सत्यमेव जयते

Understanding Dynamics of Man Animal Conflict in Kashmir



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Iterative International Publishers

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Understanding Dynamics of Man Animal Conflict in Kashmir

First Edition

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Preface



The purpose of compiling this book entitled "*Understanding Dynamics of Man–Animal Conflict in Kashmir"* is to offer a comprehensive, field-based, and scientifically informed account of the complex and increasing interactions between humans and wildlife in the Kashmir Valley from a veterinarian's perspective. The book systematically presents statistical data on man–animal conflict incidents across districts, identifies major conflict hotspots, and traces the historical pattern of such encounters in the region. It examines the components and factors that lead to human–wildlife conflict, including ecological changes, habitat disturbance, and the resurgence of wild animals outside their natural habitats. A significant focus is placed on the identification of wild animals during conflict situations and on addressing emergencies involving injured, trapped, or distressed wildlife through appropriate veterinary and rescue management. The work also discusses mitigation measures, advisories, and practical instructions to be followed during conflict situations, along with the measures adopted by the Department to control and manage such incidents. It explains the framework for compensation to victims, highlights strategies for effective mitigation and long-term management, and emphasizes coordinated action between veterinary professionals, wildlife authorities, and local communities. By integrating data, field experience, veterinary science, and wildlife management practices, the book aims to serve as a practical guide for officials, veterinarians, students, policymakers, and community responders engaged in managing human–wildlife conflict in Kashmir. This book on man–animal conflict in Kashmir is important because it brings together scattered data, field experiences, departmental practices, and scientific knowledge into a single, accessible resource for those who must respond to conflict situations in real time. In a region where human settlements increasingly intersect with wildlife habitats, such a concise yet comprehensive guide enables veterinarians, wildlife officials, field staff, students, and community responders to quickly understand conflict patterns, identify species accurately, follow advisories, and apply appropriate mitigation and emergency management measures. By presenting practical insights alongside statistical trends and institutional responses, the book promotes informed decision-making, coordinated action, and humane handling of both human and animal interests. Ultimately, it serves as a ready reference that strengthens preparedness, supports policy and training, and contributes to more effective and sustainable management of man–animal conflict in Kashmir.

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Message

The interface between human settlements and wildlife habitats in the Kashmir region has undergone substantial ecological change over the years and is facing challenges of frequent human–animal conflict, which is a multi-dimensional complex issue that needs objective evaluation of field conditions, understanding of ecology, and development of appropriate response mechanism. Dr. Mohsin Ali Gazi (MVSc), Veterinary Officer, Kashmir Region, has made a systematic study of Man–Animal Conflict in Kashmir, and has factored various Ecological and anthropogenic determinants to decipher conflict distribution pattern and to delineate high-risk zones of conflict.

This volume integrates relevant domain of veterinary science with wildlife management for prevention and mitigation of man-animal conflict, with emphasis on species-specific encounters, behavior pattern of the species under stress conditions, and design of responsive intervention strategies. It outlines the rescue operations, clinical management, emergency operations, and emphasizes on coordinated response systems and in-built institutional mechanisms. This publication is a handy reference for practitioners, administrators, and policymakers for conservation and management of human–wildlife conflict.

I extend my appreciation to Dr. Mohsin Ali Gazi for his commitment to advance conservation practice through this important work. I am confident that this volume will make a lasting contribution to the effective management of human–wildlife interactions in Jammu & Kashmir.

(Chaturbhuja Behera) IFS
Pr. Chief Conservator of Forests/
Chief Wildlife Warden, JsK



Message

The expanding interface between human settlements and wildlife habitats in the Kashmir Valley has rendered human–animal conflict a critical challenge for both conservation and public safety. Accelerated land-use change, habitat fragmentation, and rising anthropogenic pressures have intensified these interactions, necessitating responses that are scientific, humane, and institutionally coordinated.In this context, ***Understanding Dynamics of Man–Animal Conflict in Kashmir*** **by Dr. Mohsin Ali Gazi (MVSc)** emerges as a timely and significant contribution. Grounded in extensive field experience and veterinary expertise, the work presents a structured, data-driven analysis of conflict patterns, identifies key hotspots, and traces their evolution across the region.What distinguishes this volume is its integration of veterinary science with practical wildlife management. It offers clear, technically sound guidance on species identification, behavioral assessment under stress, emergency response protocols, rescue methodologies, clinical stabilization, and post-conflict monitoring. The emphasis on biosecurity, zoonotic risk mitigation, humane restraint, and scientifically validated immobilization protocols reflects a high standard of professional rigor and ethical responsibility.Equally valuable is its balanced treatment of mitigation strategies, institutional frameworks, compensation mechanisms, and inter-agency coordination. By combining empirical observations with policy insights, the book provides an operational framework that supports evidence-based decision-making and effective field response.This publication serves not only as a scholarly resource but also as a practical manual for veterinarians, wildlife managers, field personnel, policymakers, and community stakeholders. It meaningfully contributes to strengthening preparedness and promoting sustainable, humane management of human–wildlife interactions in the Kashmir region.Dr. Gazi's work reflects exceptional professional competence, clinical precision, and a deep commitment to conservation medicine. His contributions to wildlife rescue, conflict response, and interdisciplinary coordination set a benchmark for field-based practice. This volume is poised to remain an authoritative reference for years to come.

Tawheed Ahmed Deva (IFS)
Conservator of Forests Wildlife
/Regional Wildlife Warden Kashmir Region

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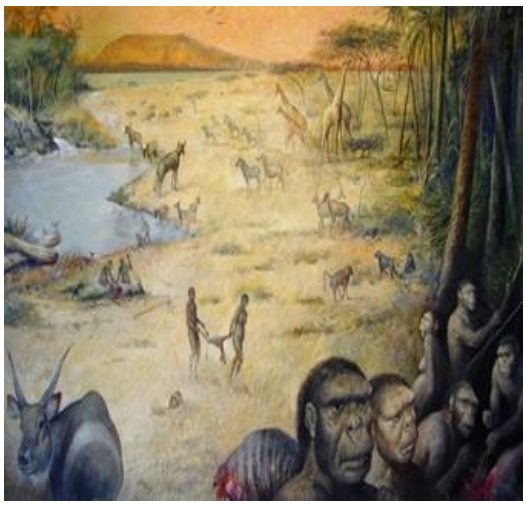
History of Man-Animal Conflict

Chapter 1

The history of human animal conflict in Kashmir is deeply intertwined with the region's unique geography, rich biodiversity, and evolving patterns of human settlement. Nestled within the Himalayan ecosystem, Kashmir has long been home to diverse wildlife species ranging from the Himalayan black bear and leopard to hangul and numerous avian species coexisting alongside agrarian and pastoral communities. Traditionally, this coexistence was moderated by cultural practices, seasonal migration patterns, and an ecological balance sustained by dense forests and relatively low population pressures. However, over time, demographic expansion, deforestation, infrastructural development, changing agricultural practices, and prolonged socio-political disturbances have significantly altered the human–wildlife interface. As natural habitats fragmented and food sources diminished, wildlife increasingly ventured into human habitations, leading to crop depredation, livestock loss, property damage, and, in some instances, tragic loss of human life. The history of man–animal conflict in Kashmir is therefore not merely a record of isolated incidents but a reflection of shifting landscapes, developmental priorities, and environmental governance challenges. Understanding this historical trajectory is essential to contextualizing present-day conflict patterns and formulating informed, sustainable strategies for coexistence in the region.

Over the decades, the pattern of human animal conflict in Kashmir has evolved alongside transformations in land use, forest cover, and socio-economic structures. In earlier times, dense forests and clearly demarcated grazing routes helped maintain a functional separation between human settlements and wildlife habitats. However, progressive encroachments, expansion of horticulture and agriculture into forest fringes, urban growth, and infrastructure development have steadily narrowed this buffer. Seasonal food scarcity, particularly during harsh winters, has further compelled species such as black bears and leopards to descend into villages in search of sustenance. Additionally, declining natural prey bases and habitat degradation have intensified predator–livestock interactions. These developments have contributed to a noticeable increase in reported incidents, public anxiety, and administrative intervention. Tracing this historical progression reveals that contemporary conflict in Kashmir is not an abrupt phenomenon but the cumulative outcome of ecological imbalance, developmental pressures, and changing human–environment relationships.

From the earliest phases of human evolution, *Homo sapiens* relied on hunting wild animals as a primary means of survival. Archaeological evidence from sites such as Olduvai Gorge reveals cut marks on bones and stone tools, demonstrating organized hunting and butchering practices. Early humans targeted large mega fauna mammoths, bison, and wild deer using cooperative strategies, projectile weapons, and knowledge of animal behavior. Hunting was not merely subsistence activity; it shaped social organization, ritual life, and migration patterns. Over time, however, intensive hunting contributed to the decline and extinction of several prehistoric species, marking one of humanity's earliest ecological impacts.



Who came first? Animal or Human …

Animals came long before humans; the first simple animals appeared hundreds of millions of years ago, while modern humans (Homo sapiens) evolved only about 300,000 years ago from apelike ancestors who separated from other primates millions of years prior. So have equal right to share space. Life on Earth began with animals (very broadly understood as living organisms) long before humans as earth formed about 4.5 billion years ago. The earliest life forms appeared around 3.5–3.8 billion years ago (single-celled organisms). The first animals (multicellular organisms) appeared about 600 million years ago. Early animals lived in the oceans (sponges, jellyfish-like organisms). Humans did not exist anywhere in this timeline.



Human–wildlife conflict is a long-standing reality that has accompanied human civilization for centuries and is not a recent phenomenon. Its intensity has increased as human settlements, agricultural expansion, and resource extraction activities have progressively extended into landscapes historically occupied by wildlife. The roots of man–animal conflict can be traced to the earliest phases of human habitation in proximity to forests and natural ecosystems. With the growth of human populations and the transformation of land for cultivation, livestock rearing, and habitation, the spatial boundaries between human and wildlife domains gradually diminished. In their search for food, water, and shelter, wild animals increasingly entered human-dominated areas, resulting in recurrent interactions that often escalated into conflict.

Historical accounts and community narratives across the world document instances of crop depredation by herbivores, livestock predation by carnivores, and occasional attacks on humans—each are reflecting the enduring tension between survival imperatives and the aspiration for coexistence. In the context of Kashmir, this conflict assumes particular significance due to the region's rich biodiversity and the close interface between human settlements and forested, mountainous terrain. Species such as the leopard, Himalayan black bear, and wild boar frequently come into contact with human populations. Over the decades, shifting land-use patterns, deforestation, habitat fragmentation, and encroachment into wildlife corridors have further intensified such encounters, rendering human–wildlife conflict a persistent and complex management challenge requiring sustained mitigation and policy intervention.

Various national and international organizations have attempted to define human–wildlife conflict in conceptual and operational terms. The World-Wide Fund for Nature (WWF) (2004) defined it as "any interaction between humans and wildlife that results in negative impacts on human social, economic, or cultural life, on the conservation of wildlife populations, or on the environment." Similarly, the "Creating Co-existence" workshop held during the 5th World Parks Congress (8–17 September 2003, Montreal) described human–wildlife conflict as a situation occurring "when the needs and behavior of wildlife negatively impact the goals of humans, or when the goals of humans negatively impact the needs of wildlife."

Further, a 2007 review by the United States Geological Survey (USGS) conceptualized human–wildlife conflict in two interrelated contexts: first, where wildlife actions threaten human life, livelihoods, or lifestyles; and second, where human activities endanger the safety, habitat, or survival of wildlife. Importantly, the review emphasized that in both contexts, the ultimate outcomes are largely shaped by human responses to such interactions.

The Government of Yukon has defined human–wildlife conflict in practical and damage-oriented terms, describing it as "any interaction between wildlife and humans which causes harm, whether to the human, the wild animal, or property." In this context, "property" encompasses buildings, equipment, camps, livestock, and pets, though it expressly excludes crops, fields, and fences. This definition reflects an administrative perspective focused primarily on tangible loss and material damage.

In 2020, the IUCN Species Survival Commission Human Wildlife Conflict Task Force offered a broader and more socio-ecological understanding, defining human wildlife conflict as "struggles that emerge when the presence or behavior of wildlife poses actual or perceived, direct and recurring threats to human interests or needs, leading to disagreements between groups of people and negative impacts on people and/or wildlife." This formulation acknowledges not only physical harm but also perception, competing interests, and social tensions, thereby situating the conflict within a wider governance and coexistence framework.

Human wildlife interactions, however, long predate modern definitions and management frameworks. Evidence from prehistory indicates that encounters between early humans and wild animals were often matters of survival. During the Miocene period and subsequent geological epochs, early hominines faced predation from formidable carnivores such as saber-toothed cats, leopards, and spotted hyenas. Fossil records provide compelling testimony to this ancient conflict. The discovery of the Plio-Pleistocene horned crocodile, Crocodylus anthropophagus, at Olduvai Gorge suggests that this massive reptile was among the most dangerous predators encountered by early humans; hominid fossils from the site bear unmistakable crocodilian bite marks.

In contemporary times, such interactions remain widespread and complex. In 2023 alone, more than 1.8 million recorded human wildlife incidents involved animals struck by vehicles on roads, commonly referred to as road kill. The frequency of bird strikes continues to be a critical concern for aircraft safety engineers, while reducing animal vehicle collisions on highways is a shared priority for biologists, transport planners, and automobile safety experts.

Forest ecosystems also experience the impact of wildlife pressures. As of 2020, high populations of large ungulates such as deer have been known to cause significant ecological damage by trampling vegetation, browsing young saplings, rubbing against tree trunks, and stripping bark. Such activities can hinder forest regeneration, carry serious economic consequences, and create tensions between forestry authorities and wildlife managers. In Kashmir, the

region's historically dense forests, wetlands, and alpine pastures have long sustained abundant wildlife, including the Himalayan black bear, leopard, hangul (Kashmir stag), musk deer, and various smaller carnivorous species.

The historic picture of man animal conflict in Kashmir has been shortly summarized and categorized into various phases as under:

Pre-Dogra Period (Before 1846): Coexistence within Ecological Balance

Kashmir was heavily forested with vast, continuous wildlife habitats.Human settlements were sparse and largely confined to river basins. Communities such as Gujjars and Bakarwals had traditional grazing routes and deep ecological knowledge. Wildlife corridors were intact; animals rarely entered human settlements. Encounters occurred, but they were accepted as part of living near forests, not seen as "conflict. Nature of interaction was confined to coexistence, traditional tolerance, low population pressure.

Dogra Rule (1846–1947): Beginning of Forest Exploitation

This period marks the first structural disturbance to Kashmir's forests. Commercial timber extraction began on a large scale, forests were opened for revenue generation, road construction for timber transport fragmented habitats, settlements slowly expanded toward forest fringes and hunting by royalty and elites reduced prey base for predators as a result of which leopards and bears began moving closer to villages due to shrinking prey and habitat.

Early Post-Independence Period (1947–1970s): Population Growth and Agricultural Expansion

With the rapid increase in human population in the valley, there was conversion of forest land into agricultural fields and orchards followed by expansion of villages into forest peripheries. A little scientific wildlife management at the time was quite evident. During this time, bears started frequenting maize fields and orchards. Leopards began targeting livestock more frequently and first documented patterns of recurring village entries by leopards was noticed.

1970s–1990s: Legal Protection of Wildlife but Rising Habitat Pressure

Enactment of the Wildlife Protection Act, 1972 and declaration of protected areas like Dachigam National Park came into existence. Wildlife gained legal protection, but forests outside protected zones kept shrinking. Simultaneously urbanization increased. Roads and human infrastructure cut through wildlife

corridors and waste disposal practices worsened near forest edges. Wildlife became legally protected but ecologically displaced.

