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Risk factors responsible for wildlife destruction in District Battagram, Pakistan

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Various natural disasters and anthropogenic activities are responsible for the destruction of a large number of wild species throughout the world. The present study was conducted in District Battagram, Khyber Pakhtunkhwa, Pakistan from March to July 2021. All the evidence was collected through a structured questionnaire, oral interview, and field survey. The habitat of wild animals is continuously destroyed due to deforestation, the rate of deforestation in the District is very high and reported in different locations, i.e. Chetoo Paimal Shareef, (almost 120 pine trees were catted) Shumalai (Donga, and Tapka) about 300 trees of pines species were catted). Human population increment also badly affects local wildlife, according to the census of 1998, the population of the district was 307,278 with an annual 0.58% growth rate and according to the census of 2017, the district population is 476,612, with a 1.46% growth rate in previous 2 decades. According to the perception of the local peoples, overhunting is directly proportional to the awareness of the local community and population, overhunting was reported from different areas, and pheasants hunting were reported from the mountains of Shumlai, Chail, Baliya, and Allai. Similarly, Chakoor and Mountain Duck hunting is also reported from different areas of Nandihiaar Valley and Chor Valley. About 62% of respondents observed the forest fire in different areas of the district, among these, 14% of people specified the region of the forest fire, i.e. Shumlai Hill (2020) and Tapka (2021). Road constructions and other infrastructure lost the habitat of wild species, and many deaths of wild species were reported from road accidents on CPEC (China-Pakistan Economic Corridor). Peoples of elevated areas are very poor, so they cut the trees, and hunt wild animals to overcome their needs. Illegal fishing is very common and usually, peoples use chemicals (20%), Electric current (60%), and nets (18%). The forest and wildlife departments do not work properly, there are proper rules but there is no implementation in the district. According to the wildlife department, the ratio of staff is insufficient that's they cannot monitor properly.

Keywords: Risk factors, wildlife declining, Questionnaire survey, sign survey, Battagram

INTRODUCTION

Many wild species are commonly used for different purposes such as medicine, ornamentation, and as a food source that plays very important roles in international markets for black trade (Ullah et al. 2020). Various natural disasters and some anthropogenic activities are responsible for the destruction of a large number of wild species throughout the world (Ullah et al. 2020), declining of wild species was reported in both protected and non-protected areas including the rapid growth of human population, land formation, usage of land surface and cover changes, infrastructural development, climate change, and variability, poaching for the trophy and bushmeat, outbreaks of infectious diseases, poor

governance, weak law enforcement, competition with livestock for space, water and pasture, and some other natural disasters (Bouche et al. 2011; Maisels, et al. 2013).

Species that are living in those areas, where threats processes like changing their intensity on the surface of the earth are at higher risk of extinction (Ullah et al. 2021). Because of overpopulation, construction, and overuse of natural resources, Pakistan is under high ecological pressure. (Alam (2009). Extinction of railings in Pakistan is speedily at the rate of 4 to 6% per year, which leads to the extinction of wildlife (Ibrar, 2003). On the other hand, some Factors of extinction are generally acknowledged such as habitat destruction, habitat partition, pray-related

hunting, and trophy overhunting (Rahat et al. 2020).

Wildlife conservation is very important, to study the attitude and perception of people towards the protection and conservation of wild species (Newmark et al. 1994). People's attitudes toward conservation may be changed by providing awareness through campaigns and education which is also needed (Tsi et al. 2008). Extinction is also increased by policies and system of management that opposes wildlife conservation due to fewer resources, insufficient to prevent extinction or less accomplishment of the policies (Ahmad et al. 2021). The dangers to wildlife are the destruction of habitat, unwise collection of high Grazing, Deforestation, soil erosion, microorganisms attack, poaching, and the killing of wild animals (Haq, 2012). Hunting is driven largely by trade and wild meat, while not a critical source of food for a large number.

