Leopard Intrusion Into Human Settlements: A Study Of Conflict In Margalla Hills National Park

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ABSTRACT

The leopard is among the most common apex predators having recurrent conflict with humans throughout the world. This study investigates the dynamics and potential mitigation of human-leopard conflict in communities bordering Margalla Hills National Park, Pakistan, where livestock depredation drives conflict. A questionnaire survey of 174 residents provided data on depredation patterns, risk perceptions, attitudes toward leopards, and perspectives on solutions. Key findings show uneven distribution of attacks by location and livestock type due to husbandry practices and land use. Small farms, carelessness, and sole dependence on vulnerable livestock enable persistent conflict. The majority of respondents (57.71%) said leopards were rare, while 32% said they were common. The predominant perception of leopards as very or slightly dangerous reveals a high level of fear and risk awareness. The most common response was positive, with 89 respondents viewing leopards favorably. A high prevalence of goats in Saidpur village in comparison to other rural settings explains the recurrent depredation and resultant increased human-leopard conflict. Community attitudes toward leopards are diverse, signaling opportunities for constructive engagement through research, education, and inclusive policy development. With careful persistence over time, communities may eventually find an equitable path towards coexistence that preserves Islamabad's iconic leopards while also meeting local priorities.

Keywords: Common Leopard, Human-Wildlife Conflict, Livestock Depredation, Leopard, Margalla Hills, Coexistence.

INTRODUCTION

The term "human-wildlife conflict" refers to any violent encounter between humans and animals (Nyhus, 2016) and activities on the part of humans or other animals that endanger wildlife or reduce the benefits they bring to humans in terms of food, medicine, revenue, and entertainment. Large carnivores are seen with a significant deal of animosity by the global population because of the consequences that people believe they have, as well as the real effects that they have, on human health and livelihoods. Because of their large home ranges, towering physical statures, and enormous dietary requirements, felids are particularly at risk of coming into conflict with humans (Loveridge et al., 2010).

Even though there are numerous positive benefits, such as recreational, educational, psychological, and environmental services, human interactions with wildlife are typically portrayed in a negative light. As a result of this, there is a growing agreement that the phrase "human–wildlife conflict and coexistence" refers to both the recognition of problems and the possibility of potential solutions. (Clucas & Marzluff, 2013, Nyhus, 2016). The resolution of this conflict is essential to the protection and restoration of a great number of species, and arguments over whether or not it is possible to coexist peacefully with other forms of life (Nyhus, 2016, Redpath et al., 2018).

In addition to the negative consequences on biodiversity and ecological health, human–animal conflict can also have significant negative effects on human health, protection, and welfare. When humans and wild animals come into conflict, it can result in tangible and economic damage to property, as well as to crops, cattle, and game species. Indirect impacts of conflict are more difficult to determine and include opportunity costs to farmers and rangers connected with crop or livestock protection, lower mental well-being, interruptions to livelihoods, and food insecurity. Farmers and rangers face opportunity costs when protecting crops or livestock (Dickman et al., 2011, Loveridge et al., 2010).

Due to extensive disruption caused by local communities in the vicinity of Margalla Hills National Park, leopards have relocated to protected areas. These leopards, scientifically known as *Panthera pardus fusca*, are highly sensitive to human-induced disturbances, habitat loss, fragmentation, and a diminishing prey population (Kabir et al., n.d.). Over the past century, this top predator has experienced a significant decline in its historical range due to factors like habitat degradation, fragmentation, depletion of natural prey species, unsustainable harvesting, illegal trade in leopard skins and bones, and conflicts between humans and leopards. (*P. pardus fusca*) is most commonly involved in conflicts with humans. Their smaller body size, resilience, and adaptability allow them to coexist successfully in proximity to human populations (Kumbhojkar et al., 2019). Competition for territory often results in the displacement of leopards from their

natural habitats, typically affecting young males under three years of age and weakened males suffering from disease or injuries (Gunawan et al., 2017).

Leopards play a critical role in maintaining biodiversity as top predators in their ecosystems. In Pakistan, their diet may include lizards, rhesus monkeys, snakes, and porcupines. When wild prey becomes scarce, leopards have been known to prey on domestic animals such as sheep, goats, cattle, donkeys, and calves, with most livestock predation occurring during late morning and evening hours (Consolee et al., 2020). Their ability to adapt to human-dominated areas includes shifts in dietary habits to encompass livestock, dogs, and, in rare instances, human encounters (Aryal & Kreigenhofer, 2009).