1990s Conflict Period in Kashmir: A Turning Point

The armed conflict period had an unexpected ecological impact. Large forest areas became inaccessible to humans. Wildlife populations in some areas increased due to reduced human interference. Simultaneously, governance and forest monitoring weakened. Illegal logging and unregulated resource use increased in some belts. After the late 1990s, when normalcy partially returned and humans re-entered forest areas. Wildlife had expanded its range into abandoned spaces which led to sudden spikes in encounters.

2000–2015: Sharp Rise in Leopard and Bear Incidents

This is when man–animal conflict became a major public issue in Kashmir mostly due to massive urban expansion of Srinagar, Anantnag, Baramulla, Kupwara. Growth of apple orchards (major bear attractant), garbage dumps near forest fringes along with the decline in natural prey for leopards. There were frequent reports of, leopards entering homes, schools, cowsheds, bears attacking orchard workers. Social media and news coverage creating public panic. Wildlife Department had to form Rapid Response Teams for capture and rescue.

2015–Present: Chronic Conflict Phase

In the last decade, conflict has become chronic and widespread and leopards were seen in semi-urban areas, even Srinagar outskirts. Bears frequenting villages almost every harvest season. There was a rise in road accidents involving wildlife followed by translocation of captured leopards often failing (they return or create conflict elsewhere).Scientific studies now confirm Kashmir has lost significant wildlife corridors and buffer zones.





Species-wise Historical Pattern in Kashmir		
Species	**Earlier Pattern**	**Present Pattern**
Leopard	Deep forest predator	Lives near villages, livestock hunter
Black Bear	Forest fruit eater	Orchard raider, human attacker
Hangul	Wide range movement	Restricted to Dachigam
Wild Boar	Forest dweller	Major crop raider
Monkeys	Limited presence	Frequent village nuisance

Historical Shift in the Nature of Conflict	
Animals avoided humans	Animals live among humans
Rare incidents	Frequent incidents
Cultural tolerance	Fear and retaliation

The historical trajectory of man animal conflict in Kashmir is a story of forest exploitation (Dogra period), population and agricultural expansion (post-1947), legal protection without habitat restoration (1970s onward), political conflict altering ecological spaces (1990s), urbanization and waste mismanagement (2000s onward), today's conflict is therefore historically produced, not accidental. Understanding this history is essential to designing long-term solutions based on restoring ecological balance, not merely capturing animals after incidents occur. From early agrarian settlements carved out of forests and wetlands to the rapid urban expansion of the late twentieth and early twenty-first centuries, the relationship between humans and wildlife in Kashmir has steadily shifted from coexistence to contestation. What was once a shared landscape where pastoralists, farmers, and wild species negotiated space through seasonal rhythms has increasingly becomes a fragmented terrain marked by shrinking habitats, encroachments, and altered land-use patterns.

Kashmir's unique geography, characterized by dense forests, alpine pastures, orchards, and riverine systems, historically supported a rich diversity of wildlife. Species such as the Himalayan black bear, leopard, and ungulates thrived in contiguous forest corridors. However, demographic pressures, deforestation, infrastructural development, and the conversion of forest land into agricultural and residential areas have gradually disrupted these ecological balances (Campbell, 2012). The decline of natural prey, coupled with habitat fragmentation, has forced many wild animals to venture into human settlements, thereby intensifying encounters and increasing instances of crop raiding, livestock depredation, and attacks on humans. Importantly, the historical narrative also reflects changing administrative and legal responses. From informal community-based deterrence methods in earlier times to the institutional involvement of the wildlife department, veterinary interventions, and compensation schemes in recent decades, the management of conflict has evolved significantly. Yet, despite policy reforms and conservation legislation, the persistence and in some areas, escalation of conflict underscores the limitations of reactive approaches (Kellert*et.al* 1996). It highlights the need to understand conflict not merely as an environmental issue but as a complex socio-ecological phenomenon shaped by economic dependency, governance challenges, climate variability, and shifting human attitudes toward wildlife (Abrahams, 2021).The history of man–animal conflict in Kashmir therefore serves as a mirror reflecting broader questions of development, conservation, and justice. It compels us to reconsider how land is used, how habitats are protected, and how communities living at the forest margins are supported. The past demonstrates that conflict intensifies when ecological integrity is compromised and when policy responses fail to integrate local realities.

In the end, it becomes clear that understanding the historical trajectory of man animal conflict is indispensable for framing sustainable solutions. Without acknowledging the layered pastits patterns of coexistence, disruption, adaptation, and resistance any contemporary strategy risks being incomplete. The historical lens thus provides both caution and guidance: caution against repeating patterns of unchecked expansion and ecological neglect, and guidance toward a more balanced, informed, and humane approach to coexistence in the fragile yet resilient landscape of Kashmir.





1st pic show an early depiction of man animal conflict, where a lone human confronts wildlife in the forest with minimal tools and knowledge & second picture shows a modern approach to man animal conflict, showing scientific management through the use of cages and humane trapping techniques for safe wildlife control.

Introduction to Man Animal Conflict

Chapter 2

Human–animal conflict refers to situations in which interactions between wildlife and human populations lead to physical harm, financial damage, or social disruption, impacting either or both sides. Such conflicts generally emerge as a consequence of expanding human activities such as urbanization, agricultural development, deforestation, and habitat fragmentation which reduce and alter natural ecosystems. As traditional habitats shrink or become degraded, wild species are often forced to move beyond their usual ranges and venture into human-dominated landscapes in search of food, shelter, or territory, thereby increasing the likelihood of confrontation. These interactions frequently lead to crop destruction, livestock depredation, property damage, and, in severe cases, human casualties. In response, wildlife may face persecution, retaliatory killings, or forced relocation, further intensifying the cycle of conflict. The issue has become increasingly significant in regions where forests, agricultural lands, and habitations closely interface, making conflict mitigation an important concern for both conservation and community safety. Man–animal conflict in Kashmir has intensified in recent years due to shrinking wildlife habitats, rapid urbanization, deforestation, and climate change, which push animals closer to human settlements in search of food. Species such as Asiatic black bears, leopards, snow leopards, and Himalayan monkeys frequently stray into villages and orchards, causing crop damage, livestock losses, and sometimes fatal attacks on people. Apple orchards and maize fields attract bears and monkeys, while leopards often prey on livestock and occasionally enter residential areas, creating fear and insecurity among locals (Dar*et.al* 2022). At the same time, retaliatory actions by humans lead to injury or death of wildlife, threatening biodiversity (Acharya,*et, al* 2016). The conflict highlights the fragile balance between conservation and human livelihoods in Kashmir and underscores the need for better land-use planning, early warning systems, community awareness, and effective wildlife management strategies. Human Wild Animal Conflict in Kashmir has become more frequent, serious and wide spread with the growing population and loss of habitat. This conflict has unique ecological, cultural, social, historical, physical, economic and political characteristics and therefore, strategizes to manage these interactions. The Human Wild Animal interaction threatens people's safety and livelihood and emerges as a conflict situation. The challenge of managing Human Wild Animal Conflict can effectively protect communities, stop escalating conflict, built trust in conservation and can avoid retaliation against wild animals. It has been seen

over the past many years that wild animals like Leopard, Black bear, Brown bear, Macaque, Langur, Wild boar, Snake, Porcupine, Wolf and at times Hangul resort to interact in conflict with the humans and cause damage to life and property. It has also been observed that nearly 90% of human deaths and injuries, as well as those involving leopards and black bears, are primarily associated with direct encounters between humans and these species. Other wild animals generally cause damage to standing crops, agricultural and horticultural fields, and livestock. Although the presence of snakes in human-dominated landscapes is often unwelcome, such incidents are typically linked to accidental encounters rather than deliberate aggression (Alireza*et.al* 2024).

Human animal conflict cannot be understood merely as an ecological issue; it is a multidimensional challenge that lies at the crossroads of environmental conservation, public safety, and sustainable development. As expanding human populations continue to intrude into forested and wildlife-rich areas, the growing spatial overlap intensifies encounters and underscores the necessity for carefully balanced intervention frameworks. Addressing this challenge demands integrated strategies that combine scientific habitat management, community engagement, efficient administrative response systems, and transparent compensation policies for affected individuals. A thoughtful and inclusive approach is essential not only to safeguard human interests but also to preserve biodiversity and maintain ecological equilibrium for generations to come.

Components and factors leading to Human-Wildlife Conflict

Human wildlife conflict often arises when human activities increasingly encroach upon or exist alongside natural wildlife habitats. As agricultural lands expand and settlements move closer to forested areas, animals are drawn toward easily accessible food sources. Herbivorous species frequently feed on cultivated crops, while carnivores may prey on domesticated livestock, directly affecting the livelihoods of farming communities. When such losses threaten economic stability, affected individuals may resort to drastic or retaliatory actions in an attempt to safeguard their resources, thereby intensifying the cycle of conflict (Bhat*et.al* 2021). Some major components and factors involved are here as under:

- Destruction and disturbance of animal habitat which is the destruction of the home of wild animals. Humans kill or chase wild animals by digging, cutting, sealing by stones and smoking in their natural habitat and this became a leading factor for the MAC.
- Buffer zone for wild animals refers to a transitional area between core wildlife habitats (like forests or protected areas) and human settlements, designed to reduce direct contact and conflict. A shrinking buffer zone

between forests and human habitations has increased the frequency of man–animal conflict."

- Promptly increasing human population and high biodiversity, interactions between people and wild animals are becoming more and more prevalent.
- Other factors include large scale habitat destruction through deforestation overgrazing by livestock and expansion of human settlements and agriculture.

Human wildlife conflict is a multifaceted issue that emerges from the growing overlap between human activities and wildlife habitats. In Kashmir, as in many other regions, the destruction and disturbance of natural habitats through deforestation, overgrazing, expansion of settlements, and agricultural development has forced wildlife into closer proximity with human populations (Ahmad*et.al* 2021). Shrinking buffer zones, combined with high biodiversity and a rapidly increasing human population, have intensified encounters, leading to crop damage, livestock predation, and economic losses for local communities. These pressures often provoke retaliatory actions, perpetuating a cycle of conflict that threatens both human livelihoods and wildlife survival. Addressing this challenge requires a holistic approach that integrates habitat conservation, sustainable land-use planning, community engagement, and effective conflict mitigation strategies, ensuring the long-term coexistence of humans and wildlife in Kashmir's fragile ecosystems.

The images below clearly show rescue of a Himalayan black bear during man animal conflict and wildlife officials are seen carefully securing the bear using tranquilization techniques, ensuring minimal stress and safety for both the animal and the rescuers. The other image shows the rehabilitation phase, where the bear is being monitored in a safe space within wildlife premises. Veterinary staff are providing medical care and assessing the bear's health, preparing it for eventual release back into its natural habitat.





Basis for resurgence of wild animals outside natural habitat

It has been noted that the resurgence of wild animal populations and the growing frequency of adverse encounters with human communities can be attributed to several key factors, which are outlined below.

- Predatory attacks when animals view the person as a prey (sometimes attacks a child when alone and undefended).
- Invasion of personal space of an animal.
- Movement of animals inside human dominated landscapes including sudden encounter.
- Attraction of animals by food resources, municipality dump, garbage heaps.
- Increase in dog population.
- Shrinking habitat.
- Lack of buffer Zones.
- Growing expense of the crops like maize, orchids/ plantations filling the erstwhile gaps between forests and habitations.
- Decreased prey base in forests.
- Expansion of human settlements

Human encroachment into forest areas has reduced the natural habitats available to wildlife, forcing animals to venture into human settlements in search of food, water, and shelter. Man–animal conflict, therefore, arises primarily because of human activities rather than the animals themselves. When wildlife enters these altered landscapes, animals may act defensively or aggressively to protect themselves, leading to confrontations with people.

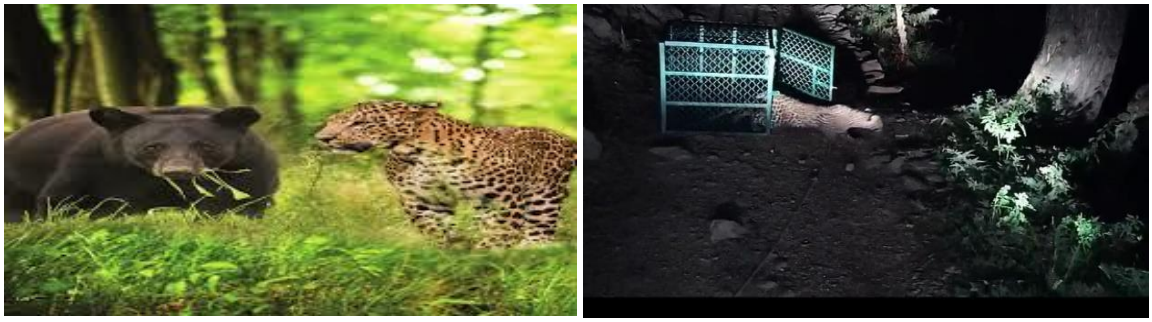
Interactions between wild animals such as bears and leopards and human populations usually occur in areas where forests, agricultural lands, and settlements lie in close proximity. These animals may venture into human habitations in search of food, water, or territory, especially when their natural habitats are disturbed or resources become scarce. Such encounters can lead to fear, injury, loss of livestock, and at times loss of human life, while also putting the animals at risk of retaliation. Understanding the patterns of these interactions is essential for developing effective strategies to minimize conflict and promote safer coexistence between humans and wildlife. In general, the wild animals most commonly involved in man wildlife conflict are bears and leopards, as their habitats frequently overlap with human settlements and agricultural areas. Leopards interact with humans mostly in landscapes where forests, villages, and agricultural fields overlap. Being highly adaptable and elusive animals, leopards often move close to human settlements in search of

easy prey such as dogs, livestock, or unattended domestic animals, especially at night. Habitat disturbance, depletion of natural prey, and shrinking buffer zones push them toward human-dominated areas (Ahmad*et.al* 2021).These interactions usually occur when leopards pass through villages, hide in crop fields or orchards during the day, or prey on livestock kept in open sheds. Direct attacks on humans are rare and typically happen when the animal feels threatened, cornered, injured, or surprised at close range. In many cases, fear and panic among people escalate the situation, leading to crowding, chasing, or provoking the animal, which increases the risk of injury to both humans and the leopard. On the other hand, Bear has short eye-sight and poor hearing sense. It doesn't give signal of its presence until human beings come quite close. The food available on the orchards or private lands is generally more delicious than that available in the wild area. During autumn, fruits like apples, pears, peach, walnut etc. ripen and maize mature, which attract bear. It has been observed that such negative interactions in the form of conflict threaten the livelihood, well-being and security of human communities living close to wildlife habitat. Though wildlife suffers the maximum causality most of the time but it creates agnostic feelings amongst the humans regarding wildlife. This also leaves retaliation killing of wild animals, engagement in illegal trade of wildlife, poaching etc. The growing human population, increase in livestock numbers, land use change particularly in favor of orchards, dissection of wildlife habitats and their consequent shrinking are the basic reasons for resurgence of the wild animals outside the forest areas. Expanding human settlements have shrunk the buffer zones bringing man and wild animal face to face. Now-a-days, people are also growing honey most preferred food for bear. The man-animal conflict in a man-made problem, it may aggravate if animals are stressed for their survival (Angwafo*et.al* 2020).