The major hazards in the district Battagram are soil erosion, deforestation, attack of micro-organisms, over-collection, habitat loss, overhunting, and killing of wild animals (Haq, 2012). Wild animals are used for Ornaments, care of health, and getting food, (Begum et al. 2014), increase in the human population plaguing some problems including, a decrease in resources of the forest which leads to the extinction of the forest and wildlife species. These effects the loss of biodiversity worldwide (Naeem et al. 2016) in the past 50 years the population of humans has increased become above then doubled as well as the demand for their products of agriculture has raised at the same rate. Approximately 10% increase in the productive area: thus pesticides use also increased as the demand of the population which adversely affects the production of our crops (Haq, 2012), continuous growth in human populations is the main cause of wildlife loss globally which, (Cheng et al. 2019), the common factor of the ecosystem of the world is forest fire as well, It affects the soil as well as plants, and other wildlife species in a specific area. Its effect is the micro as well as the macro-nutrient, organic matter of soil, and properties of soil (PH, soil biota as well as bulk density, colouration, and texture). Forest fire depends upon different factors like the load of fuel, fire intensity, and moisture of the soil. Fire has advantages and disadvantages for the soil of a forest and it depends on its intensity and time interval, fire with low severity causes the combustion of organic matter (Escobar et al. 2015).

MATERIALS AND METHODS

2.1. Study Area

The present study was conducted in District Battagram, Khyber Pakhtunkhwa, Pakistan from March to July 2021. Coordinates of the district ranging from 34°33' - 34°47' (N) to 72°54' - 73°15' (E). Geographically District Battagram is located in the very important ecological zone of Khyber Pakhtunkhwa and part of the Himalayan mountain ranges. District Battagram is surrounded by District Mansehra, Shangla, Kohistan, Tor Ghar, and some parts of the

northern areas of Gilgit Baltistan (Khan et al. 2021; Ahmad et al. 2021; Ullah^a et al. 2021; Ullah^b et al. 2021). Battagram has an area of 1,301 km² with a population is 476,612 according to the census of 2018 (Figure 1).



Figure 1: Map of the study area

Methods

Evidence about risk factors was estimated by questionnaire-based surveys, oral interviews, and field surveys (Ullah et al. 2020). Data were randomly collected from different potential sites of the study area including Balija Maidan, Shumlai (Donga and Tapka) and Chail Mountain, Battagram proper, Chapargram, Koza Banda, Battamori, Jesol, Paimal Shareef, and Alai. During a field, survey researchers visited the field for searching deforestation, forest fire, illegal hunting and fishing, rapid construction growth, and cub poaching. Similarly, structured questionnaires were filed and informal interviews & discussions were made with local communities about all the risks that decline the frequency of wild animals.

A total of 50 structured questionnaires were filled from the entire study area, among total, Balija Maidan (10), Shumlai (Donga and Tapka) (9) Chail Mountain (4), Battagram proper (3), Chapargram (4), Koza Banda (6), Battamori, Jesol (7), Paimal Shareef (2), and Alai (5). Each questionnaire is composed of multiple questions related to the risk factors. Questions were asked in the local language "Pashto" and then translated into English during questionnaire filling.

Data were also collected from local people with informal interviews and discussions about extinction risks in the study area. An important discussion was made and recorded in written form on the backside of the questionnaire "specific remarks" to evaluate thoughts of people toward these factors.

A field survey was also conducted during multiple visits to the field. During the field survey, the researchers were encountered different signs of risks such as deforestation, forest fire, illegal hunting and fishing, rapid construction growth, and cub poaching contribute a lot towards the population decline.

RESULTS

Results from a questionnaire-based survey.

All the questionnaires were filled out voluntarily by the local community of the study area. As a result of the questionnaire-based survey, the local community claimed that the wildlife of district Battagram facing high risks due to the rapid growth of the human population, deforestation, forest fire, urbanization, rapid rate of construction, poaching, illegal hunting, and continuous fishing. The questions were divided into multiple areas of interest some of the important questions are followed.

Which animals are more affected?

According to the responders, wild animals including mammals, birds, reptiles, and fishes are more affected; among mammals common leopards, black bears, grey goral, foxes, and monkeys respectively. Most of the targeted birds include pheasant species, pigeons, and some ducks; among reptiles, most of the snakes are facing high threats from the human population. Factors that affect the survival of these species include deforestation (30%) followed by illegal hunting (27%) and human population incensement (19%) (Figure 2).