METHODOLOGY

Margalla Hills National Park is situated near Islamabad's northernmost point and has a total area of 17,386 hectares. The landscape is mainly comprised of slopes gullies and limestone rocks. Geographically MHNP is located between 33.0°36 and 36.0°33 N latitude and 72.0°50 and 73.0°26 N longitude. At a height of 465–1600 meters, the Margalla Hills are primarily composed of limestone. It has many streams, which give the local fauna and residents access to fresh water. The climate of the MHNP is humid subtropical. Within its zone are around thirty communities, home to approximately seventy thousand people. The locals have been residing in this area for several decades and lead conventional lives (Yasmin et al 2021, Ahmed et al 2023).

The study was carried out in 6 villages namely Shah-Allah Ditta, Sinyari, Meraberi, Kot Jannah, Saipur, and Kalinjar which are located on the periphery of (MHNP) and were most prone to human-leopard conflict, from August 2023 to October 2023 in the form of questionnaire survey, interviews and group discussions with 174 randomly selected locals to estimate the livestock depredation, peoples attitude towards common leopards and reason for the conflict. The collected data was arranged and analyzed using Microsoft Excel 2016 and Origin.
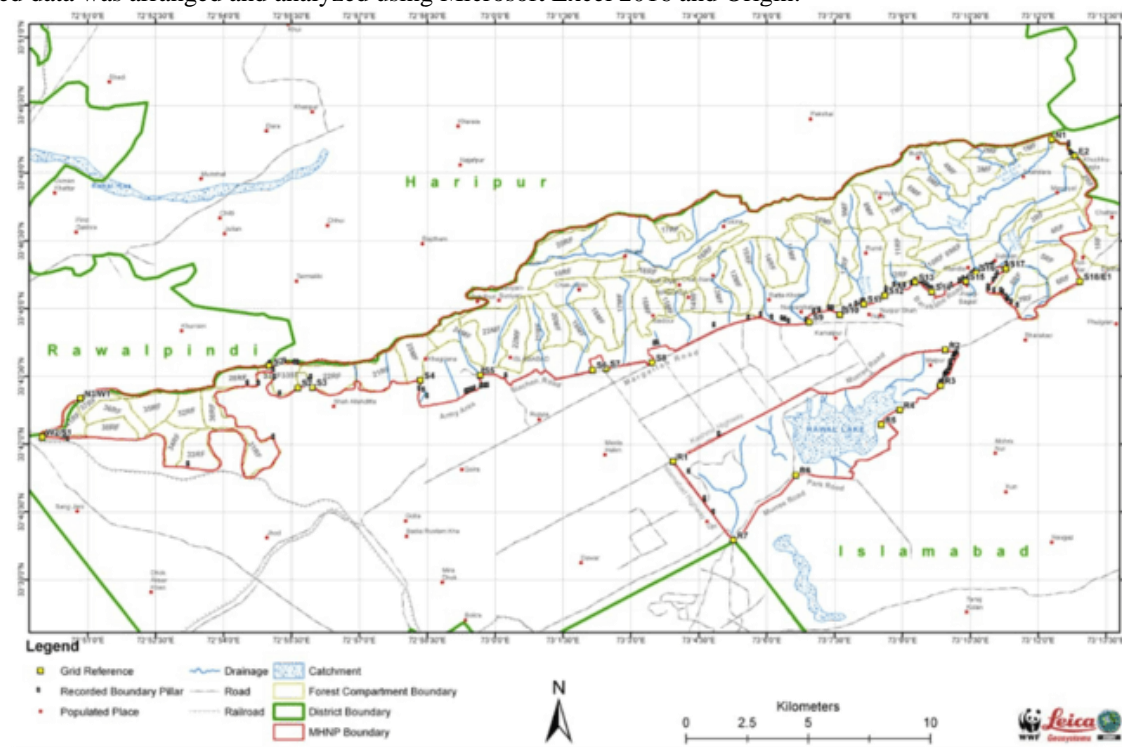
Figure 1. Map of Margalla Hills National Park

RESULTS

The study revealed that most common occupation of respondents was of livestock ownership (38%) and a majority (29.14%) was between 20-30 years old. 168 respondents were male while 8 were female which could be attributed to cultural gender norms in the region that limit women's participation in public forums. More than half (55%) of the people were graduates while the rest (45%) had at least completed secondary education which could be the result of living close to the developed capital city of Islamabad. Among the land owners a minority (6.86%) owned 20 acres or more.