In Jammu and Kashmir, the species most frequently involved in human–wildlife conflict are the common leopard (*Panthera pardus*) and the Himalayan black bear (*Ursus thibetanus*). These animals are generally elusive and tend to avoid human presence. Most reported attacks occur unintentionally, often as a result of sudden or accidental encounters rather than deliberate aggression. Consequently, the likelihood of such incidents can be significantly reduced if local communities adhere to the precautionary advisories and safety guidelines periodically issued by the Department of Wildlife Protection.

In Jammu and Kashmir, the common leopard (*Panthera pardus*) and the Himalayan black bear (*Ursus thibetanus laniger*) are the two species most frequently involved in human–animal conflict. The common leopard, a highly adaptable and territorial carnivore, primarily inhabits forests, scrublands, and mountainous regions but is capable of moving into agricultural fields and human settlements when natural prey becomes scarce. Its diet mainly consists of

small to medium-sized mammals, but it often preys on livestock such as goats and sheep, which brings it into direct conflict with local communities. Leopards are solitary and nocturnal, using stealth and agility to hunt, which sometimes results in sudden and unexpected encounters with humans, especially near villages situated close to forested areas (Bombieri, 2018).The Himalayan black bear, an omnivorous and generally herbivorous species, is adapted to the temperate and subalpine forests of the region. Bears feed on fruits, nuts, insects, and occasionally small animals, but habitat loss, deforestation, and reduced availability of natural food sources drive them into orchards, crop fields, and human settlements (Barua*et.al* 2013). Black bears are strong climbers and have keen senses of smell, which help them locate food in human habitats, leading to frequent crop raids and property damage. They are generally shy but may become aggressive if threatened or concerned. In both species, the main causes of human–animal conflict are habitat fragmentation, encroachment of human settlements into wildlife areas, shrinking buffer zones, and seasonal food scarcity. Their physiological traits stealth, agility, strength, and foraging adaptability combined with the pressures of human expansion, make encounters with humans inevitable. Understanding their behavior, habitat preferences, and conflict triggers is essential for devising effective mitigation strategies to reduce risks to both humans and wildlife in Kashmir.



The images depict two of the most commonly encountered species in human animal conflict scenarios in Kashmir.

Measures taken by the Department to control the Man-Animal Conflict

The Department has adopted a multi-pronged strategy to control man animal conflict through prevention, rapid response, and community participation. Regular patrolling, installation of cages and traps in vulnerable areas, and deployment of trained rescue team's help in timely capture and relocation of wild animals straying into human habitations. Awareness programmes are conducted to educate local communities about precautionary measures and safe behavior in conflict zones (Bhatia*et.al* 2017). The Department has played a pivotal role in strengthening habitat management by securing forest boundaries, maintaining natural prey base, and reducing anthropogenic pressures near

wildlife corridors. Additionally, compensation and ex-gratia mechanisms are streamlined to provide prompt relief to victims, thereby fostering public cooperation in conflict mitigation efforts.

The following steps are being undertaken by the Department of wildlife protection Kashmir to control the man-animal conflict

1. Control Rooms have been constituted at strategic points which work round the clock and reach the remotest areas within shortest possible time. The Control Rooms are well equipped with tranquilizing guns medicines, capture nets, and other operational gears.
2. Cages are installed at vulnerable points so as to capture wild animals alive which possess threat to life and property of the people when they venture into human habitations.
3. Do's and Don'ts are circulated among the public through mosques, Electronic and print media.
4. Network is strengthened by keeping strong communications through Police, Sarpanches' and Numberdars and Local villagers, etc.
5. Close coordination is being maintained with Forest department and sister wings so as to combat Man Animal Conflict by reaching the spot at appropriate time so as to prevent loss of human life as well as wildlife.
6. A network of "Informers" has been established in more susceptible /vulnerable villages of Districts where the chances of wild animal invasions are maximum. These Informers are intimating the nature of incident, assisting with the deputed Rescue Parties and helping the victims and their kin to formulate their Ex-gratia /Compensation cases.
7. Constitution of Conflict Resolution Squads.
8. Skill up gradation of frontline staff.
9. Conducting regular training of frontline field workers to strengthen their capabilities with latest methods and mechanism of animal rescue and other associated modalities of man animal conflict.
10. Control room equipped with tranquilizing guns, capture nets, cages, medicines, and trained personnel to safely capture and relocate wild animals that stray into human habitations.
11. A fleet of specialized wildlife rescue vehicles has also been deployed to reach high-risk areas swiftly and strengthen on-ground response. Public awareness campaigns, including advisories on safety precautions and best practices during wildlife encounters, are regularly disseminated through electronic, print, and social media to educate residents living near forests. In addition, the department provides compensation to victims of wildlife attacks to offer relief and support, while ongoing training workshops build capacity among frontline staff to manage conflicts more efficiently.

Man, animal conflict in Kashmir underscores that this phenomenon is not an isolated or sporadic occurrence, but a complex and evolving interaction shaped by geography, ecology, demography, and development(Ahmad*et.al* 2021). Kashmir's fragile Himalayan ecosystem, marked by forests, orchards, wetlands, and expanding human settlements creates a shared landscape where boundaries between wildlife habitats and human habitation are increasingly blurred. Rapid urbanization, deforestation, agricultural expansion, and infrastructural growth have narrowed natural corridors and reduced prey availability, compelling wild animals to move into human dominated spaces. At the same time, growing human dependence on forest resources and livelihood activities near protected areas has heightened vulnerability to encounters. The introduction to this subject therefore establishes that man animal conflict in Kashmir is deeply rooted in habitat alteration, socioeconomic pressures, and environmental change rather than mere animal aggression. It also highlights the multidimensional consequences of such conflicts as loss of human life, livestock depredation, crop damage, psychological trauma, and retaliatory harm to wildlife. Understanding these foundational aspects is essential, as they frame the broader discourse of conservation, policy intervention, community participation, and sustainable coexistence.







The details of programms/ initiatives launched in recent years for forest and wildlife conservation are as under:

- Habitat improvement on scientific basis by way of planting of fruit bearing and other species of trees, soil conservation, DRSM and Crate works, forest fire control and also compensatory afforestation are being carried out under CAMPA for preservation and conservation of the biodiversity of these areas.
- Plantation under JK Green drive mission, Ek Ped Ma ke Naam and Ek Ped Shaheedon ke Naam campaign were conducted in the Wildlife Protected Areas of Kashmir.
- Cleanliness/ plastic free drives conducted within protected areas in association with local communities, Municipalities, Educational Institutions and NGOs.
- Preparation of Management Plans with respect to Dachigam National Park and alongwith its adjoining Conservation Reserves, Kazinag National Park-Limber WLS- Lachipora WLS (Integrated),Thajwas Wildlife Sanctuary, Rajparian Wildlife Sanctuary, Hirpora Wildlife Sanctuary, Gulmarg Wildlife Sanctuary, Overa-Aru Wildlife Sanctuary and Integrated Management Action Plan for (8) Wetland Conservation Reserves have been completed for effective management.
- Declaration of Eco-Sensitive Zones around National Parks and Wildlife Sanctuaries.
- Population Estimation Census of various wildlife species viz; Hangul, Water-fowl etc. was conducted by the Department successfully.
- The demarcation of boundaries of the protected areas was launched to protect and preserve them.
- A state of art Wild Animal Health Care-cum-research Centre at Dachigam national park has been establishment by the Department of Wildlife Protection for veterinary care of rescued wild animals equipped with surgical theatre, imaging unit and a molecular diagnostic laboratory. Besides, DNA Bank.
- Promotion of Eco-Tourism by way of allowing trekking inside wildlife areas on the designated trek routes.

Identification of Wild Animal Species

Chapter 3

Identification of wild animals is a foundational step in wildlife management, conservation, veterinary intervention, and the mitigation of man animal conflict. Accurate identification enables wildlife authorities, veterinarians, and field staff to determine the species involved in an incident, assess its behavior, evaluate risk to human populations, and plan appropriate rescue, capture, treatment, or relocation strategies. In regions like Kashmir, where human settlements increasingly overlap with forest habitats, correct identification becomes critical in situations involving livestock depredation, crop damage, or sightings of potentially dangerous animals such as leopards and bears. Misidentification can lead to improper response measures, unnecessary panic, wrongful capture, or even harm to non-target species.

Modern wildlife identification relies on a combination of traditional field skills and advanced technological methods. Direct visual observation remains important, where trained personnel identify animals based on morphology, coat patterns, size, gait, and behavioral traits. Indirect evidence such as pugmarks (footprints), scat (droppings), scratch marks, feeding signs, and kill patterns are also systematically analyzed. However, technological advancements have significantly improved accuracy. Nowadays camera traps and CCTV footage provide photographic evidence that can be examined for stripe, spot, or rosette patterns unique to individual animals, especially in species like leopards. Latest advances with thermal imaging cameras and night-vision devices assist in nocturnal identification. Drones equipped with high-resolution cameras help survey inaccessible terrain and track animal movement without disturbance.

Genetic and forensic methods further strengthen identification processes with DNA analysis from hair, scat, saliva on prey, or tissue samples allows precise species and even individual identification is made possible. Radio-collaring and GPS telemetry help track known animals and confirm whether a previously monitored animal is involved in a conflict event. Software-based image analysis and pattern recognition tools are increasingly used to match coat patterns with existing wildlife databases. Acoustic monitoring devices can identify species based on vocalizations, particularly in dense forests where visibility is poor.

When discussing camera traps, it serves as an essential scientific tool by generating reliable, non-invasive, and time-stamped visual data on wildlife

presence, movement patterns, and behavioral activity in proximity to human settlements. Installed along forest fringes, livestock paths, orchards, and known conflict hotspots, these motion-sensor cameras capture images or videos of animals without disturbing them, enabling accurate species identification and, in the case of patterned animals like leopards, even individual recognition. This helps authorities confirm which animal is involved in repeated incidents, avoiding wrongful capture of non-target species and reducing panic caused by rumors or misidentification. Camera trap data also reveal movement patterns, peak activity times (often nocturnal), entry routes into villages, and habitat use, allowing wildlife departments to plan targeted patrolling, early warning advisories, and strategic placement of cages or tranquilization teams. Over time, the accumulated footage supports mapping of conflict zones, seasonal trends, and behavioral changes, informing long-term mitigation planning and habitat management. Because camera trap's function day and night and in difficult terrain, they are especially valuable in regions like Kashmir where dense vegetation and rugged landscapes limit direct observation. Thus, camera traps serve as an essential scientific tool that improves decision-making, enhances human safety, and promotes more humane and effective wildlife management during conflict situations (Anand and Radhakrishna 2017).

While camera traps are highly useful in man animal conflict management, they have important limitations that can affect their effectiveness. Their coverage is limited to the specific area where they are installed, so animals may pass outside the camera's detection zone and remain unrecorded. Dense vegetation, uneven terrain, fog, rain, snow, or poor lighting can reduce image clarity, making species identification difficult. Fast-moving animals may appear blurred, and incorrect camera angle or height can result in partial or unusable images. Battery failure, memory card limits, or technical malfunction can cause loss of critical data, especially in remote forest areas where regular maintenance is difficult. Camera traps also require time for installation, monitoring, and data retrieval, which may not be suitable in urgent conflict situations. Additionally, they cannot provide real-time alerts unless connected to advanced systems, and there is always a risk of theft, vandalism, or damage by animals or humans. Therefore, while camera traps are valuable, they must be used alongside other identification and monitoring methods in conflict management.

Identification of wild animal species through CCTV surveillance has also become an important tool in modern wildlife management and conflict mitigation. Cameras installed near forest edges, villages, agricultural fields, and protected areas help capture real-time images and videos of animals moving through these landscapes. By analyzing physical features such as body size, coat color, markings, gait, and behavior, wildlife officials can accurately determine the species involved in conflict incident. CCTV footage also helps track

movement patterns, identify repeated visits by particular animals, and assess peak activity times.





Cages and camera traps





Wildlife species identification in the field relies on a comparative assessment of indirect and direct signs such as pugmarks, scat, feeding signs, scratch marks, calls, body size, movement pattern, and habitat preference (Madden 2004). Since many species in regions like Kashmir share overlapping habitats and are rarely seen directly, accurate identification depends on comparing multiple indicators rather than a single clue. For instance, the pugmark of a wolf is larger and more elongated than that of a jackal or fox, while scat of carnivores differs in size and content depending on whether it belongs to a leopard, wolf, or fox. Similarly, pellet droppings of herbivores like barking deer, hangul, and livestock may appear similar but vary in size, grouping pattern, and location. Feeding signs also differ: porcupines leave gnawed bark and quills, bears leave uprooted soil and plant debris, and leopards drag prey to concealed spots. Vocalizations, gait patterns, and time of activity (nocturnal, diurnal, crepuscular) further aid distinction. Thus, wildlife identification is a comparative, evidence-based exercise where field staff interpret a combination of signs to differentiate species accurately, which is crucial for census work, conflict investigation, habitat study, and effective wildlife management.



Another method for identification of identifying presence of wild animal is through wild animal poop identification, which is also known as scat analysis, is a practical field method used by wildlife personnel to determine the presence, species, diet, movement, and health of animals without directly sighting them. In forested and mountainous regions like Kashmir, where animals are elusive

and often nocturnal, droppings serve as reliable indirect evidence of wildlife activity. The process is done by carefully observing the scat's size, shape, color, texture, smell, contents (such as hair, bones, seeds, grass, or insects), and the location where it is found—such as trails, water sources, burrows, or territorial marking points. Carnivore scat is typically tubular and contains hair or bones, while herbivore droppings are pellet-like and fibrous. Field staff may also collect samples using gloves and sterile tools for laboratory examination, including parasite study and DNA analysis for precise species confirmation. This method is widely used for wildlife census, understanding feeding habits, tracking animal movement, investigating man–animal conflict, assessing habitat use, and supporting conservation planning, making it a simple yet powerful scientific tool in wildlife management (Maulana, 2023).

A wild animal scat (poop) identification chart is an important field tool for wildlife staff in Kashmir, where direct sightings are rare but animal presence can be reliably inferred from droppings. By observing size, shape, color, contents, smell, and location, trained personnel can distinguish between carnivores, herbivores, and omnivores and even identify the likely species. For example, wolf and jackal scat is tubular, twisted at the ends, and often contains hair, bone fragments, and a strong musky odour, usually deposited on trails or elevated spots for territorial marking. Red fox scat is smaller, pointed at one end, and may contain hair, feathers, insects, or berry seeds. Leopard scat is thicker, segmented, dark, and rich in hair and bone, often found along forest paths. In contrast, herbivores like barking deer, hangul, and livestock produce pellet-like droppings, while porcupine scat is cylindrical with plant fiber content and is commonly found near burrows (Bhat*et.al* 2022). Bear droppings vary seasonally—fibrous and plant-rich in summer, but containing hair, bones, or maize remains when feeding opportunistically. The location of scat near water sources, trails, crop fields, or rocky ridges further aid identification. Such a chart is invaluable during man–animal conflict investigations, wildlife census work, and habitat use studies in Kashmir's forests, mountains, and alpine landscapes, allowing officials to assess species presence without direct animal encounter. Identification of wild animal scats in the field has important limitations because droppings of different species often overlap in size, shape, and appearance, especially among carnivores and small omnivores (Mosimane*et.al* 2013). Environmental factors such as rain, snow, sunlight, wind, and trampling can quickly distort the scat's original form, color, texture, and smell, removing key identifying features. Seasonal changes in diet further complicate recognition: a carnivore feeding on berries or grains may produce scat that resembles that of an omnivore or herbivore, while herbivore droppings may vary with moisture content of forage. In areas where multiple species use the same trails, water sources, or territorial marking points, it becomes difficult to attribute scat to a particular animal with certainty. Age of the scat also

matters—older droppings lose odour and structural detail. Additionally, field identification depends heavily on observer experience and can be subjective or prone to error. Because of these limitations, scat identification alone is not fully reliable and should be corroborated with other signs such as pugmarks, feeding marks, camera trap evidence, habitat context, and, where possible, laboratory DNA analysis.