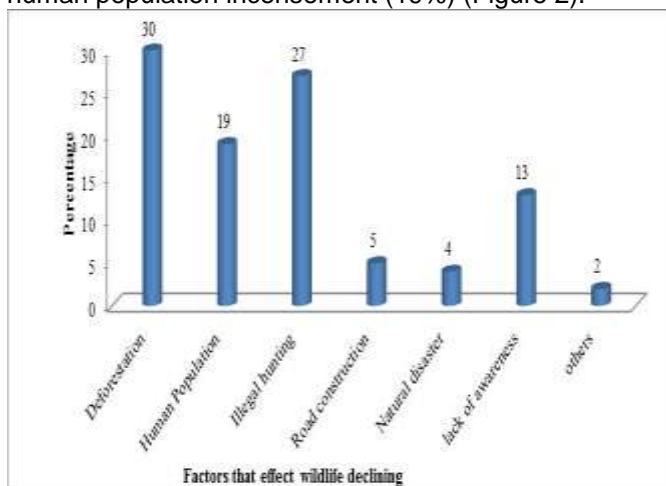


Figure 2: Major factors that affect wildlife declining

Illegal fishing

According to the questionnaires-based survey, about 88% of responders respond that illegal fishing accrues in the entire district and 12% respond that illegal fishing does not occur. The hunters follow many ways of hunting i.e. chemicals (20%), Electric current (60%), excessive nets usage (18%), and other tactics (2%). Among all these towards fish population, electric current and use of chemicals affected fish population enormously about 80% declining contribution. Due to such excessive illegal fishing, the entire fish population of the district continuously declined over the last five years that extinct in the entire population of various freshwater fishes (figure

3).

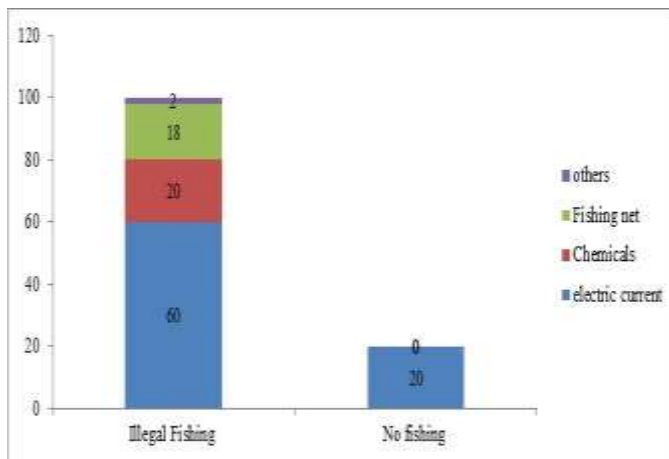


Figure 3: Various tactics for fishing

Wildlife conservation can be promoted by the awareness of the local community.

A questionnaire-based survey towards awareness of the local community indicated that 70% of responders think that wildlife conservation can be promoted by awareness of the local community. On the other hand, 25% of responders think that it may affect but are not sure and also think it may be promoted, they have no idea about awareness of the local community, and 5% of people do not respond (Figure 4).

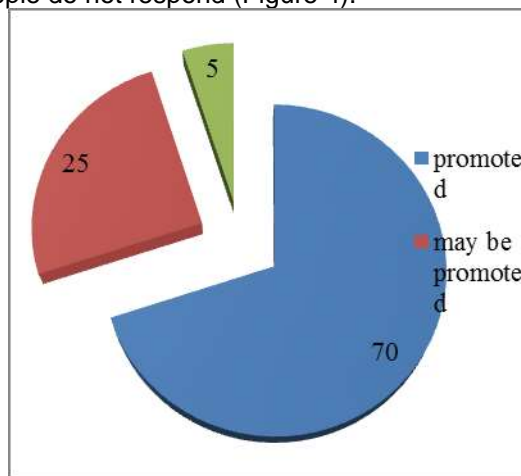


Figure 4: Perception of the locals towards awareness of the local community

Rate of deforestation

In this survey, (56%) of respondents think that the rate of deforestation is very high, another hand 32% of people responded that there is a medium rate of deforestation and 2% of respondents responded that there is no deforestation in the study area.

