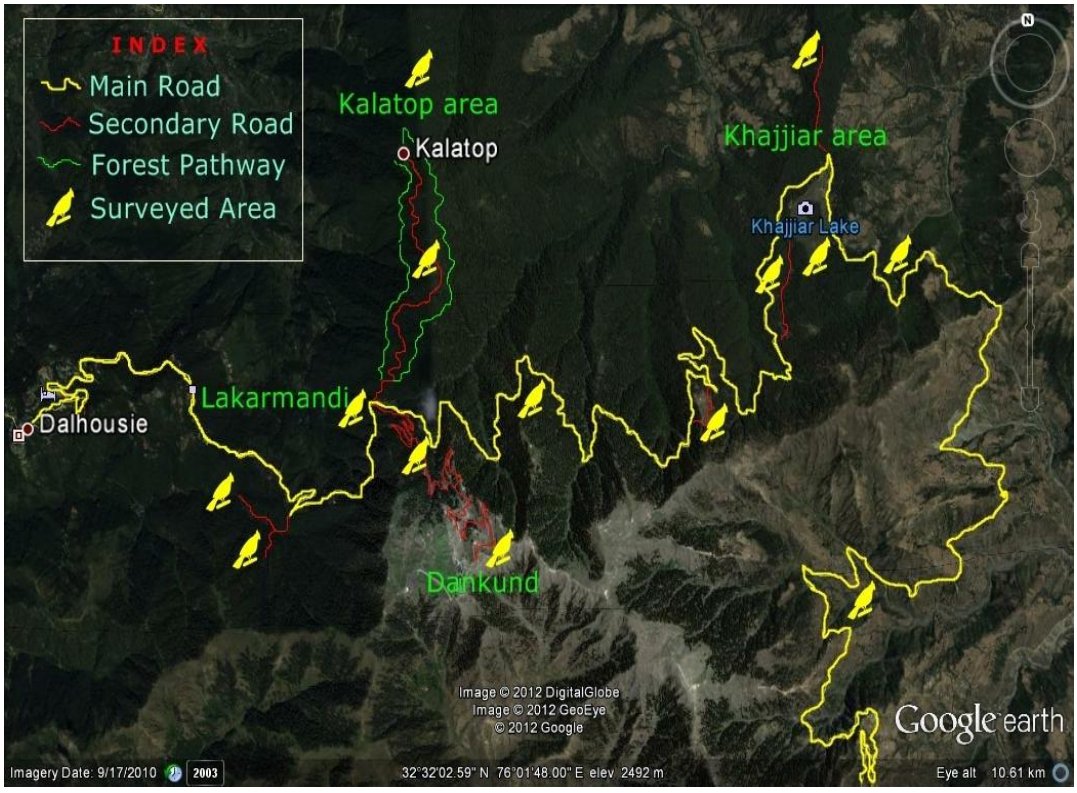
Capital City
भारतीय वन्यजीव संस्थान
Wildlife Institute of India


INDEX
Main Road
Secondary Road
Forest Pathway
Surveyed Area
Kalatop area
Kalatop
Khajjiar area
Khajjiar Lake
Lakarmandi
Dalhousie
Dainkund
Image © 2012 DigitalGlobe
Image © 2012 GeoEye
© 2012 Google
Google earth
Imagery Date: 9/17/2010
2003
32°32'02.59" N 76°01'48.00" E elev 2492 m
Eye alt 10.61 km

❖ Origin of research problem:

The research problem originated by spotting of single Musk Deer in the sanctuary after 20 years long period. The sighting of Himalayan Serow (Capricornis sumatraensis thar) is almost negligible since 2015-16. This is been a 5-6 years long span when peoples have not seen even a single individual of Himalayan Serow in the area. So research problem originated mainly to analyse the factors responsible for the absence of / negligible sighting of threatened faunal diversity like Black Musk Deer (Moschus moschiferus), Hiamalayan/ Kahmir Gray Langur (semnopithecus ajax), Himalayan Griffon Vulture (Gyps himalayensis) , Himalayan Serow in the sanctuary. It was necessary to analyse the effect of anthropogenic activities, change in climatic factors and change in the habits of wild fauna of the sanctuary for their rare sighting or sighting after long time span.