Brown bear scat



Leopard scat



Civet scats



Black bear scats



Hangul deer scats



Snow leopard scats



Porcupine scats



Deer scats



Musk deer scats



Red fox scats



Jackal scats



Himalayan grey langur scat



Wild boar scats



Ibex scats



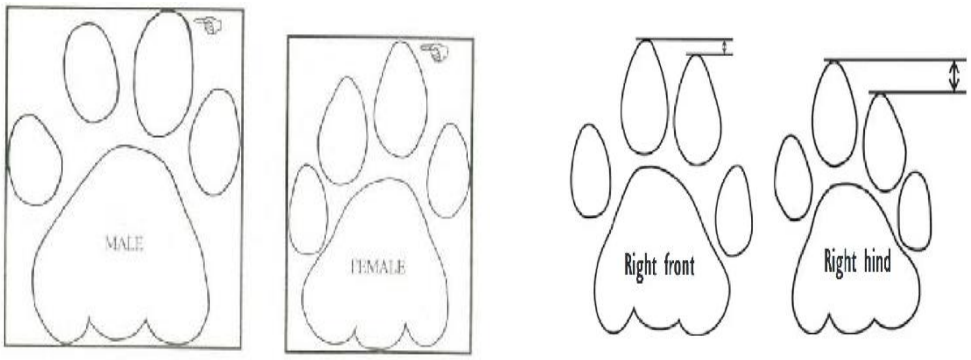
Marmot Scats

Another method of Identification is with the help of animal pugmarks which is a traditional and valuable method used in wildlife tracking to determine the presence and movement of wild animals, especially in forest and conflict-prone areas. Pugmarks, or footprints, left on soft soil, mud, sand, or snow, provide important clues about the species, size, direction of movement, and sometimes even the age and sex of the animal. Trained personnel examine the shape of the pad, number and arrangement of toes, presence or absence of claw marks, and overall dimensions of the print to distinguish between species such as leopard, dog, wolf, bear, or large felines. For example, feline pugmarks typically show four toes without visible claw marks and a rounded pad, while canines often display claw impressions and a more oval shape. The stride length and depth of the impression can indicate the animal's speed and weight. In regions like Kashmir, pugmark analysis is especially useful in identifying animals involved in man–animal conflict when direct sighting is not possible. However, accurate reading requires experience, as soil type, weather conditions, and overlapping tracks can distort the prints. Identification of pugmarks in wild animals involves careful examination of footprints left on soft substrates such as mud, sand, soil, or snow, using both visual assessment and simple field measurements. Trained observers study the overall shape of the track, size (length and breadth), number and arrangement of toes, presence or absence of claw marks, pad shape, stride length, and direction of movement.

These features help differentiate species: felines like leopards show round pugmarks with four toes, no claw impressions, and a broad, three-lobed heel pad; canines such as dogs and wolves display more oval prints with visible claw marks and a narrower pad; bears leave large, elongated prints resembling a human foot with five toes; and hoofed animals like deer or wild boar show split hoof impressions rather than pads and toes (Moten*et.al* 2017). Measuring the stride and track pattern can also indicate whether the animal was walking, running, or stalking. Accurate differentiation requires experience because soil texture, weather, and overlapping tracks can distort the prints, but when carefully interpreted, pugmarks provide valuable clues for species identification in wildlife monitoring and man–animal conflict situations.Comparative identification of pugmarks in wild animals is based on analyzing distinctive

features such as shape, size, toe arrangement, claw impressions, and pad structure to differentiate species. Feline pugmarks, such as those of leopards, are typically round, show four toes without claw marks, and have a broad heel pad with three lobes at the posterior edge and two at the anterior, indicating retractile claws. In contrast, canine pugmarks from dogs or wolves appear more oval, usually show visible claw marks, and have a narrower, triangular heel pad with a symmetrical toe arrangement. Bear pugmarks are much larger and elongated, often resembling a human footprint, with five toes clearly visible and prominent claw marks ahead of each toe. Hoofed animals like deer and wild boar do not show pads and toes but instead leave split hoof impressions, with wild boar tracks appearing broader and more rounded compared to the slender, pointed hooves of deer. By comparing these structural differences along with measurements of length, width, and stride pattern, trained personnel can reliably distinguish species from their pugmarks, even when the animal is not directly observed. Dog pugmarks are generally oval, show four toes with clear claw impressions, and have a relatively small, triangular heel pad; the toes appear more forward-pointing and symmetrical. Domestic cat pugmarks are smaller and rounder, show four toes without claw marks due to retractile claws, and have a compact heel pad with less prominent lobes. Leopard pugmarks are larger, round, and similar to a cat's but distinctly bigger, with four toes, no claw marks, and a broad heel pad showing three lobes at the back and two at the front—often described as an "M" shape; the toes appear asymmetrical, with the leading toe slightly ahead. Bear pugmarks are markedly different, appearing large and elongated like a human footprint, with five toes clearly visible and prominent claw marks ahead of each toe, along with a long heel impression.

By comparing these structural features along with size and stride pattern, field personnel can reliably differentiate these species from their pugmarks even in the absence of direct sighting (Mugloo et.al 2014).In conclusion, pugmark identification is a fundamental field technique for detecting and differentiating wild animal species based on footprint size, shape, toe arrangement, claw marks, stride pattern, and habitat context. It provides valuable indirect evidence of animal presence, movement, and behaviour, particularly in terrains where direct sightings are difficult. However, like scat analysis, pugmark interpretation is influenced by soil type, weather conditions, substrate distortion, and observer experience, which can limit accuracy.Therefore, pugmark evidence should be assessed comparatively and supported by additional signs such as scat, feeding marks, camera trap records, and habitat knowledge. Images below show pug marks of (male and female animal).

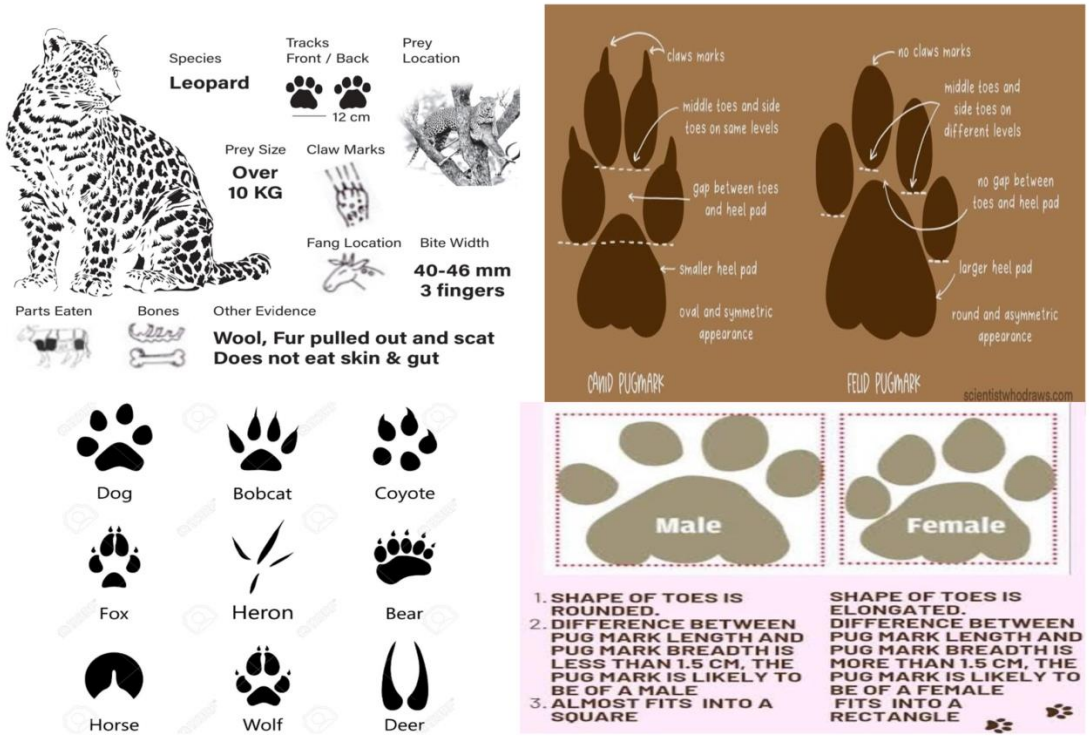






Images show pug marks of different wild animals, illustrating distinct track patterns used for species identification and movement assessment in the field.





Images show comparative features of pug marks highlighting differences in size, shape, toe arrangement, and claw impressions for accurate species identification.

Although identification of wild animals is an important aspect of wildlife management but it is often constrained by limitations and prone to errors due to poor visibility, similar morphology, environmental conditions, and inadequate

observational tools. Identification of wild animals requires caution because errors can lead to improper response, wrongful capture, or harm to non-target species. Field staff must avoid relying on a single sign such as pugmarks or eyewitness reports, as these can be misleading due to soil conditions, weather, overlapping tracks, or panic among local residents. Observations should be made from a safe distance using binoculars, cameras, or drones to prevent disturbance or provocation of the animal. Handling of indirect evidence like scat, hair, or carcasses should be done with gloves and proper tools to avoid contamination, especially when samples are meant for DNA analysis. Identification should ideally be confirmed through multiple indicators via visual signs, camera footage, behavioral patterns, and, where possible, scientific testing.

Despite technological support, there are limitations to wild animal identification. Poor visibility, dense vegetation, nocturnal activity, and rugged terrain often hinder accurate observation. Camera traps and CCTV images may be unclear or captured at difficult angles, making species differentiation challenging (for example, distinguishing a leopard from a large feral cat). Environmental factors such as rain, snow, or wind can distort tracks and erase evidence. DNA and forensic methods require time, laboratory facilities, and technical expertise, which may not be readily available in urgent conflict situations (Chaudhary et.al 2024). Moreover, animals of the same species may show similar physical features, making individual identification difficult without prior records. Human error, lack of training, and reliance on assumptions also contribute to misidentification. Therefore, identification of wild animals must be approached carefully, scientifically, and with awareness of its practical constraints.

Conclusion

Accurate identification of wild animals is an essential step in managing human wildlife interactions, wildlife rescue, conservation planning, and veterinary intervention. It enables field staff, veterinarians, forest officials, and local communities to respond appropriately during conflict situations, apply correct rescue and rehabilitation protocols, and ensure that animals are treated, handled, and released in a manner consistent with their species-specific needs. However, identification in field conditions is often challenged by poor visibility, stress situations, misleading physical similarities between species, reliance on CCTV or eyewitness accounts, and limited technical expertise.

Managing Human Wildlife Conflict in Kashmir

Chapter 4

As we all know that the Kashmir Valley supports a mosaic of habitats ranging from temperate forests to alpine meadows. Livelihoods of rural people depend largely on agriculture, horticulture, pastoralism and small-scale forestry, bringing people and domestic animals into close proximity with wild species. Where habitats overlap and resources (food, water, shelter) become limited or attractable, leading to conflict. Man–animal conflict (MAC) leads to loss of human life and injury, crop and livestock damage, retaliatory killing of wild animals, and social unrest all of which undermine conservation goals and local livelihoods. (MAC) in the Kashmir Valley is an increasingly visible and complex conservation and public-safety challenge nowadays. The Valley's rich biodiversity and dense human settlements, coupled with changing land use pattern, climate variability, and rising human pressures, have intensified encounters between people and wildlife notably brown/black bears, leopards, wild boar, monkeys etc. Black/Brown bears commonly are seen in picture during **c**rop raiding in orchards, fruit harvest seasons and garbage dumping sites**.** Leopards mostly appear due to lack of prey base, increasing dog population and improper waste management which attract these leopards on streets and roads. Wild boar usually come out more frequently during harvest seasons, winter/ scarcity time, after habitat disturbance, during breeding seasons and is found mostly near orchards and field edges. Sometimes monkeys which have a nuisance behavior, mostly become a part of conflict due to habitat loss, seasonal shortages, poor waste management, orchard expansion and are found of raiding of kitchens and small orchards (Asmat, 2024).

Talking about principal drivers of this man animal conflict in Kashmir may include seasonal pressures and climate variability, changing land use and food availability, food conditioning and habituation, habitat fragmentation and loss**,** population growth and human encroachment, lack of community awareness and inadequate livestock protection and improper waste management**.** Management must be interdisciplinary and locally adapted including the following framework which integrates veterinary, ecological, social, and administrative actions. Improved waste management being the first and foremost, animal-proof garbage collection points and community composting centers to reduce attractants is the basic thing which is to be implemented. Another thing is **o**rchard and crop protection by use of early-warning lights, noise-makers, guarding, and temporary barriers during fruiting seasons; planting sacrificial

crops as buffers that can also help in prevention of these conflicts. Then comes the livestock management by keeping proper night enclosures (predator-proof corrals), supervised grazing, and guardian animals (dogs) to help to prevent episodes of man animal conflict. Veterinary extension services which promote vaccination drives and proper carcass disposal contribute and avoid attracting scavengers. Lastly habitat management and corridors, in which we have to m**a**intain and restore habitat patches, create buffer zones and wildlife corridors to reduce the need for animals to cross human areas. Our plan of work should incorporate fully trained, well-equipped wildlife rescue and response teams able to respond to calls for injured, trapped, or problem animals under supervision of our veterinary wing is essential so that the work is taken with utmost care and clear SOPs for capture, chemical immobilization, humane handling, treatment, and either rehabilitation or translocation are achieved. A centralized reporting system (toll-free number or local hotline) to log incidents, dispatch teams, and record data for trend analysis is also required for to track hotspots, frequency, species involved, and outcomes (Arif& Singh 2022). Then comes the **c**ommunity-based management plans which **i**nvolve local communities in surveillance, formation of village man animal conflicts involving mohalla heads, orchard owners, herders and youth, (committees must coordinate with our department control rooms during conflicts regularly), volunteers, early-warning (night patrols, village monitoring animal movements via wasp groups, phone alerts, installing of community watch towers in orchards and crop rich areas),community awareness and education programs at school level, mohalla/village level awareness programmes, regular outreach, and training for frontline staff (forest guards, village leaders) to improve coexistence strategies and reduce fear and myths about wildlife. Additionally, use of an electric fencing and solar-powered lights, **s**trategically placed around high-value orchards and other vulnerable places can prove helpful along with l**i**vestock corrals with strengthened roofing and walls which can prevent opportunistic predation by leopards and nocturnal raids (Naqash, 2022). Use of non-lethal deterrents including acoustic devices, flashing lights, chilli-based repellents, and trained shepherding is also important. Regarding disease surveillance and one health approaches (monitoring for zoonotic diseases), post-incident medical care and first aid along with veterinary treatment for injured wildlife to improve survival and welfare is also very essential. Simultaneously when conflict leads to injury or death of animals (wild or domestic), veterinary forensic investigations have a role to identify causes and inform mitigation (e.g., poisonings, snares, poaching, trauma, electrocutions, gunshots, vehicular collisions.