Traditionally the use of wild animals and their parts in our culture

According to the questionnaire-based survey, 34% of responders responded that wild animals are important for Traditional Medicines, 36% of residents of the district think that wild animals are important for Culture and 30% of responders don't respond (Figure 5)

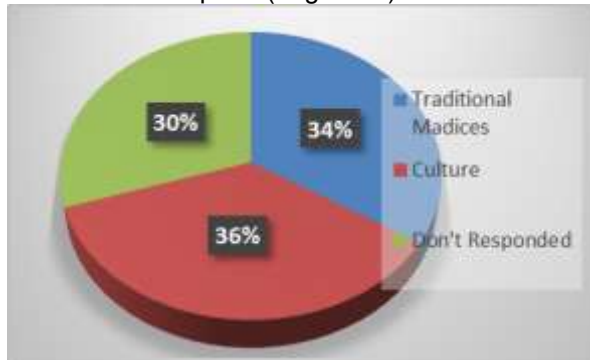


Figure 5: Perception of the locals towards awareness of the local community

Forest fire recorded in the study area

According to the Questionnaire base survey, 62% of responders observed forest fires in the different forests of the Battagram, among them 14% of people specified the exact place and time (Hill Shumlai) of a forest fire. According to the thoughts of the local community, a forest fire cannot occur naturally in this area but most forest fire is caused by humans (Shepard man, grazers, tourists, and migratory peoples), and 38% of respondents have no idea about a forest fire in the district Battagram.

Human-wildlife conflicts

Regarding human-wildlife conflict, 50% of responders responded that Human-wildlife conflicts occur in different parts of the study area. Among large animals, Common Leopard, Black Bear, migratory wolf, Jackal, and Monkeys were considered the most conflicted animals with human beings (Figure 6)

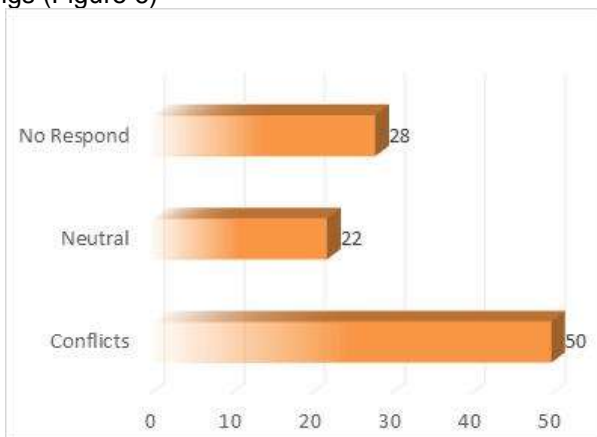


Figure 6: Perception of the locals towards human-wildlife conflict

Risk Factors Responsible for Wildlife Destruction.

Besides of questionnaire, some of the (Yes/No) questions were also asked by the local community during the questionnaire survey to assess every parameter related to the extinction risks. These types of questions are very important to assess perceptions of the local community in a short time. As a result of these questions, mostly they respond positively towards (Yes) and indicated that every parameter of the risks is very high that leading to the decline of the wild species (Table 1).

Table 1: Response to the yes/no questions about wildlife risk in the study area

Question	Yes	No	Neutral
Do you think that humans population growth negatively affects the survival of wild animals	92 %	8 %	
Do you think that human-wildlife Do conflicts occur in this area?	50%	22%	28 %
Is there any illegal fishing in your area	88%	12%	
Any poaching of wild animals reptiles and birds	48%	38%	14%
Is wildlife conservation can be promoted by awareness of the local community?	36%	4%	60%
Any record of forest fire	32% Location: Shumlai Hill 14%	62%	6%

3.1. Informal interviews and discussion

Data were also collected from local people with informal interviews and discussions about extinction risks in the study area. Important discussions were made with the local community to evaluate the thoughts of people toward these factors; some of the important responses are below.

Less Awareness:

People do not understand the importance of wild species so everyone trying to destroy their habitat which affects directly and indirectly wild species. Everyone thinks for himself, not about the entire population, and this is because of less education and awareness.

Deforestations:

Very high levels of deforestation have been recorded in this research and that is the ultimate reason for habitat destruction that leads to the decline of wild species at a very high rate.

Poverty:

The most important factors are poverty, peoples who are living in the hilly areas of district Battagram are very poor and they cut the forest (trees), hunt animals to overcome their needs, and also do not capable of proper education.