❖ Objectives:

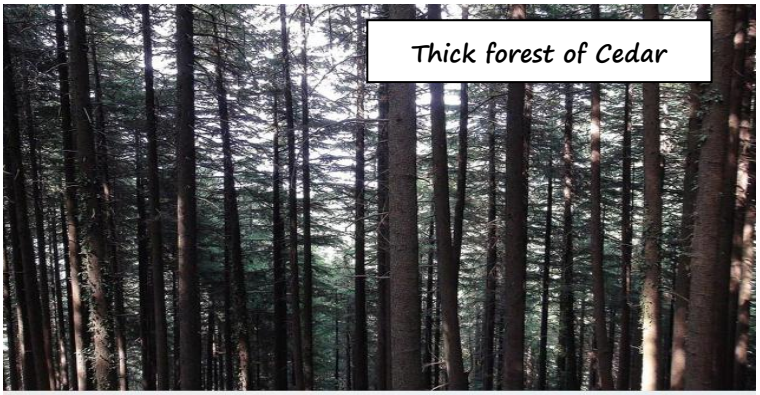
Main objective of the research is to trace or find out the reasons behind the absence of important threatened faunal wild life in the sanctuary during past few years. So that these wonderful creatures could lead their life without any disturbance like other. Wild life organisms have the full right to live like others in their natural habitat. To ensure their livelihood smooth and to ensure their conservation are some objectives behind the research.

To remove those obstacles which are threatening their survival and allow them to interbreed within themselves to increase their population, so that they could maintain their race were some objectives behind the research.

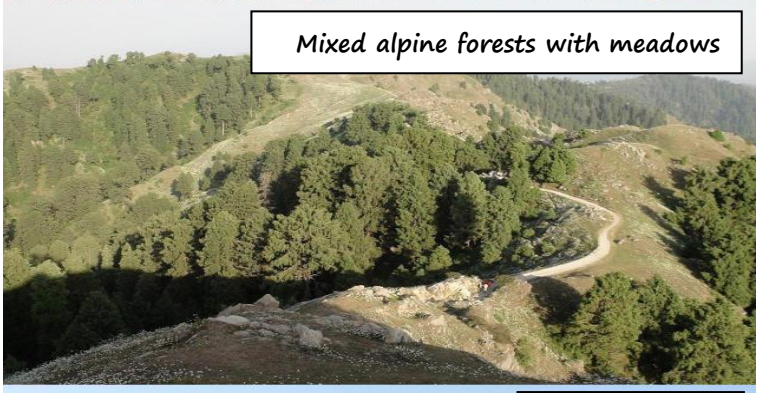
❖ Materials and Methods:

Study area: study was carried out from June 2019-August, 2021 in different forest patches of Kalatop- Khajjiyar Wildlife sanctuary. Survey was started from Khajjiyar to Lakkarmandi, Kalatop, Dainkund and Pohlani area of this Wildlife sanctuary. The site experience temperate climate where maximum rainfall occurs from mid June to September. August is the month when highest rainfall is recorded.

Methodology: Research is based upon the interviews of the senior officials, forest workers, local peoples, herb collectors, Morchella collectors, migratory labourers living in the area, nomadic grazers, shepherd, Gujjars etc. Literature review also helped me a lot to find out the reasons behind the negligible sighting of Threatened wild life fauna of the sanctuary.



Thick forest of Cedar



Mixed alpine forests with meadows

Khajjiyar Lake

Dense Kalatop Forest


Himalayan Sacred Langur


Musk Deer


Griffon Vulture


Large Billed Crow


Himalayan Serow


Common Hoopoe

❖ Result / findings & Discussion:

Tourist influx to the area of **Kalatop-Khajjiyar** wild life sanctuary is including **Dalhousie** is about 10-12 Lacs per year. Vehicular movement to the area has been increased to a large extent. Tourist as well as local public wander the area in the vehicles with blowing horns.

Black Musk Deer (Moschus moschiferus) can refer to any one or all seven of the species that make up ***Moschus***, the only extant genus of the family **Moschidae**. The musk deer family differs from cervids or true deer by lacking antlers and facial glands and by possessing only a single pair of teats, a caudal gland, a pair of tusk-like teeth and of particular economic importance to humans a musk gland. Musk deer live mainly in forested and alpine scrub habitats in the mountains of southern Asia.

Black Musk Deer is also found in Kalatop-Khajjiyar Wildlife Sanctuary. Official sighting of this beautiful creature is almost negligible from last 20 years. Official spotting of Musk Deer (Moschus moschiferus) in the sanctuary has been reported through a trap camera after about 20 years along road side in the way to Lakkarmandi –Kalatop rest house in the month of June 2019. Recently in the month of August, 2021 Musk deer has again been recorded by a forest guard Atul Mohinder and Akshay in the area of Kalatop. They have trapped this wonderful creature in their mobile by using mobile camera and recorded his leaping movement for about 35seconds. This again has confirmed the presence of this Mammal in the sanctuary.