Tail Piece

Conflicts between wildlife and humans cost many lives, both human and wildlife, threaten livelihoods, and jeopardize long-term conservation goals such as securing protected areas and building constituencies in support of biodiversity. Human animal conflict in the Kashmir Valley is not an inevitable byproduct of conservation it is a manageable socio-ecological problem. With coordinated, community centered strategies that combine prevention, rapid response, veterinary care, technical supervision, and policy support, it is possible to reduce conflict, protect livelihoods, and conserve the valley's wildlife.

What are Hotspots of Man Animal Conflict

Chapter 5

Hotspots of man animal conflict are geographic areas where human settlements, agricultural lands, or livestock-grazing zones closely overlap with the natural habitats of wildlife, leading to repeated encounters, crop damage, livestock predation, or direct threats to human safety. These areas are typically located along forest fringes, wildlife corridors, or near water sources that attract wild animals. In scientific terms, hotspots of man animal conflict refer to specific geographic areas where the frequency, intensity, and recurrence of interactions between humans and wildlife are significantly higher than in surrounding regions. These areas are identified through systematic data collection and spatial analysis of conflict incidents such as crop damage, livestock depredation, property destruction, or attacks on humans. In Kashmir Valley, such hotspots are particularly concentrated around the edges of Dachigam National Park, Tral, Ganderbal, Baramulla, Kupwara, and Anantnag, where dense forests, orchards, and terraced farmland meet animal habitats. Species commonly involved include leopards, Asiatic black bears, wild boars, monkeys, and occasionally Hangul deer, which venture into human areas in search of food, especially during harsh winters or fruiting seasons when natural resources are limited (Bhat and Khan 2014). Hotspots emerge due to habitat fragmentation, urban encroachment, agricultural expansion, and decline in prey base, forcing wildlife to enter villages and orchards. Seasonal trends are noticeable: leopards and bears are more active near human settlements during late winter and early spring, while wild boars and monkeys cause crop depredation during fruiting and sowing seasons (Nyhus, 2016). Mapping these hotspots using field surveys, local reports, camera traps, and GIS tools allows the Wildlife Department to deploy rapid response teams, install preventive fencing, educate local communities, and implement habitat improvement measures, thereby reducing conflict and promoting coexistence between humans and wildlife in Kashmir.

Identifying a hotspot for man animal conflict involves a systematic approach that combines field observation, community inputs, historical records, and technological tools to locate areas with frequent wildlife–human interactions. The process begins with collection of conflict reports from villagers, forest guards, and local authorities, noting incidents such as livestock predation, crop damage, animal sightings, or human injuries. These reports are then mapped spatially and temporally to detect patterns, highlighting regions that experience repeated encounters over time. Field surveys complement these reports by assessing forest edges, wildlife corridors, water sources, and crop fields for

signs of animal activity, including pugmarks, droppings, scratch marks, feeding signs, and carcasses (Dayer*et.al* 2017). Advanced methods like camera traps, drones, and GPS telemetry are employed to monitor animal movement, identify species involved, and determine peak activity periods, while GIS and remote sensing help overlay human settlements, agricultural lands, and forest cover to pinpoint high-risk zones. Seasonal trends are also considered, as certain animals, such as leopards, bears, or wild boars, may move closer to villages during winter, fruiting, or mating seasons. Socioeconomic factors, like orchard density, livestock management practices, and waste disposal, are analyzed to understand why conflicts occur in specific areas. By integrating these multiple lines of evidence, wildlife managers can accurately designate hotspots, prioritize preventive measures such as fencing, early-warning systems, community awareness programs, and rapid-response teams, ultimately reducing human animal conflicts and promoting coexistence (Rashid and Bhat 2024).

The scientific method of identifying a hotspot for man animal conflict involves a structured, data driven approach that combines field surveys, spatial analysis, and statistical evaluation to accurately pinpoint areas where wildlife and human interactions are frequent and problematic.

The process typically follows these steps

1. **Data Acquisition:** Compile organized and comprehensive records of conflict incidents from diverse sources, including local residents, forest and wildlife authorities, livestock loss reports, crop damage claims, and archived historical data. Each record should clearly document essential details such as the date of occurrence, precise location (with geographic coordinates), species involved, nature of the incident, and the level of damage or severity.
2. **Field Validation:** Ground surveys need to be conducted to confirm the presence of animals using indirect evidence such as pugmarks, scat, scratch marks, feeding signs, dens, or kill sites. Camera traps, drones, and direct observations are used to validate reports and monitor animal movement patterns.
3. **Species Identification:** Identification of the species involved in conflict incidents through careful examination of field evidence such as visual observations, footprints (pugmarks), camera trap footage, and, where required, DNA testing. Precise identification is crucial, as each species exhibits distinct behavior patterns and therefore demands tailored management and mitigation approaches.
4. **Geospatial Mapping:** Entering and assembling all recorded conflict incidents into a Geographic Information System (GIS) to produce maps that show where and how often these events occur. Then combine this information with other relevant data, such as land use patterns, forest areas,

water bodies, nearby villages, livestock grazing zones, and wildlife movement corridors, to better understand the relationship between human activities and conflict locations.

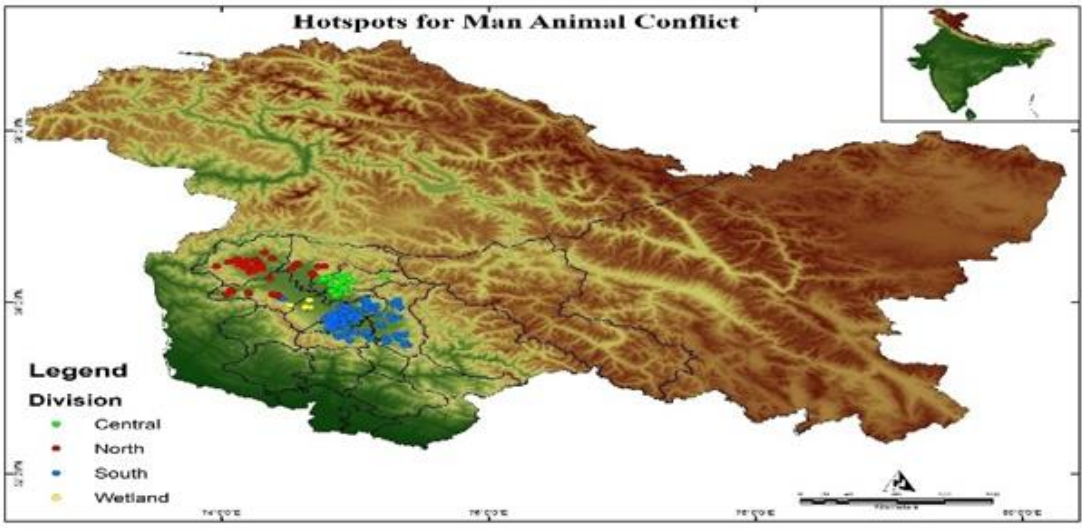
5. **Data Interpretation:** Use quantitative methods such as kernel density estimation, hotspot analysis, or frequency distribution to identify clusters of incidents. Areas with significantly higher frequency of conflicts than surrounding regions are scientifically designated as hotspots.
6. **Chronological Analysis / Temporal Assessment:** Analyze seasonal and diurnal trends, as many animals have predictable movement patterns linked to breeding, fruiting, or prey availability, which influence when and where conflicts occur.
7. **Data Validation and Dissemination:** Verify the identified conflict hotspots by consulting local communities and conducting field inspections to confirm their reliability. The resulting analysis produces a priority map of high-risk areas, which helps authorities plan the deployment of rapid response teams, implement preventive actions such as fencing and improved livestock enclosures, establish early-warning mechanisms, and undertake targeted habitat management measures.

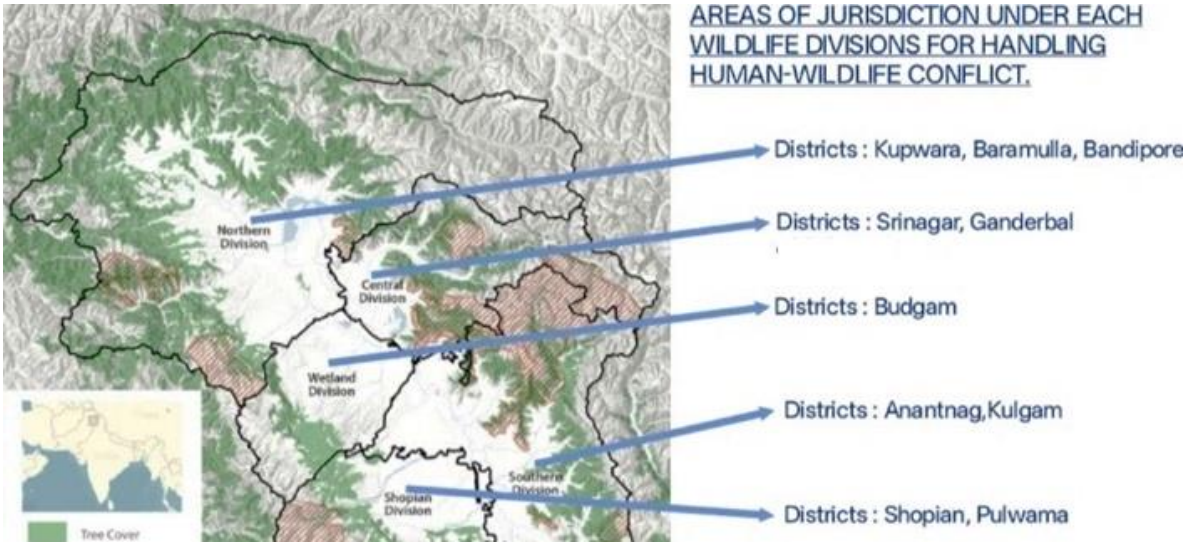
This method ensures that hotspots are identified objectively, reproducibly, and based on evidence, allowing wildlife managers to make informed decisions to reduce human–animal conflicts while protecting both humans and wildlife.

Identifying hotspots of man animal conflict faces several limitations and difficulties that make the process challenging. A primary limitation is the lack of complete and accurate data, as many incidents go unreported, especially in remote or sparsely populated areas, while some reports from local residents may be exaggerated or misattributed. Field verification is often difficult due to rugged terrain, dense forests, harsh weather, and nocturnal activity of animals, which limit the collection of direct evidence such as pugmarks, droppings, or feeding signs. Technological tools like camera traps, drones, and GPS collars, while useful, are expensive, require technical expertise, and need regular maintenance, which can be hard to sustain in remote locations. Seasonal and migratory patterns of wildlife further complicate identification, as areas may only become conflict-prone at certain times of the year. Species misidentification, particularly among similar-looking animals like leopards and large feral cats, can lead to incorrect hotspot designation. Additionally, integrating human settlement patterns, agricultural land, and forest cover using GIS requires accurate, up-to-date maps and specialized skills, which may not always be available (Conover, 2022). These challenges mean that hotspot identification is often approximate, requiring a combination of scientific data, local knowledge, and continuous monitoring to ensure effective conflict management.

Table below show some identified Hotspots of Man-Animal Conflict in Kashmir Region

Division	District	Some prolonged Hotspots
Central	Ganderbal	Lar Ganderbal, Chountwaliwar Ganderbal, Kangan Ganderbal, Thune Kangan, Gund Kangan, Wangath Kangan, Chattergul Kangan, Manigam Ganderbal, Waliwar GanderbalAnderwan Kangan.
	Srinagar	Dara Srinagar, Theed Harwan.
North	Kupwara	Lolab Sogam, Mawer Langate, Kalaroos Kupwara, Kandi Khas Kupwara, Braripora Handwara, Karhama Kupwara, Rajwar Handwara.
	Baramulla	Limber Boniyar Baramulla, Tangmarg Baramulla, Ferozpora Tangmarg, Boniyar Baramulla, Nadihal Rohama Baramulla, Choolan Uri, Zeran Tangmarg, Nowgam Kandi Baramulla.
	Bandipora	Kudara Arin Bandipora, Aloosa Bandipora, Rafiabad Handwara, Sumlar Bandipora, Quil Muqam Bandipora, Ajas Bandipora, Bazipora Ajas Bandipora.
South	Anantnag	Kokernag Anantnag, Lever Pahalgam, Ahalan Gadool Kokernag, Khiram Anantnag, Nagbal Hapatnard Anantnag, Batakoot Pahalgam.
	Kulgam	Halan Kulgam, Manzgam Kulgam, D.H Pora Kulgam, Chawalgam Kulgam,
Shopian	Shopian	Hirpora Shopian, Imamsahib Shopian, Sedow Shopian, Keller Shopian.
	Pulwama	Panner Tral, Karmullah Tral, Aripal Tral, Saimoh Tral, Satoora Tral.
Wetland	Budgam	Khansahib Budgam, Khag Budgam, Hardapanzoo Khansahib, Shunglipora Khag.





Division wise spatial distribution map illustrating identified hotspots of human wildlife conflict across the Kashmir Valley.

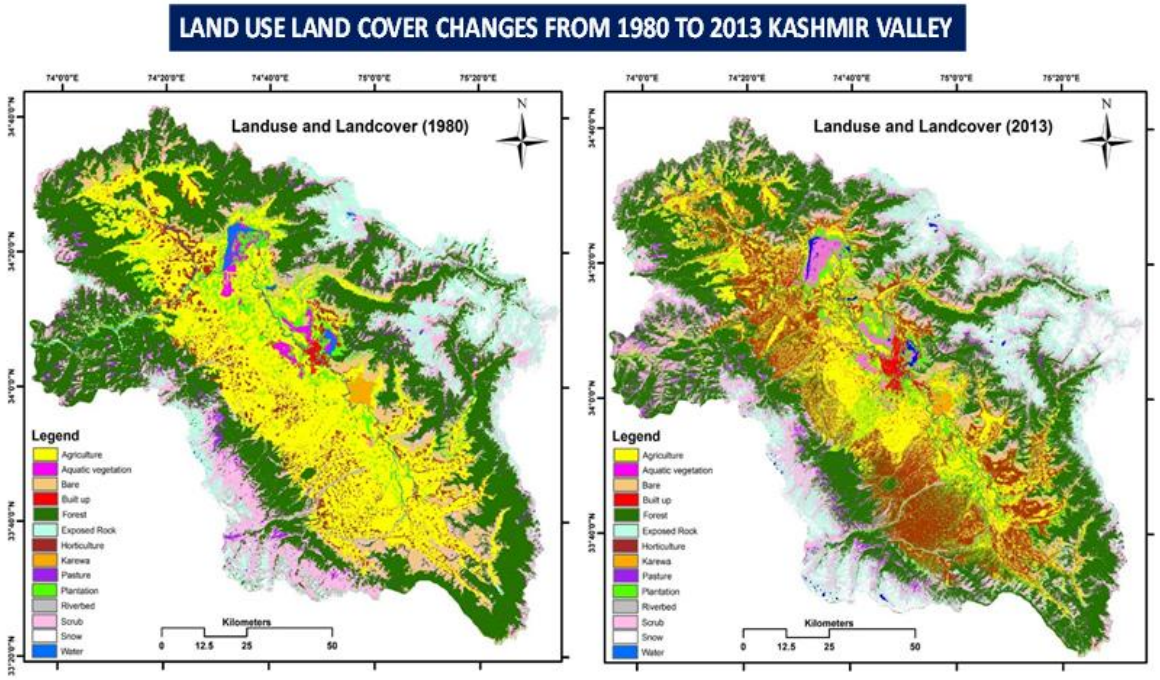
Kashmir, often called the *Vale of Kashmir*, is a scenic intermountain valley nestled in the western Himalayas, stretching roughly 135 km long and 32 km wide and surrounded by high mountain ranges. The valley's floor is drained by the Jhelum River, which meanders through fertile plains, wetlands, and lakes such as Wular—one of Asia's largest freshwater lakes. Its diverse terrain includes broad river plains, terraces known as *karewas*, dense forests, alpine meadows, and glacial foothills that together sustain rich biodiversity, traditional agriculture (paddy, orchards), and human settlements. These ecosystems are home to protected wildlife, including species like the Kashmir stag (*hangul*) and snow leopard, and are integral to local culture, livelihoods, and hydrological systems.