Poor implementations of rules and laws:

The forest and wildlife departments do not work properly, there are proper rules in various acts for wildlife conservation but there is no implementation in the study area. Some of the forest and wildlife staff are also involved in deforestation and illegal hunting but no one among responders points to their personals. Strict supervision of departments are required (wildlife guards and other responsible persons) and need to deliver the importance of wildlife through awareness seminar. According to the wildlife departments, the ratio of workers/staff is insufficient that's why they cannot monitor properly.

Illegal hunting:

Illegal hunting is very high in the study area which directly affects wildlife extinction. Mostly hunters targeted large animals like black bears, common leopards, and some pheasants' in the study area.

Construction:

Some of the Constructions also badly affect the lives of the wild species that includes (buildings and especially road constructions). The road may be constructed for tourism including one of the important routs China-Pakistan Economic Corridor (CPEC).

Forest fire:

Forest fire also affects wildlife which is reported in the hill (specific area) forests in 2020 and Tapka Shumlai in March 2021.

Illegal fishing:

Illegal fishing is very common in the study area, peoples of the various parts usually hunt illegally through chemicals, electric current (especially through the generator), and nets. Among all types, chemicals and electric currents are dangerous because they affect the entire stream.

Sign a survey in the field

According to the field survey, we observed that the main and huge factor of wildlife extinction is the destruction of habitat or loss of habitat. Multiple factors are responsible for the destruction/loss of habitat. The majority of factors that are related/linked with humans are as follows.

Deforestation:

Deforestation plays a vital role in wildlife extinction. The rate of deforestation in the district is very high. The habitat of wild animals is destroyed through deforestation, if the wild animals have no habitat for survival and breeding, it impacts many wild species and they will be extinct. Deforestation is reported in the different areas of the district i.e. Chetoo Paimal Shareef about 120 pine trees were cut. Similarly, in the Hill of Shumlai, Dongaa, and Tapka around about 300 fresh pine trees of different

species were cut for different purposes; burning, construction, economy, agriculture, etc. (figure 7).



Figure 7: Deforestation in the study area

Overpopulation:

Increasing the population of humans affected wildlife both directly and indirectly. Overpopulation affected a large number of wild species because of high demands for a place to live, Food materials, Cosmetic products, culture, Medicines, and Raw materials which are mostly obtained from wild animals. According to the census of 1998, the population of the district was 307,278 the average annual growth was -0.58% rate and According to the census of 2017, the district population is 476,612. The percentage of the human population growth in the previous 2 decades is 1.46%.

Forest fire:

It is observed in field surveys that forest fires Cause severe extinction of wildlife. A forest fire can cause direct damage to various small animals, i.e. (Reptiles, amphibians, and other small animals) because they don't have the capabilities to escape from fire. And indirectly forest fires destroy their habitat and cause fragmentations. During this survey forest fires were reported in different areas of the district such as Donga, Tapka Shumlai, Hill Shumlai, and Gangwal Allai, the impact of this fire affected about 250 pine trees of different species and many herbs and shrubs (figure 8).



Figure 8: Forest fire in the study area

DISCUSSION

The major hazards in the district Battagram are soil erosion, deforestation, attack of micro-organisms, over-collection, habitat loss, overhunting, and killing of wild animals (Haq 2012). According to a study that described the effect of road construction leads to the loss of habitat, degradation, and fragmentation. These effects are changing the structure of the community and affect the natural processes (Brandon, 1995; Ullah et al. 2022; Shah et al. 2022). The present study described that the road construction loss the wildlife habitat and deforestation reported for the means of road construction, road traffics lead to accidents with wild animals many deaths of wild animals were reported in the valley of Nandiar and CPEC of the district Battagram. In the different areas of Battagram, different roads are constructed for tourism exploration.

Human interference is the major threat of wildlife poaching, wildlife hunting usually affected large animals and birds. In South-East Asia rate of wildlife, extinction is very high throughout the world due to poaching. Many animals (mammals) are declining due to overhunting, low rate of reproduction, and habitat loss (Khan et al. 2010). The present study observed that hunting links to the population of humans, increasing in human population will increase overhunting in combination with a lack of awareness leading to the distraction of many species in Battagram. Illegal hunting of pheasants is reported from different mountains in the study area Shumlai, Chail, Balija, and Allai. Hunting of the Chakoor (Zarka) and Mountain ducks (Elai) is reported from Chor Valley and different areas of Nandiar Valley.