Livestock Status

The data gathered on the types of livestock owned in different villages within the study area as shown in Table 1 and Figure 2. Saidpur had very few cattle but the largest goat and sheep flocks. This contrasts with Shah-Allah Ditta which had moderate cattle numbers but fewer goats and sheep. The village of Kalinjar had the most cattle yet far fewer goats. Hen ownership was fairly consistent across villages.

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Table1. Showing Livestock per Village

Animals Owned by Respondents per Village				
Villages	Cattle	Goat	Sheep	Hen
Shah-Allah Ditta	43	21	9	41
Sinyari	46	41	7	36
Meraberi	31	33	11	49
Kalinjar	49	12	8	52
Saidpur	4	116	71	39
Kot Jannah	27	29	6	44
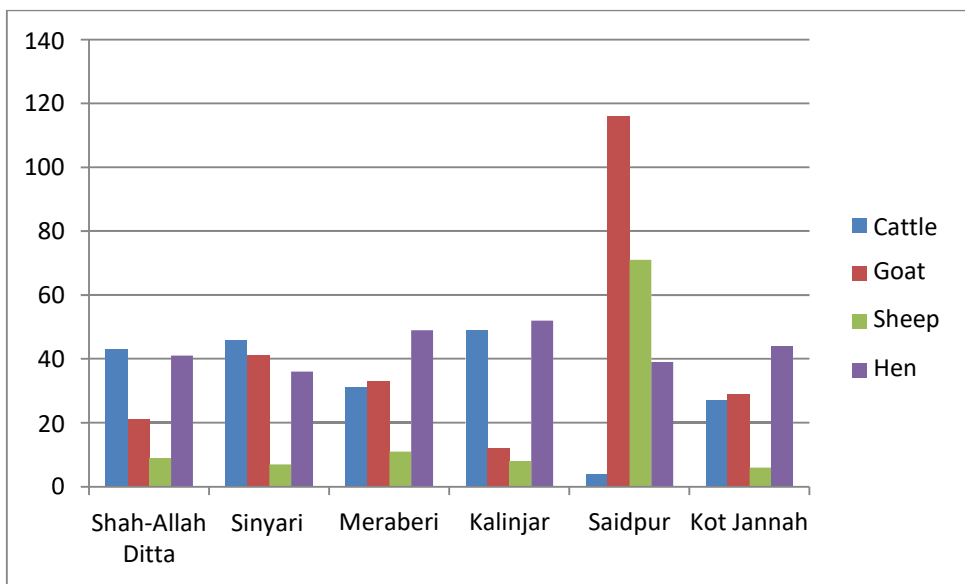
Figure 2. The Status of Livestock/Village

Perception about Common Leopard Status

The survey asked respondents to describe their perception of leopard presence in the area as shown in Table 2 and Figure 3.The majority said leopards were rare, while medium said they were common. A small portion believed leopards were absent.

Table 2. Showing Perception About Common Leopard

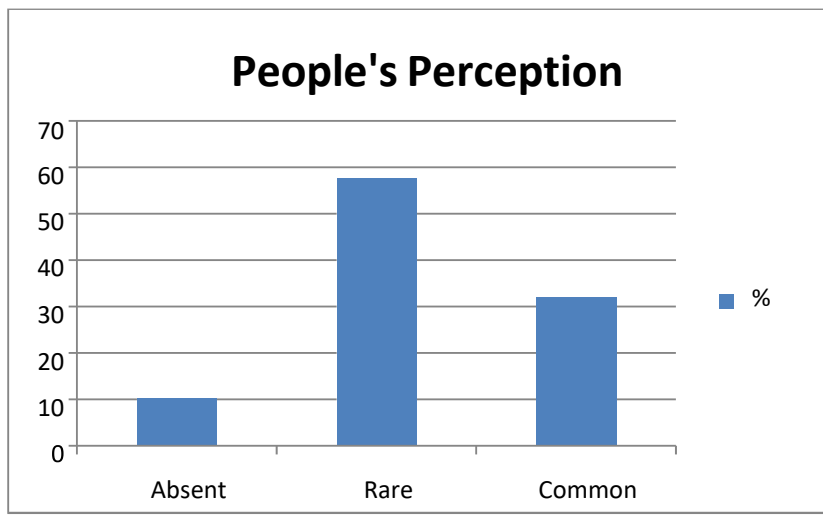| Perception	No. of People	%age
Absent	17	10.28571
Rare	101	57.71429
Common	56	32
Total	174	100