From around 1980 to 2026, Kashmir's landscapes have experienced significant transformation driven by population growth, development pressures, and environmental stressors. Satellite studies show notable declines in forest cover, water bodies, snow/glacial areas, and traditional agriculture, alongside increases in urban built-up areas, barren land, and plantations/orchards, reflecting shifts in how land is used and covered over time (Ramseena, 2025).

A persistent issue has been illegal encroachment on forest land, with government data indicating that over 19,500 hectares of forest land in Jammu & Kashmir remain under occupation, including thousands of cases in the Kashmir region across divisions such as Anantnag, Shopian, Lidder, and Awantipora. Encroachments are often linked to agricultural expansion, settlement growth, and infrastructure development, fragmenting once-contiguous forests and threatening biodiversity.

In protected wildlife zones and wetland areas, human activities and land-use change have altered habitats. Wetlands such as those around Wular and Hokersar have seen shifting extents and pressures from nearby development, while forests adjoining sanctuaries face thinning and loss. Deforestation and glacial retreat (e.g., shrinkage of the Kolahoi Glacier) have reduced water availability and altered ecological conditions, pushing wildlife closer to human landscapes and disrupting traditional land use (Ahmed and khan 2016, Deshmukh & Ravindra 2024).

Overall, the combined effects of encroachments, urbanization, agricultural conversion, infrastructure expansion, and climate-mediated landscape shifts from 1980 to 2026 reveal a trajectory of intensified human impact on Kashmir's natural environments, with significant consequences for forests, protected wildlife habitats, water resources, and traditional land cover.

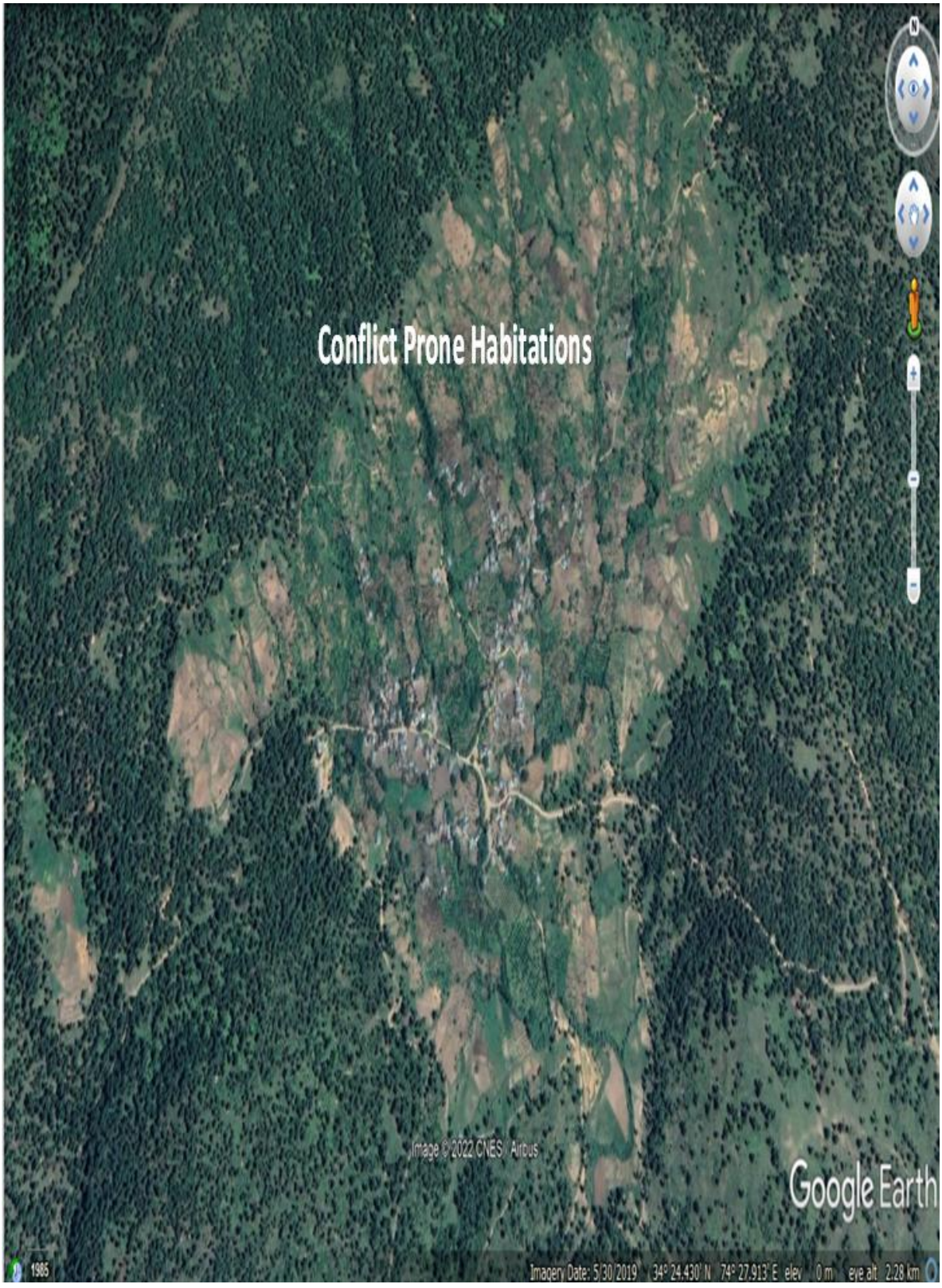


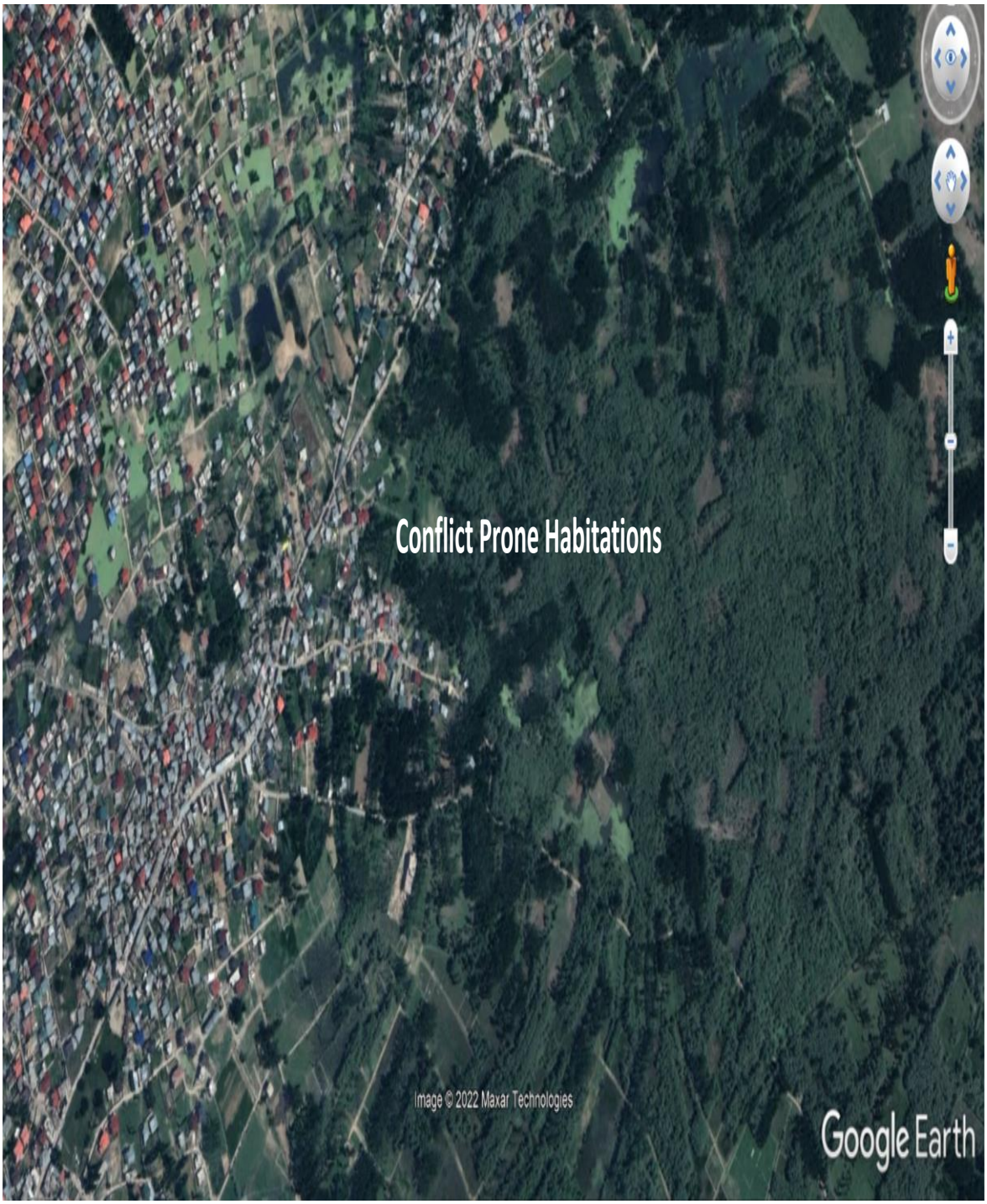
Land Use Land Cover has been Changed, Changes in Agriculture, Forest and Wetlands Shows Decreasing Trend in terms of % Change





The two images clearly illustrate the drastic transformation in land use patterns over time, highlighting how extensive human encroachment has reduced forest cover and fragmented wildlife habitats. The comparison demonstrates the shift from a predominantly natural landscape to one increasingly dominated by urban development and infrastructure expansion.


Conflict Prone Habitations
Image © 2022 CNES / Airbus
Google Earth
Imagery Date: 5/30/2019 34° 24.430' N 74° 27.913' E elev 0 m eye alt 2.28 km



High-resolution imagery from Google earth clearly delineates the spatial configuration of conflict-prone habitations, revealing the close juxtaposition of expanding human settlements with fragmented forest patches, degraded buffer zones, and disrupted wildlife corridors.

Addressing Wild Animals Emergencies during Man Animal Conflict

Chapter 6

Wild animal emergencies are sudden, critical situations in which a wild animal's life, health, or safety is at immediate risk, demanding urgent intervention by veterinarians and wildlife authorities. These emergencies may arise from road accidents, poaching injuries, entanglement in wires or traps, electrocution, fractures from falls, disease outbreaks, dehydration, starvation, or extreme environmental stress such as heat or cold exposure. In many cases, animals are also found exhausted after prolonged flight, trapped in human settlements, or injured during territorial fights. Such conditions often lead to shock, respiratory distress, bleeding, infection, or severe stress responses that can rapidly worsen without prompt care (Rohini, 2017). Managing a wild animal emergency requires quick assessment, safe restraint, minimal handling to reduce stress, appropriate sedation, stabilization through fluid therapy and wound management, and careful transportation to a secure, quiet location for treatment or rehabilitation. Effective response depends on coordination between veterinary teams, wildlife staff, and local authorities to ensure timely rescue while safeguarding both the animal and the public (Redpath*et.al* 2015).

Wild animal emergencies can also be defined as life-threatening situations in which wild animals are injured, distressed, diseased, trapped, or displaced, requiring immediate veterinary and wildlife management intervention. These emergencies become especially critical during man animal conflict, when animals stray into human habitations due to habitat loss, food scarcity, injury, or disorientation and face risks from crowds, vehicles, retaliation, and stress. Common emergencies include road-traffic injuries, snare or trap wounds, gunshot injuries, fractures from falls, electrocution, and dehydration, exhaustion after prolonged chasing, and acute stress that may lead to capture myopathy during rescue operations. Animals involved in conflict situations often suffer from shock, hyperthermia, respiratory distress, and panic due to crowd pressure and noise, which worsens their clinical condition even before handling begins. Rapid response, crowd control, minimal handling, proper restraint, sedation when required, fluid therapy, and safe transport to a quiet location are essential to prevent deterioration. Effective management of such emergencies requires coordination between veterinarians, wildlife staff, and law-enforcement to ensure both human safety and animal survival, making emergency preparedness a crucial component of wildlife conflict response in regions like Kashmir.

Wildlife emergency conditions encompass a wide range of medical and surgical crises that require rapid, skilled intervention to save the animal's life while minimizing stress. Common emergencies include road-traffic injuries leading to fractures, internal hemorrhage, and head trauma; snare and trap wounds causing deep lacerations and tissue necrosis; gunshot or pellet injuries; electrocution burns; dog-bite wounds; dehydration and starvation; shock and capture myopathy following rescue; respiratory distress from exhaustion or heat stress, parasitic overload and infections; dystocia (difficult birth) in pregnant animals, and gastrointestinal obstruction from ingestion of foreign bodies such as plastic (Sulistiyono, 2023). Medical management begins with rapid assessment of airway, breathing, and circulation, followed by control of bleeding, fluid therapy for shock and dehydration, pain management, antibiotics for infection control, anti-inflammatory drugs, and cooling or warming as required. Surgical management may involve wound debridement and suturing, fracture stabilization with splints or external fixation, removal of foreign bodies or pellets, treatment of burns, and in severe cases, amputation or exploratory surgery for internal injuries. Throughout treatment, minimal handling, proper sedation, quiet surroundings, and careful monitoring are essential to prevent stress-induced complications. Effective management of wildlife emergencies thus combines prompt first aid, appropriate veterinary care, and supportive rehabilitation to restore the animal for possible release back into the wild (Schuster, 2024).

Managing wild animal emergencies presents several practical and clinical limitations that make treatment far more challenging than in domestic animals. The foremost limitation is extreme stress and fear in wild animals, which can rapidly lead to shock or capture myopathy during handling and restraint. Lack of species-specific clinical data (drug dosages, anesthesia protocols, normal vital parameters) often forces veterinarians to rely on approximations. Field conditions are usually uncontrolled and resource-poor, with limited equipment, lighting, and sterile facilities at rescue sites. Safe physical restraint is difficult and risky for both staff and animal, often requiring sedation, which itself carries anesthetic risks. Delayed reporting and transport time can worsen injuries before treatment begins. Environmental factors such as terrain, weather, and crowd pressure during man animal conflict further complicate rescue efforts. Post-treatment care is also limited because wild animals cannot be easily confined, monitored, or handled repeatedly like domestic animals. Additionally, lack of diagnostic tools (X-ray, lab tests, and imaging) in field settings restricts accurate assessment of internal injuries. Rehabilitation and release decisions are complicated by the need to ensure the animal can survive independently without imprinting on humans. These constraints make wildlife emergency management a delicate balance between rapid intervention, minimal handling, and improvisation under challenging conditions.