Monitoring of population and research is important for the protection of wildlife (Marco et al. 2014). An increase in the human population plaguing some problems for the world including, a decrease in the resources of the forest which leads to the extinction of the area of forest, and wildlife species can be captured easily by hunters and smugglers. These effects the loss of biodiversity worldwide (Ripple et al. 2014) in the past 50 years the population of humans has increasingly become above then doubled as well as the products of agriculture have risen similarly. 10% has increased in productive areas of arable: thus pesticide use also has increased as the demand of the population, and its effect has reached worldwide importance (Wood et al. 2008) continuously growth in human populations is the main cause of loss of wildlife globally. This introduces the need for humans, and the human population decline in wildlife for activities of anthropogenic (Wood et al. 2008; Khan et al. 2021). The present study described that increasing in the human population affected directly and indirectly to wildlife, increasing humans populations encroaching into wild areas which cause fragmentation in wild habitat and high numbers of people have high demands of place to lives, Food materials, Cosmetic products, Culture, Medicines

and raw materials which mostly obtained from wild animals. According to the 1998 census, the population of the study area was 307,278 with an average annuals growth -of 0.58% rate and according to the 2017 census, the study area population were 476,612 the percentage of the human population growth in the previous 2 decades is 1.46%, its means that the human's population has a role in the extinction of wildlife.

The common factor of the ecosystem of the world is forest fire. It affects the soil as well as plants .forest fire is helpful to maintain the stability and diversity of the ecosystem. The forest fire effect on the region of the forest is complex. Its effect on the micro as well as the macro-nutrient, organic matter of soil, and properties of soil (PH, soil biota as well as bulk density, colouration, and texture) the forest fire effect depends upon different factors like a load of fuel, fire intensity, and moisture of the soil. Fire has advantages and disadvantages for the soil of the forest and it depends on its intensity and time interval. Fire with low severity cause the combustion of organic matter in the soil and grows nutrient availability, as a result continuously plants grows and nutrients in the soil increase while fire with high severity causes the loss of organic matter in the soil, the deficiency of K, S, N, and P and microbes death occur (Marco, et al, 2014). The present study observed that the forest fire cause the extinction of wildlife, a forest fire can cause directly affect wild animals such as small animals like reptiles, amphibians, and other small, old unhealthy animals that die during forest fires because they don't escape from the forest fire the large healthy young animals can escape from the fire of forest, the escaped young healthy animals were face to habitat destruction, and directly effect of can cause an effect on wildlife its cause habitat fragmentation/destruction as well as cause deforestation, during field survey forest fire reported in the different area of the study area such as reported in Donga, Tapka shumai, Hill shumai, and Gangwal Allai the impact of this fire were disturbed above than 250 different plants and small animals.

CONCLUSION

The habitat of wild animals is continuously destroyed due to deforestation, the rate of deforestation in the District is very high and reported in different locations, i.e. Chetoo Paimal Shareef, (almost 120 pine trees were catted) Shumalai (Donga, and Tapka) about 300 trees of pines species were catted). Human population increment also badly affects local wildlife, according to the census of 1998, the population of the district was 307,278 with an annual 0.58% growth rate and according to the census of 2017, the district population is 476,612, with a 1.46% growth rate in previous 2 decades. According to the perception of the local peoples, overhunting is directly proportional to the awareness of the local community and population, overhunting was reported from different areas, and pheasants hunting were reported from the mountains of Shumlai, Chail, Balija, and Allai. Similarly, Shakoor and

Mountain Duck hunting is also reported from different areas of Nandihiaar Valley and Chor Valley. About 62% of respondents observed the forest fire in different areas of the district, among these, 14% of people specified the region of the forest fire, i.e. Shumalai Hill (2020) and Tapka (2021). Road constructions and other infrastructure loss the habitat of wild species, and many deaths of wild species were reported from road accidents on CPEC (China Pakistan Economic Corridor). Peoples of elevated areas are very poor, so they cut the trees, and hunt wild animals to overcome their needs. Illegal fishing is very common and usually, peoples use chemicals (20%), Electric current (60%), and nets (18%). The forest and wildlife departments do not work properly, there are proper rules but there is no implementation in the district. According to the Wildlife Department, the ratio of staff is insufficient that's they cannot monitor properly.