Musk Deer-June 2019

The Himalayan Grey Langur (Semnopithecus ajax) is an Endangered species confined to the Chamba Valley of the Western Himalayas in Himachal Pradesh state in India. This Langur is basically folivorous (leaf-eater) and feeds on a combination of fruits, buds, leaves, stems, barks, roots and flowers but has also been observed eating insects.These Langurs come to agriculture fields during the harvesting of crops and move to the deep forest during other periods of the year. This tendency is more visible in the areas of Kalatop and Khajjiar.

The Himalayan Grey Langur generally raids crops in a silent way not violently. Now it is believed that this species is no longer shy and violent encounters are frequent. Locals say that S. ajax was not visible in human habitats in the past and has rarely raided cultivated fields in the past but presently, these incidents are more frequent. Expansion of the human population and developmental work leads to habitat loss. Feeding habits of monkeys and Langurs have changed. Now, they have become more dependent on human leftovers like baked or cooked food available at human habitations, offered by tourists or left as garbage by hotels.

At the ecosystem level, primates Himalayan Langurs are very essential to maintain homeostasis of the forest ecosystem, especially critical for forest regeneration and survival. They often performs ecological services that are important

to maintain tropical habitat such as seed disperser, pollinator, seed predator as well as food for the top predator. The wild population management, monitoring, public education, and limiting factor management needed for its conservation. Overall, the density of Langurs is low. Hence, the conservation of this Langur population should become a priority now to avoid decline in population of this endemic primate.

Conflict between the Himalayan Grey Langur and humans is growing with increasing incidents of crop raids. This is mainly due to the destruction of natural habitat and reduction in the natural food resources of this species in the forest.

Chamba, the most favourable natural habitat for S. ajax is now affected by human activities, causing continuous decline in space. Agriculture, construction of roads and hydro-electrical projects are mainly responsible for this degradation. Fragmentation, deforestation, persecution and retaliatory killing due to crop raiding, and commercial horticulture expansion are threats of serious concern confronting the Himalayan Grey Langurs.

The major and common threats throughout the region are habitat loss and degradation through human encroachment, overgrazing, building roads through forests, lopping, deforestation, agriculture, forest fire, unavailability of food, predation by carnivores (leopards and tigers) and attack of several viral and bacterial diseases. Although the habitat of these langurs is stable currently, it is predicted to decline in the future by 10 per cent due to forest clearance for agriculture, tourism, hydro project construction and encroachments.

Population threats to Himalayan Griffon Vulture:

Flocks of threatened vulture species, Himalayan Griffon Vulture (Gyps himalayensis) were spotted at the Kalatop Khajjiar Wildlife Sanctuary frequently which indicates a healthy and rich biodiversity of this area. The vulture, known as king scavengers plays a key role in the environment as ecosystem service provider as it feeds on carrion and keeps the natural environment clean and controls spreading viral diseases from decaying carrion. The population of Himalayan Griffon Vulture had seen declined in the area due to feeding on carcass of animals treated with veterinary drug Diclofenac (NSAID) an anti-inflammatory non-steroidal drug widely used for livestock. This drug leads to renal failure and cause visceral gout in vultures. Their number has also been reduced to a large extent due to the gastric infections, ulceration, carcinogenic problems by consuming polythene contents present in the dead and decaying cattle of the area. Changing climatic conditions might have proven harmful for their survival. Himalayan vultures are localized scavengers of nature, with the important role of removing and processing carrion. They are the most dominant bird scavenger of the area.

Measures taken by wildlife Department to conserve Biodiversity:-

Banned drugs are not allowed on the wildlife unless proper permission from legal sources. No disturbance / harm should be caused to wildlife. Destruction of natural habitats, roosting areas, nests, dens etc. of wildlife species is strictly prohibited in the sanctuary. The natural water resources and other resources should not be disturbed and kept clean. The researchers should respect the local traditions and cultures. Waste material like polythene bags, other biological wastes etc. Should not be thrown in the area. Cleanliness has to be maintained. No fire, smoke etc. endangering the environment is allowed in the forest area. Digging lopping, cutting and damage to plants, trees, soil surface/ vegetation is not allowed. Collection of fuel wood, timber, medicinal plants is strictly prohibited from the forests. No construction of path, temporary road by damaging forest land is allowed. The research / findings shall be

furnished to the Chief Wild Life Warden (CWLW), HP at the end of the research. Any other condition as would be imposed by the concerned DFO as per ground situation shall be fulfilled.