Figure 3. The Status of People's Perception Towards Leopards

Leopards Sighting in Last 5 Years

The respondents were asked to report how many leopard sightings they had experienced in the past year as shown in Figure 4. The vast majority reported a low number of sightings. Only a minority had a high frequency of sightings.
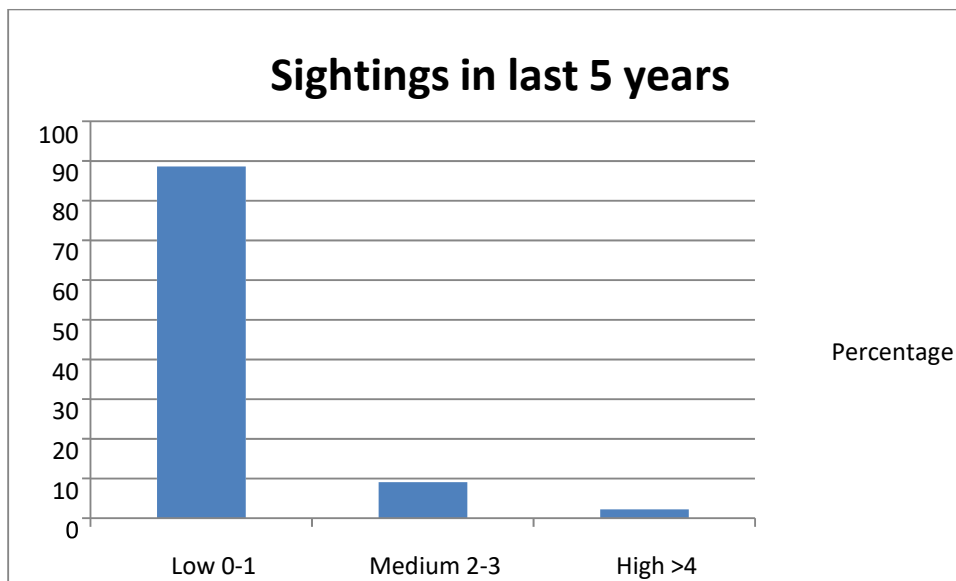

Figure 4. The Status of Sightings in Last 5 Years

Depredation Intensity:

The survey collected specific data on livestock attacks in 3 out of 6 villages - Saidpur, Kot Janna, and Meraberi as shown in Table 3 and Figure 5. In Saidpur, goats (5) were attacked for multiple years during early morning, night, and evening. In Kot Jannah and Meraberi, a single goat depredation occurred. Several insights emerge. First, goats appear most vulnerable across all three villages. Second, night attacks are common but daytime depredations also occur. Third, some areas like Saidpur experience chronic attacks while others have sporadic conflict.