CONFLICT OF INTEREST

The authors declared that the present study was performed in the absence of any conflict of interest.

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AUTHOR CONTRIBUTIONS

WU conducted the field survey and collected the data and organized it into a meaningful manuscript. AS prepared the manuscript according to the journal's instructions and reviewed it before submission to the journal. FAK, IUH, AU, U and HUR helped in data collection and data analysis. ZU supervised WU for data collection and manuscript preparation.

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REFERENCES

Ahmad, M., Khan, R. A., Ullah, Z., Sajid, M., Khan, M. S., Khan, M. F., ... & Shah, S. R. (2021). Prevalence of Hard Ticks in Cows and Buffaloes in District Malakand, Pakistan. *Bioscience Research*, 18(1), 1461-1470.

Ahmad, M., Khan, R.A., Ullah, Z., Sajid, M., Khan, M. S., Khan, M. F., Akhtar, N., Khan, G.B., Yasmin, S., Ali, A., Saqlain, M., Tauseef, I., Shah, S.R. Prevalence of Hard Ticks in Cows and Buffaloes in District

Malakand, Pakistan. *Bioscience Research*. 2021, 18(1), 1461-1470.

Begum, A., Ghalib, S. A., Khan, M. Z., Zehra, A., Khan, A. R., Hussain, B., & Tabbassum, T. A. L. F. (2014). An overview of the current status and distribution of amphibians in Sindh. *African Journal of Science and Research*, 3(4), 21-23.

Bouche P, Douglas-Hamilton I, Wittemyer G, Nianogo AJ, Doucet JL, Lejeune P, et al. (2011) Will elephants soon disappear from West African savannahs? *PLoS One* 6, e20619. doi: 10.1371/ journal.pone.0020619 PMID: 21731620

Brandon, K. (1995). People, parks, forests or fields: a realistic view of tropical forest conservation. *Land Use Policy*, 12(2), 137-144.

Cheng, T. L., Gerson, A., Moore, M. S., Reichard, J. D., DeSimone, J., Willis, C. K., ... & Kilpatrick, A. M. (2019). Higher fat stores contribute to persistence of little brown bat populations with white-nose syndrome. *Journal of Animal Ecology*, 88(4), 591-600.

Di Marco, M., Butchart, S. H. M., Visconti, P., Buchanan, G. M., Ficetola, G. F., & Rondinini, C. In press. *A retrospective evaluation of the global decline of carnivores and ungulates. Conserv. Biol.*

Escobar, L. E., Awan, M. N., & Qiao, H. (2015). Anthropogenic disturbance and habitat loss for the red-listed Asiatic black bear (*Ursus thibetanus*): Using ecological niche modeling and nighttime light satellite imagery. *Biological Conservation*, 191, 400-407.

Haq, F. (2012). The critically endangered flora and fauna of district Battagram Pakistan. *Advances in Life sciences*, 2(4), 118-123.

Jan Alam, S.I. Ali (2009). Conservation Status of *Astragalus gilgitensis* Ali (Fabaceae): A Critically Endangered Species in the Gilgit District, Pakistan. *Phyton. (Horn, Austria)* 48(2): 211–225.

Khan, A., Umhang, G., Ullah, Z., Boué, F., Bastid, V., Ullah, I., & Ahmed, H. Investigation of *Echinococcus multilocularis* in foxes and dogs in Pakistan by detection of copro-DNA. *Parasitology Research*. 2021, 1-7.

Khan, A., Umhang, G., Ullah, Z., Boué, F., Bastid, V., Ullah, I., ... & Ahmed, H. (2021). Investigation of *Echinococcus multilocularis* in foxes and dogs in Pakistan by detection of copro-DNA. *Parasitology Research*, 120, 731-737.

Khan, M. Z., Ghalib, S. A., & Hussain, B. (2010). Status and new nesting sites of sea turtles in Pakistan. *Chelonian Conservation and Biology*, 9(1), 119-123.