Himalayan Serow (Capricornis thar) is a shy nature mammal not sighted in the sanctuary since about 15 years. Before that time there were the confirmed presence of 2-3 pairs of Himalayan Serow in the area but at high altitude away from the human habitation. There was the sighting of female Serow for some time in the sanctuary area followed by the disappearance of female too since a long time. It might be possible that they have been preyed upon by Leopard or some other top carnivore. There was a prevalence of Mouth-hoof disease in the sanctuary during 2005-06. Serow with infected hoofs were seen in the area during that time. Majority of Serow died during that time. Veterinary teams with expert physicians also visited the sanctuary to treat the affected animals. Numerous Himalayan Goral were also effected with the disease during that time. This disease might have affected the Himalayan Serow. Multiple Serow dead bodies were found in the nullah and diches during that time.

❖ Conclusion:

A very little Climate change is there in the area. Tourism has no big effect on the survival of Wildlife of the sanctuary. Wildlife has restricted to come near the road in day time only. Numerous Griffon Vulture are in abundance in Diankund, Pohlani area, Talai, Jot area. There is a strange sighting of a herd of wild Boar in the area of Kalatop- Lakkarmandi during the year 2020. This is quite unnatural incident. Because wild Wild Boar is an inhabitant of temperate regions unlike Kalatop- Khajjiar and loves to inhabit adjoining areas of Khairi, Bhalei, Barngal, Sherpur, Chamera lake etc. This is due to changing climatic conditions in the sanctuary area and to drink the water of ponds made in the sanctuary area or due to Forest Fire in their basic habitat. Wild Boar herd has crossed the Lakkarmandi- Kalatop area multiple times during last one year might be due to decreasing temperature during April/May 2020. They were seen crossing the area coming from Chowari to Chamba. Dropping/ scat/faecal remains of Serow has been found in the sanctuary by forest workers, herb collectors, Morchella collectors upto 2015-16. at high hills of Kalatop.

Our study discovered that musk Deer does face anthropogenic pressure in the sanctuary in past years. Poachers killed Musk Deer primarily for the musk pod, skin and meat. Based on the local people's perception poachers have killed Musk Deer when those were seen frequently.The traps were found to be the primary tool used to kill musk deer, followed by snares and guns.

Population Density of Black Bear, Yellow Throated Marten and Himalayan Goral has been increased to a large extent in past few years. They can be seen even in the locality to feed on the leftovers of human beings. Administration of Declofenac has been banned on the cattles by the Government for the conservation of Vultures. Dead Catttles are not generally thrown in the open by peoples nowadays. They are buried properly. This has also effected the survival of Vulture.Himalayan Brown Goral in the herd of 20 or more individuals are sighted in the sanctuary frequently. Barking Deers have also been noticed in the area frequently but singly. Himalayan Black Bear has attacked human being in the sanctuary multiple time. In December 2019 Himalayan Black Bear broken the door of staff canteen at Kalatop , damaged the refrigerator and stolen the eatables.

Habitat degradation, over exploitation, environmental change, increased anthropogenic activities have made their survival tough and threatened. Department of Wildlife Chamba putting great efforts for the conservation of all the species especially threatened species of animals inhabiting this sanctuary. Trap cameras have been installed to record the activities of various animal species. Wild life awareness through various activities has also been increased. Local people participation, continuous monitoring by well trained and enthusiastic staff, publicity regarding conservation through social media, technological advancements etc have increased the survival and conservation of faunal diversity of this sanctuary. Human activities have been restricted to its minimum to reduce the disturbance causing to biodiversity in the sanctuary. This research will aid in the designing and implementation of a holistic stakeholder involved participatory conservation program for the endangered faunal diversity in the sanctuary. This research will open more venues for wildlife research and their conservation in the region.

For the sustainable conservation of Endangered Faunal diversity, a regular monitoring program should be operated by the Government in addition, alternative income generating sources, such as ecotourism, should be promoted to increase livelihood income of the local people and to promote wildlife conservation. The proper management of grassland habitats and community forests may reduce the dependency of local people animal's habitats. Stakeholders like forest workers, migrant labourers, nomadic grazers, wildlife conservation committees and community Forest users must play an active role to manage the grassland habitats and forests in proper cooperation with the local people.

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B.O. Khajjiyar - Sh. Slaeem Beg
Forest Guard Khajjiyar- Sh. Vipan Kumar
Forest Guard Kalatop- Sh. Akshay
Forest Guard Lakkarmandi- Sh. Atul Mohinder
Sr. Forest Guard (Check Post Lakkarmandi) - Ravinder Kumar
Office Superintendent Chamba wild life- Sh. Ashok Thakur
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A big thanks to the Migratory labourer of Lakkarmandi, Nomadic grazers, shepherds and Gujjars moving up and down hills frequently and Yash Raj- an undergraduate student to accompany me in the field during field study.

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Monal

Yellow Throated Marten

Koklas Pheasant

Oriental turtle Dove

Asiatic Black Beer

Leopard Cat