Table 3. Showing Depredation Details

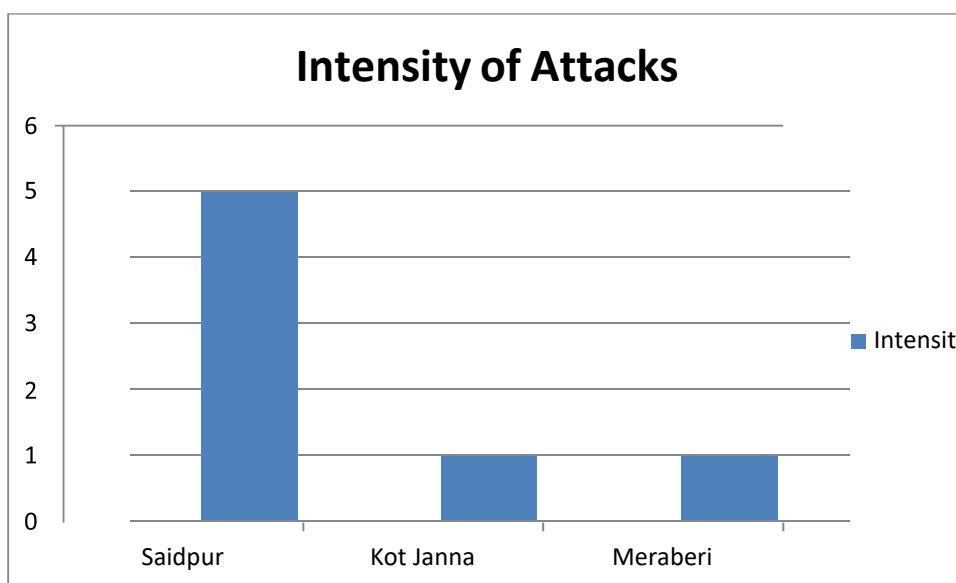| Depredation Details	Saidpur	Kot Janna	Meraberi
Year/Month	2021, 2022, 2023	2020	2022
Prey type	Goat	Goat	Goat
Intensity	5	1	1
Time	Early Morning, Night, Evening	Night	Day

Figure 5. The Status of Leopard Attack Intensity

Human's attitude towards Leopard:

The local attitudes toward leopards were measured, finding a range of perspectives as shown in Figure 6. The most common response was positive. However, a substantial segment of respondents held negative attitudes.
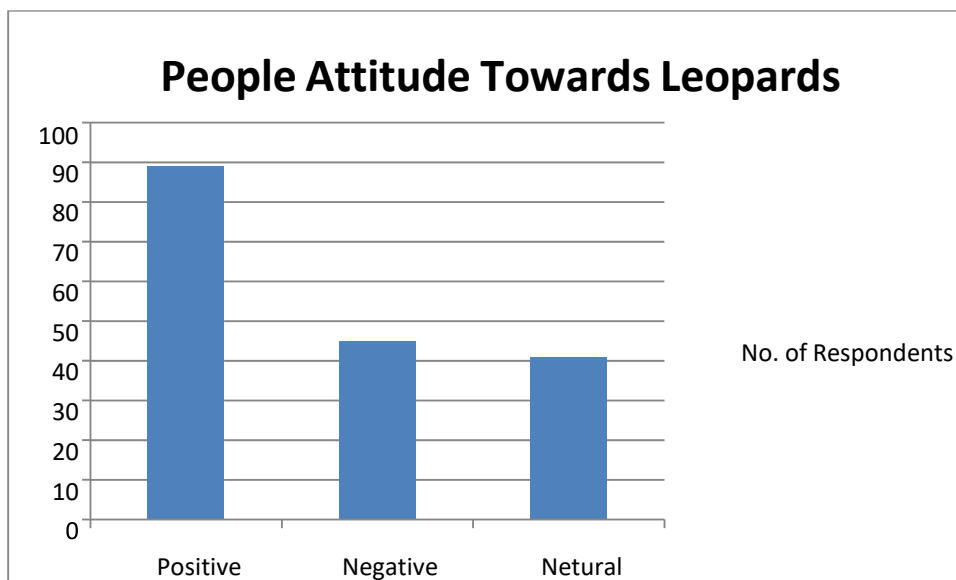