In the end managing wild animal medical and surgical emergency conditions demands a careful balance between rapid clinical intervention and minimizing stress to the animal. Successful outcomes depend on prompt assessment, safe restraint, timely stabilization, and appropriate medical or surgical care delivered often under difficult field conditions. Equally important are species-appropriate handling, sedation protocols, infection control, and supportive therapy to prevent complications such as shock or capture myopathy. Because diagnostic facilities and post-operative monitoring are limited in wildlife settings, veterinarians must rely on sound clinical judgment, teamwork with wildlife staff, and adaptive decision-making. Ultimately, effective emergency management not only saves individual animals but also contributes to conservation goals by enabling rehabilitation and safe return to the wild wherever possible

Wild animals presented

Surgical / Traumatic Conditions

- Road traffic accident injuries
- Long bone fractures
- Pelvic and spinal fractures
- Mandibular and skull fractures
- Gunshot and pellet wounds
- Wire snare and trap injuries
- Limb ischemia and gangrene
- Deep lacerations and puncture wounds
- Amputations
- Internal hemorrhage
- Organ rupture
- Rib fractures with pneumothorax
- Electrocution burns



Common Surgical Interventions

- Fracture stabilization
- Wound debridement and suturing
- Amputation
- Thoracocentesis
- Laparotomy
- Abscess drainage
- Foreign Body Removal
- ophthalmic and Dental Work
- Soft Tissue Affections: (Abscesses, hematomas, tumors, and cysts).
- Traumatic Injuries and Musculoskeletal Disorders





Emergency Medical Management

Shock treatment

Fluid therapy

Oxygen support

Pain management

Temperature regulation

Surgical emergencies





Medical Conditions

•Capture myopathy
•Shock (hypovolemic / neurogenic)
•Hyperthermia or hypothermia
•Dehydration and starvation
•Electrolyte imbalance
•Aspiration pneumonia
•Septicemia
•Poisoning (pesticides / rodenticides)
•Gastrointestinal impaction or perforation
•Renal failure
•Hepatic failure
•Neurological deficits and paralysis

Internal Hemorrhage

Splenic, hepatic, pulmonary bleeding
Abdominal distension
Weakness





The images presented above depict some of the most commonly encountered medical conditions and wildlife emergencies affecting wild animals and birds, as addressed through timely veterinary intervention and field management practices.

Several notable success stories highlight the critical role of veterinary wildlife unit in mitigating human wildlife conflict and advancing conservation goals. Through timely tranquilization and rescue operations, injured leopards, civet cats, deer's, jungle cats, and Himalayan black bears etc. have been safely captured by our veterinary wing from densely populated areas, and received treatment for trauma, accidental injuries, and other disease conditions, and were successfully released back into suitable habitats. In multiple instances, rapid veterinary intervention has reduced panic among local communities while ensuring the welfare of distressed animals. These interventions not only safeguard animal health but also build public trust in conservation authorities. The Veterinary Wing has recorded several notable success stories that reflect both professional competence and dedication to wildlife welfare. A significant achievement was the surgical correction of a severe corneal injury in a jungle cat, where meticulous ophthalmic repair and post-operative care enabled the animal's full recovery and successful release back into its natural habitat. Similarly, a musk deer that had sustained accidental traumatic injuries underwent prompt surgical intervention, followed by careful monitoring and rehabilitation, culminating in its safe reintroduction into the wild. In another critical case, a severely stressed, dehydrated, comatose, and shock-affected black bear was provided immediate emergency veterinary management, including fluid resuscitation and intensive supportive care, resulting in its remarkable recovery. The successful correction of ankyloblepharon in a rescued kitten further demonstrated the team's surgical precision and commitment to animal health across species. These interventions not only restored individual animals to health but also strengthened public confidence in wildlife conservation efforts. The dedicated work of the Veterinary Wing has been widely acknowledged in newspapers and local dailies, which highlighted these operations as exemplary instances of scientific expertise, timely response, and compassionate wildlife care. The Veterinary Wing has also achieved notable success in treating and correcting various deformities in wild birds, reflecting a high level of clinical expertise and rehabilitative care. Several cases involved wing fractures, joint dislocations, soft tissue injuries, and congenital deformities that impaired flight and survival in the wild. Through precise orthopedic interventions, splinting techniques, surgical realignment, and structured physiotherapy protocols, many of these birds were gradually restored to functional mobility. Some of the success stories are here as under:

Corneal repair (superficial lamellar keratectomy)



Wildlife Dept Successfully Performs Corneal Repair Surgery On Leopard Cat

Syed Mohammad Burhan



SRINAGAR: In a significant step, the Department of Wildlife Protection, Kashmir Division, has successfully carried out a corneal repair surgery on a leopard cat with impaired vision.

Officials of the department said that this marks a crucial intervention in wildlife healthcare, highlighting the department's commitment to the conservation and rehabilitation of injured wild animals.

The Leopard Cat, found in distress, was rescued and provided with medical attention by experts, ensuring its chances of survival in the wild, officials said.

An official said that a leopard cat having approximate weight of 2.5-3 kg's was presented from Ajas control room Bandipora from north division with a history of trauma and injury in the left eye.

"The animal on examination showed signs of pain, distress, redness and swelling of left eye, corneal edema and cloudiness. The clinical examination also revealed that the animal was having a prolapsed mass of aqueous humor that had been solidified in the area inside the eye," he said.

Giving details of the surgical procedure, Veterinary Officer Department of Wildlife Protection Kashmir, Dr Mohsin Ali Gazi said the operation required utmost care due to the delicate nature of the eye and precautions before and after the surgical procedure were also taken care of.

"At first the pre-surgical examination of the animal was conducted including tests and anesthesia was given keeping in view the body weight and other parameters of the animal" he said.

"The surgical technique involved superficial lamellar keratectomy, antibiotics, analgesics, topical medications, ophthalmic solutions, multivitamins and other necessary medication was given" he added.

Gazi further said that the animal exhibited immediate post-operative visual recovery.

He said that post-operative care is critical for successful recovery and has been a big challenge after completion of this surgery and it took a lot of effort from our team.

"Post-operative care included pain management, administration of regular antibiotics, analgesics, topical medications, regular follow-ups to monitor signs of infection and signs of recovery, even restricted movement inside premises and avoiding allergens which has been a big challenge and has been taken care in a very professional manner"

He thanked the Staff of Dept of Wildlife protection Kashmir Bashir Ahmed Reshi and Mehrajuddin who, according to him, provided all possible care to the animal during follow-ups.

"All necessary follow ups, feeding was done in hygienic manner and after a few days the animal was released into its natural habitat," he said.

Ankyloblepharitis



Kitten Undergoes Successful Eye Surgery



Syed Mohammad Burhan

SRINAGAR: In a remarkable case of veterinary care, a kitten suffering from a rare congenital condition was successfully treated at the Wild Animal Health Care Centre in Dachigam by Dr. Mohsin Ali Gazi and his team.

The team included Bashir Ahmed Reshi, Mehrajuddin Lalli, Shameema Akhter and Suraya Majeed.

The kitten, rescued from CCF North, Sonwar locality was diagnosed with Ankyloblepharon – a congenital disorder in which the upper and lower eyelids are completely fused, preventing the eyes from opening normally.

Dr. Mohsin Ali and his veterinary team performed a delicate surgical procedure to separate the fused eyelids and restore the animal's vision. "The surgery was successful, necessary treatment and medication were administered, and the kitten is now doing well with its vision fully restored," Dr. Mohsin said.

"This marks yet another successful eye repair case at the Wild Animal Health Care Centre, Dachigam, where our team continues to provide specialized care for injured and distressed animals across Kashmir," Dr Mohsin said.

Dr. Gazi mentioned that the care and management of wild animals, along with day-to-day surgical procedures and successful interventions – including today's kitten surgery – are only possible due to the constant guidance and invaluable support of the Chief Wildlife Warden, J&K, and the Regional Wildlife Warden, Kashmir Region.

Images show surgical correction stories of a severe corneal injury in a jungle cat and Successful surgical management of ankyloblepharon in a rescued kitten being undertaken at wild animal health care Centre Dachigam.



The Himalayan black bear, presented in a state of severe stress and acute shock, was promptly attended to by the veterinary team. Through emergency medical treatment and stabilization measures, the animal was successfully revived and brought out of critical condition.



The musk deer was presented with severe stress and traumatic injuries following an accidental incident. Immediate emergency veterinary care, including stabilization and treatment of wounds, helped revive the animal and improve its condition and saved the life of precious animal.

From Surgery To Sanctuary: Kashmir's Lone Wildlife Hospital Emerges As Lifeline For Wild Animals

Syed Mohammad Burhan



Srinagar: Amidst the heavy downpour on Saturday, a group of men in Nehru Park Srinagar, armed not with umbrellas but with tranquilizers and expertise, embarked on a mission. A team from the Dachigam Wildlife Sanctuary veterinary hospital, led by Dr. Mohsin Ali Gazi, waded through the weather, to rescue a distressed monkey.

"Precision is the key," Gazi, Veterinary Officer and Head of Rescue Operations, explained. "We work closely with the team to ensure smooth and efficient rescues, from administering tranquilizers safely to navigating the technical aspects of the situation," he said.

This is just another day at the office for the dedicated team, racing through congested localities of Kashmir to save wild animals in need.

Highlighting the constant influx of cases they manage, Gazi said, "We receive many calls for rescues. A couple of days ago we received a barn owl from the city's Bemina locality."

"If the rescued animal has slight wounds, it is treated on the way or else it has to be admitted to the recently established healthcare facility for the wild animals."

Pertinently, established less than a year ago, the Wildlife Healthcare Hospital at Dachigam is emerging as a beacon of hope for Kashmir's wildlife.

"Our center has become a lifeline for countless wild animals, offering vital medical care and treatment. From surgical emergencies to medical crises, we leave no stone unturned in restoring these creatures to health," Gazi said.

While the center didn't disclose the actual numbers, the veterinary officer said that they treated a significant number of animals, rehabilitating them back into their natural habitats.

"In the few months since its inception, we have treated animals including bears, leopards, civets, leopard cats, porcupines, wild herbivores like gorals and musk deer, and various wild birds," he said.

The healthcare facility boasts impressive capabilities, including ultrasound diagnostics crucial for identifying illnesses in wild animals. In addition, the facility conducts post-mortem examinations of dead and deceased animals to ascertain their actual cause of death. | More on P10

1

Kashmir's lone wildlife hospital gives new lease of life to injured animals

SYEDA RAFIYAH

Srinagar, June 13: Kashmir's lone state-of-the-art wildlife hospital that started functioning earlier this year has been treating different species of wild animals and birds that are injured in man-animal conflicts and other reasons in the valley.

The Wildlife Research Cum Healthcare Centre located at Dachigam National Park in Srinagar has been receiving different species of wild birds and animals that get the best treatment and even surgeries of serious animals are conducted.

Dr Mohsin, wildlife veterinarian at the Dachigam National Park said the hospital receives different types of wild animals and wild birds who suffer injuries in different situations.

"We get animals and birds like aquatic wild kites and animals Himalayan Goral, mallard, porcupine, common leopard and wild bear. We receive them with different deformities and disorders like electric shock, injuries and ailments and they get treatment there," he said.

Secondly, they also receive the common leopards that are wounded in man-animal conflicts and accidental injuries. "We also received the bear cubs and monkeys as they make their way from forest areas to human habitations and suffer injuries," he said.

Dr Mohsin said five days ago the hospital released a porcupine that had suffered multiple injuries throughout the body in the man-animal conflict and was not eating anything for



few days. "We monitored his movements and the only then he release was planned," he said.

Furthermore, the wild hospital also receives the wild animals for post-mortem examination that are majorly poaching cases of birds or scheduled animals and accidental deaths.

"There are different animals that have different issues. We give them fluid therapy, medication and accordingly we give them further treatment and rehabilitate them," he said.

Dr Mohsin said many such animals have been rehabilitated after successful treatment at the newly established hospital.

The doctor said the hospital is equipped with all the high-end facilities like USG, theatre, surgery department for the wild animals. "Surgical interventions are also done in cases where such an intervention is needed," he said.

He also said that sometimes they also receive wild animals (female) and they are not sure whether they are pregnant or not and they do the USG and accordingly treat them.

Hospital has become a research centre as DNA of the animals is extracted for the preservation of gene banks to keep it for research purposes for the future.

Dr Mohsin said the research centre serves as a DNA bank, which will help in forensics and allied activities of conservation projects.

"There are several animals who have reached to extinction or endangered stage. So many schools, colleges, researchers come here for training and research purposes. We give them hands-on training about the basics of the wild animal hospital," he said.

On the other side whenever there is any man-animal conflict, the team of the hospital is sent to the spot and rescue the animals and safeguard their health.

"Once the animals are physically fit then only we send them back to their habitat. The animals are sent to the nearby Dachigam and Pahalgam and other nearby rescue centres," the wildlife veterinarian said.

The commendable efforts of our Veterinary Wing have been recognized in prominent newspaper reports and local dailies, which published special features and news clippings acknowledging their dedicated service, timely interventions, and significant contributions to wildlife rescue and rehabilitation

Conflict Mitigation and Response Strategies

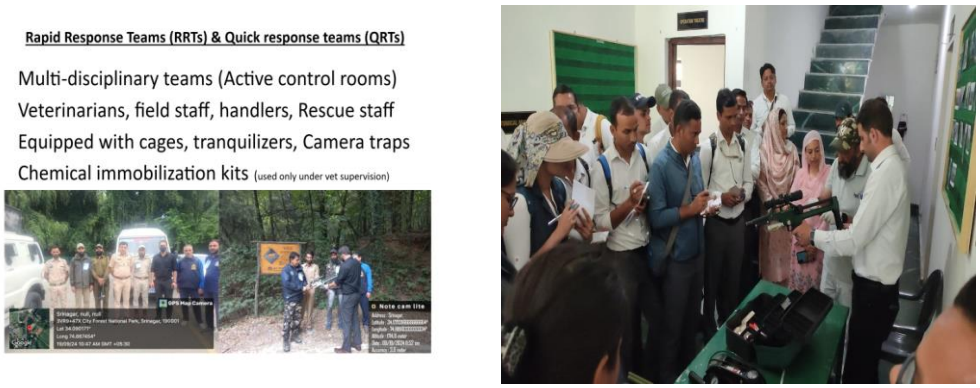
Chapter 7

Mitigation and management of man animal conflict require an integrated approach that combines scientific planning, community participation, habitat management, and rapid response mechanisms. Effective mitigation begins with accurate identification of the species involved and assessment of the conflict pattern whether it relates to crop damage, livestock depredation, property intrusion, or threat to human life. Preventive strategies include securing livestock in predator-proof sheds, installing solar or electric fencing around vulnerable areas, improving waste management to avoid attracting carnivores, and maintaining buffer zones between forests and human settlements. Early warning systems, camera traps, and regular patrolling also help monitor animal movement and alert communities in advance. Public awareness programs are again routinely essential to educate local residents on safe behavior, avoiding panic, and reporting sightings promptly to wildlife authorities. Rapid response teams trained in tranquilization, rescue, and safe relocation play a critical role when animals enter populated areas. Habitat improvement within forests such as ensuring adequate prey base and water availability reduces the likelihood of animals straying into villages. Compensation schemes for livestock loss and crop damage build trust between communities and wildlife departments, encouraging cooperation rather than retaliation. Long-term management of conflict involves land use planning, preventing encroachment into wildlife corridors, and scientific research to understand animal behavior and movement patterns. Thus, successful management of man animal conflict is not merely reactive but a continuous, coordinated effort aimed at promoting coexistence while safeguarding both human life and wildlife conservation (Teshome and Zeyede 2017).