Khan, R. A., Ullah, Z., Zaman, I. U., Khan, M. S., Mahmood, S., Akhtar, N., ... & Hussain, S. S. (2021). Population distribution and habitat analysis of Rufous treepie (*Dendrocitta vagabunda*) in Abbottabad, Pakistan. *Brazilian Journal of Biology*, 83.

- Maisels F, Strindberg S, Blake S, Wittemyer G, Hart J, Williamson EA, et al. (2013) Devastating decline of forest elephants in Central Africa. *PLoS One* 8: e59469. doi: 10.1371/journal.pone. 0059469 PMID: 23469289
- Muhammad Ibrar (2003). Conservation of Indigenous Medicinal Plants and their Traditional Knowledge found in Moist Temperate Himalaya Pakistan. Department of Biological Sciences/ Quaid-I-Azam University, Islamabad.
- Naeem Awan, M., Karamanlidis, A. A., Siddique Awan, M., Ali Nawaz, M., & Kabir, M. (2016). PRELIMINARY SURVEY ON ASIATIC BLACK BEAR IN KASHMIR HIMALAYA, PAKISTAN: IMPLICATIONS FOR PRESERVATION. *International Journal of Conservation Science*, 7(3).
- Newmark WD, Manyanza DN, Gamassa Deo-gratias M (1994). The conflict wildlife and local people living adjacent to protected areas in Tanzania: human density as a predictor: *Conserv. Biol.*, 8: 249-255
- Rahat, M. A., Haris, M., Ullah, Z., Ayaz, S. G., Nouman, M., Rasool, A., & Israr, M. Domestic animals' identification using PCR-RFLP analysis of cytochrome b gene. *Advancements in Life Sciences*. 2020, 7(3), 113-116.
- Ripple, W. J., Estes, J. A., Beschta, R. L., Wilmers, C. C., Ritchie, E. G., Hebblewhite, M., ... & Wirsing, A. J. (2014). Status and ecological effects of the world's largest carnivores. *Science*, 343(6167).
- Shah, K., Khan, M. F., Ullah, Z., Khan, R. A., Mahmood, S., Akhtar, N., & Awan, M. N. (2022). Spatio-temporal Pattern of Human Wildlife Conflict in Saiful Mulook National Park and its Vicinity.
- Tsi EA, Ajaga Nji, Wiegler G (2008). The willingness to pay for the conservation of wildlife animals: case of the Derby Eland (*Taurotragus derbianus gigas*) and the African wild dog (*Lycan pictus*) in North Cameroon.
- Ullah, I., Ullah, Z., Khan, J., Mahmood, S., Iqbal, Z., & Akhtar, N. (2022). Human-Black Bear (*Ursus thibetanus*) Conflict and its Mitigation Strategies at Siffran and Kaghan Valleys of District Mansehra Pakistan.
- Ullah^a, Z., Mahmood, S., Iqbal, Z., Akhtar, N., Khan, M. F., Said, A., & Arif, M. (2021). Damages to Himalayan white pine (*Pinus wallichiana*) by asiatic black bear (*Ursus thibetanus*) in Kaghan Valley, Pakistan. *Forests*, 12: 1130.
- Ullah^b, Z., Mahmood, S., Iqbal, Z., Khan, J., Akhtar, N., Khan, M. A., ... & Yasmin, S. (2021). Habitat selection by Asiatic black bear (*Ursus thibetanus*) in Siran and Kaghan Valleys, Pakistan. *Brazilian Journal of Biology*, 83.
- Ullah^c, Z., Sajid, M., Iqbal, Z., Akhtar, N., Khan, G.B., Ali, A., Yasmin, S., Saqlain, M., Khan, M. A., Arif, M. Movement of Asiatic Black Bear: Sign Survey Evidence from Kaghan and Siran Valleys, Pakistan. *Bioscience Research*. 2021, 18(1), 1433-1445.
- Ullah, Z.; Ullah, I.; Ullah, I.; Mahmood, S.; Iqbal, Z. Poaching of Asiatic black bear: Evidence from Siran and Kaghan valleys, Pakistan. *Glob. Ecol. Conserv.* 2020, 24, e01351.
- Wood, L. J., Fish, L., Laughren, J., & Pauly, D. (2008). Assessing progress towards global marine protection targets: shortfalls in information and action. *Oryx*, 42(3), 340-351.