Figure 6. The Status of People's Attitude Towards Leopards

Correlation between Number of Goats and Attack Intensity

A significant and noteworthy correlation of 0.95 has been identified between the number of goats per village and the incidence of attacks. This finding suggests a strong positive relationship between these two variables, indicating that as the number of goats in a given village increases, so does the frequency of attacks.
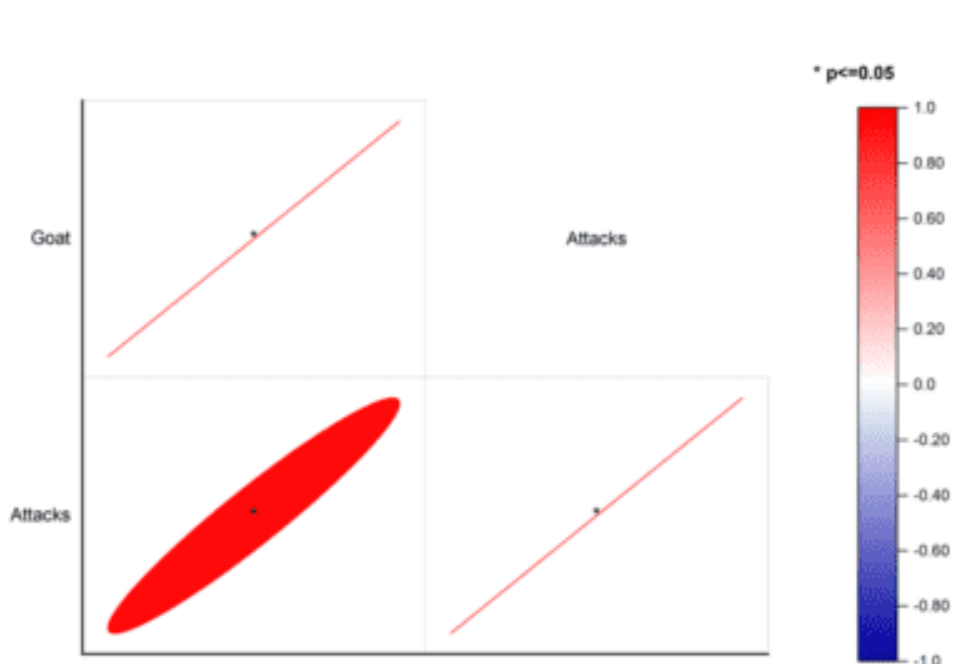

Figure 7. Showing Correlation of Leopard Attacks with Goat Numbers

DISCUSSION

This study provides important insights into the multifaceted dynamics of human-leopard conflict in communities surrounding Margalla Hills National Park. The finding that livestock depredation is the primary catalyst of conflict corroborates other research on human-leopard interactions (Yadav et al, 2021). While direct attacks on humans are rare, the persistent loss of livestock has critical implications for local livelihoods, welfare, and perceptions of risk. The uneven distribution of attacks found in this study also mirrors patterns documented elsewhere, with certain villages and livestock types at higher risk based on proximity to habitat boundaries and grazing practices (Karlsson et al, 2010).

Both material and psychological dimensions are central to human-leopard conflict. While human casualties from leopards are minimal, the persistent loss of livestock results in widespread perceptions of danger and calls for government intervention. Even if exaggerated, fears fundamentally stem from the reality of coexisting with large predators and the inherent vulnerability this entails. The diversity of attitudes towards leopards likely reflects this complex relationship, with communities recognizing risks and losses but also the ecological and cultural importance of the species. As such, varied perspectives signal opportunities for constructive dialogue, education, and mutually beneficial engagement.

Building more effective coexistence will require addressing multiple interconnected issues. Technical solutions like enhanced livestock corrals, deterrents, and supervision are undoubtedly needed to directly reduce attacks through improved animal husbandry (Li et al, 2013). However, these preventative measures alone have limits if broader socio-economic advancement, land use planning, and accessible education are not incorporated to expand options and awareness. Providing adequate training for shepherds is one example of building local capacity. Compensation programs are also essential, especially given local reliance on vulnerable livestock and perceptions that government intervention is necessary. When implemented equitably, directly, and reliably, compensation has successfully decreased retaliatory killings and improved tolerance for predators in other regions (Mwanyumba et al., 2015).

CONCLUSION

This study in the vicinity of Margalla Hills National Park, Pakistan, has illuminated the intricate dynamics of human-leopard conflict, primarily driven by livestock depredation. The research underscores the uneven distribution of leopard attacks, shaped by local practices and land use. Residents' perceptions of leopards vary, with a substantial proportion expressing fear and risk awareness, while a significant number view leopards favorably. This diversity in attitudes presents opportunities for engagement through education and policy development. The prevalence of goats in Saidpur village contributes to recurrent depredation and increased human-leopard conflict in that area. The findings emphasize the need for a well-planned, long-term approach to foster coexistence between communities and leopards, balancing the preservation of iconic leopards with the fulfillment of local priorities.

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