Moreover availability of control rooms again play a pivotal role in the management of man animal conflict by serving as centralized hubs for receiving, monitoring, and responding to distress calls from affected communities. These facilities enable timely communication between villagers, forest officials, wildlife veterinarians, and rapid-response teams, ensuring that incidents such as livestock predation, crop damage, or animal sightings are addressed quickly and efficiently. By maintaining a 24/7 monitoring system, control rooms help prioritize urgent cases, deploy appropriate personnel, and guide on-site interventions while reducing panic and potential harm to both humans and wildlife. They also serve as data collection centers, recording the

location, species involved, type of conflict, and frequency of incidents, which is essential for identifying hotspots, planning preventive measures, and evaluating long-term mitigation strategies. In regions like Kashmir, where rugged terrain and forested areas limit immediate access, control rooms ensure that distress calls are rapidly addressed, improve coordination between agencies, and foster community trust in wildlife authorities, ultimately enhancing both human safety and wildlife conservation (Cui, 2012).

The Rapid Response Teams (RRTs) constitute a critical operational unit in the management of human–wildlife conflict and function under the direct guidance, technical oversight, and supervision of the Wildlife Veterinarian. These teams are systematically trained in tranquilization protocols, including appropriate drug selection, dosage calculation, routes of administration, and post-immobilization monitoring to ensure both human safety and animal welfare. Equipped with tranquilization guns, darting equipment, capture nets, protective gear, transport cages, and other essential operational tools, the RRTs are prepared to respond swiftly to distress situations involving wild animals straying into human habitations, livestock depredation incidents, or injured and aggressive wildlife. Their coordinated field response minimizes panic, prevents mob situations, and ensures scientifically managed rescue and release operations. Over the past five years, the Department of Wildlife Protection, Kashmir, has received and attended to 14,054 distress calls related to human–animal conflict, reflecting both the scale of the challenge and the department's active engagement. To strengthen response mechanisms, the department operates 20 dedicated control rooms across various divisions, including the North Division, South (Bijbehara) Division, Shopian Division, Central Division, and Wetland Division, ensuring round-the-clock coordination and rapid deployment of teams to effectively manage conflict situations across the region.

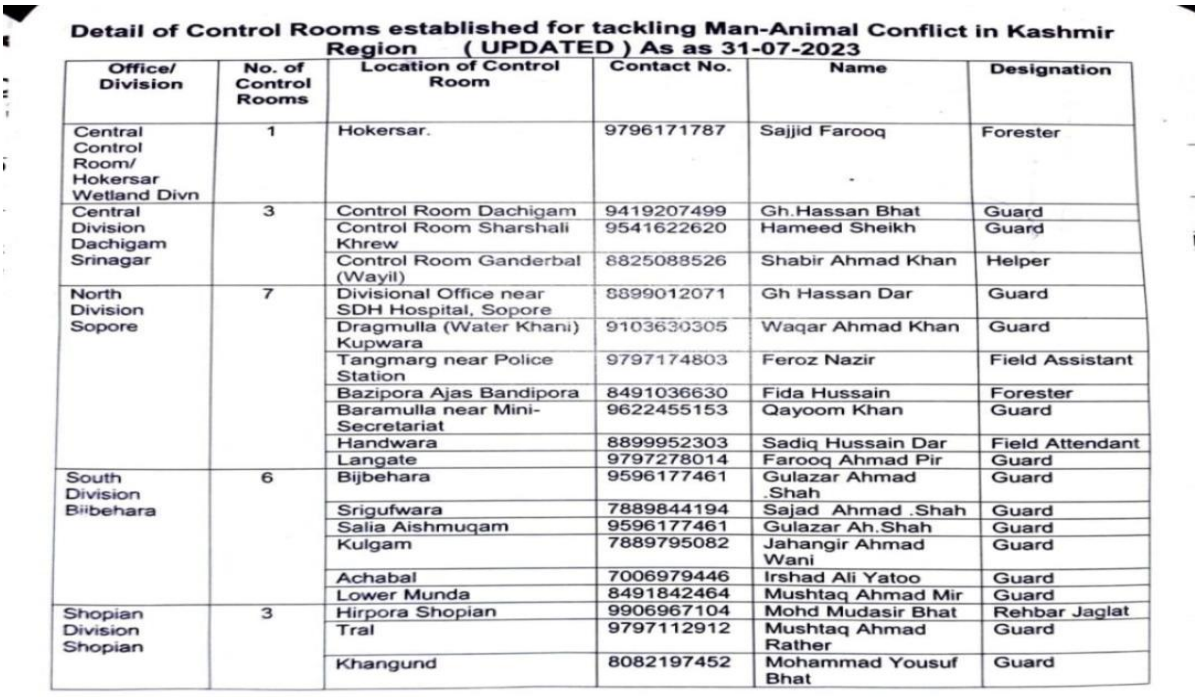


These images illustrate field teams at work during wildlife rescue and conflict response operations.



Distress calls received for last five (5) years

S.NO	FINANCIAL YEAR	NO. OF DISTRESS CALLS
1	2020-21	1714
2	2021-22	2440
3	2022-23	2731
4	2023-24	3094
5	2024-25	2350
6	2025-26 till date	1725
	TOTAL	14054



Detail of Control Rooms established for tackling Man-Animal Conflict in Kashmir Region (UPDATED) As as 31-07-2023

Office/ Division	No. of Control Rooms	Location of Control Room	Contact No.	Name	Designation
Central Control Room/ Hokersar Wetland Divn	1	Hokersar.	9796171787	Sajjid Farooq	Forester
Central Division Dachigam Srinagar	3	Control Room Dachigam	9419207499	Gh.Hassan Bhat	Guard
		Control Room Sharshali Khrew	9541622620	Hameed Sheikh	Guard
		Control Room Ganderbal (Wayil)	8825088526	Shabir Ahmad Khan	Helper
North Division Sopore	7	Divisional Office near SDH Hospital, Sopore	8899012071	Gh Hassan Dar	Guard
		Dragmulla (Water Khani) Kupwara	9103630305	Waqar Ahmad Khan	Guard
		Tangmarg near Police Station	9797174803	Feroz Nazir	Field Assistant
		Bazipora Ajas Bandipora	8491036630	Fida Hussain	Forester
		Baramulla near Mini-Secretariat	9622455153	Qayoom Khan	Guard
		Handwara	8899952303	Sadiq Hussain Dar	Field Attendant
		Langate	9797278014	Farooq Ahmad Pir	Guard
South Division Bijbehara	6	Bijbehara	9596177461	Gulazar Ahmad .Shah	Guard
		Srigufwara	7889844194	Sajad Ahmad .Shah	Guard
		Salia Aishmuqam	9596177461	Gulazar Ah.Shah	Guard
		Kulgam	7889795082	Jahangir Ahmad Wani	Guard
		Achabal	7006979446	Irshad Ali Yatoo	Guard
		Lower Munda	8491842464	Mushtaq Ahmad Mir	Guard
Shopian Division Shopian	3	Hirpora Shopian	9906967104	Mohd Mudasir Bhat	Rehbar Jaglat
		Tral	9797112912	Mushtaq Ahmad Rather	Guard
		Khangund	8082197452	Mohammad Yousuf Bhat	Guard

The first image depicts detailed records of distress calls attended by rapid response teams, while the second illustrates the details of control rooms in place for managing Man–Animal Conflict in Kashmir.

In Kashmir, mitigation and management of man animal conflict demands a region-specific strategy shaped by its dense forests, expanding human settlements along forest fringes, orchard cultivation, and the presence of species such as leopards, Asiatic black bears, Hangul, wild boar, and monkeys.

Effective management begins with mapping conflict hotspots around Dachigam, Tral, Ganderbal, Kupwara, Baramulla, and other fringe villages, followed by continuous monitoring through camera traps, patrolling, and community reporting networks. Preventive measures include construction of predator-proof livestock sheds, installation of solar or electric fencing around orchards and crop fields, proper disposal of household waste to avoid attracting bears and leopards, and maintenance of clear buffer zones between habitations and forest edges. Public awareness campaigns conducted by the Wildlife Department educate villagers on avoiding night movement in vulnerable areas, securing children and livestock, and immediately informing authorities instead of provoking or chasing animals. Rapid Response Teams equipped with tranquilization equipment, rescue cages, and transport facilities are deployed to safely capture and relocate animals that stray into human habitation. Habitat management within forests ensuring prey availability, water sources, and minimizing habitat disturbance reduces the pressure that pushes animals toward villages. Seasonal advisories during fruiting seasons and bear activity periods are also crucial in Kashmir's context. Fair and timely compensation for crop and livestock loss builds trust and discourages retaliatory killing. Long-term management further requires protection of wildlife corridors, control of urban and agricultural encroachment, and scientific study of animal movement patterns through GPS telemetry. Thus, in Kashmir, man animal conflict management is a continuous coordination between the Wildlife Department, veterinarians, forest officials, and local communities aimed at fostering coexistence while ensuring safety for both humans and wildlife.

Approaches to Managing Human–Wildlife Interactions

There are many steps that can be taken to mitigate human-wildlife conflict, but the most successful ones are those that involve local community members in the planning, implementation, and maintenance. Still, there are other examples of Human Wildlife conflict mitigations

Translocation of problem Conflict-Sensitive Wildlife

Movements: Relocating supposed "problem" animals from a site of conflict to a new place is a mitigation technique used in the past, although recent research has shown that this approach can have detrimental impacts on species and is largely ineffective (Treves& Karanth, 2021).

Establishment of Protective Barriers: Building barriers around cattle bomas (livestock enclosure), creating distinct wildlife corridors, and erecting beehive fences around farms to deter elephants have all demonstrated the ability to be successful and cost-effective strategies for mitigating human-wildlife conflict.

Compensation/ Exgratia relief: in some cases, governmental systems have been established to offer monetary compensation for losses sustained due to human-wildlife conflict. These systems hope to deter the need for retaliatory killings of animals and to financially incentivize the coexisting of humans and wildlife.

Predator-deterring guard dogs: The use of guard dogs to protect livestock from depredation has been effective in mitigating human-carnivore conflict around the globe. A recent review found that 15.4% of study cases researching human-carnivore conflict used livestock-guarding dogs as a management technique; with animal losses on average 60 times lower than the norm.

The following mitigation measures are being taken by the Department of Wildlife Protection, Kashmir Region to prevent Wildlife Damage

- Establishment of functional control rooms at divisional level and range wise have been established at strategic points which work round the clock for frequent patrolling and better protection in the field.
- Regular patrolling besides watch and ward surveillance is strengthened.
- Installing of camera traps at prone areas.
- Anti-poaching squads are constituted to curb the poaching and combat illegal trade of Wildlife.
- To intensify management activities in PAs for habitat improvement including gap filling by planting indigenous species, soil and water conservation activities.
- To enhance enforcement of acts and rules related to poaching of wild animals/ birds.
- To make all possible efforts for conservation and propagation of rare and endangered species and their habitat.
- To focus on management and conservation of wildlife and its habitat on modern lines in consonance with prevalent legislations.
- Regular water quality monitoring is done in order to assess health of the wetlands.
- Anti-plastic drives within protected areas are carried out in association with nearby Municipalities, Educational Institutions and NGOs.
- Awareness programmes regarding conservation and preservation of forests and wildlife species are organized.
- Informers are being engaged in the vicinity of protected areas to keep a close vigil on the activities of poachers.
- Close coordination is maintained with territorial Forest Department, Forest Protection Force and Police to thwart any attempt of poaching and to bring the culprits within the ambit of law.

- Communication channel and information network are strengthened by liaisoning with Police, Sarpanchs and Numberdars and local villagers, etc.
- Awareness programmes are organized periodically to sensitize people on importance of forests and wild animals.
- Short- and Long-term Conservation Action Plans are prepared with the technical assistance from the Wildlife Institute India, Dehradun (WII).

Additionally, the protection, conservation, and preservation of wildlife require a coordinated, science-based, and community-oriented approach, particularly in ecologically sensitive regions such as Kashmir. Recognizing the increasing pressures on biodiversity due to habitat fragmentation, human encroachment, climate variability, and rising incidents of man–animal conflict, the Department of Wildlife Protection has undertaken a series of structured measures to safeguard both wildlife populations and human communities. These measures are not limited to reactive interventions during conflict situations but extend to preventive strategies, habitat management, rescue and rehabilitation protocols, public awareness campaigns, and the enforcement of wildlife laws. Through surveillance, rapid response teams, compensation mechanisms, veterinary care, spatial monitoring, and community engagement programs, the Department seeks to maintain ecological balance while minimizing negative human–wildlife interactions. The following steps and initiatives reflect a comprehensive framework aimed at ensuring sustainable coexistence, strengthening conservation governance, and preserving the rich biodiversity of the region for future generations.

Some additional measures being taken by the Department for protection, conservation and preservation of Wildlife

- The boundaries of the protected areas under the administrative control of the Department of Wildlife Protection in Kashmir Region are being demarcated and fenced.
- Management and conservation of wildlife and its habitat on modern lines in consonance with prevalent legislations.
- Management activities in PAs are intensified for habitat improvement including gap filling by planting indigenous species, soil and water conservation activities.
- Planting of fruit bearing plants as source of food availability for wild animals within their habitat.
- De-weeding and desilting of wetlands is conducted.
- Regular water quality monitoring is done in order to assess health of the wetlands.

- Control Rooms at divisional level and range wise have been established at strategic points which work round the clock for frequent patrolling and better protection in the field. These Control Rooms are equipped with tranquilizing guns, medicines, capture nets, cages etc.
- A state of art Wild Animal Health Care-cum-Research Centre at Dachigam National Park has been establishment by the Department of Wildlife Protection for veterinary care of rescued wild animals equipped with surgical theatre, imaging unit and a molecular diagnostic laboratory. besides, DNA Bank.
- Enforcement of acts and rules related to poaching and illegal trade of wildlife.
- Anti-plastic drives within protected areas are carried out in association with nearby Municipalities, Educational Institutions and NGOs.
- Coordination with other departments is enhanced to implement the conservation strategies and biodiversity action plan.
- Capacity building and training of Rescue staff.
- Promotion of Eco-Tourism by way of identification of trekking routes and use of Battery-operated carts for park safaris.
- Anti-poaching squads are constituted to curb the poaching and combat illegal trade of Wildlife.
- Regular patrolling besides watch and ward surveillance is strengthened.
- Awareness programmes regarding conservation and preservation of forests and wildlife species are organized.
- Informers are being engaged in the vicinity of protected areas to keep a close vigil on the activities of poachers.
- Close coordination is maintained with territorial Forest Department, Forest Protection Force and Police to thwart any attempt of poaching and to bring the culprits within the ambit of law.
- Communication channel and information network are strengthened by liaisoning with Police, Sarpanchs and Numberdars and local villagers, etc.
- Short- and Long-term Conservation Action Plans are prepared with the technical assistance from the Wildlife Institute India, Dehradun (WTI).

In recent years, forest and wildlife conservation have assumed renewed urgency in light of accelerating habitat degradation, biodiversity loss, and increasing human–wildlife interactions. In response to these emerging ecological challenges, the concerned Department has launched a range of targeted programmes and strategic initiatives aimed at strengthening conservation efforts, enhancing habitat restoration, and promoting sustainable management of natural resources. These initiatives reflect a shift from isolated conservation actions to integrated, policy-driven frameworks that combine scientific research,

community participation, technological monitoring, and institutional coordination. By focusing on afforestation, habitat improvement, species protection, conflict mitigation, capacity building, and public awareness, these programmes seek to reinforce ecological resilience while balancing developmental needs. The details of the programmes and initiatives launched in recent years for forest and wildlife conservation are outlined below, highlighting the Department's proactive commitment to long-term environmental sustainability and biodiversity protection.

Furthermore, some more programs/ initiatives launched in recent years for forest and wildlife conservation areas under

- Habitat improvement on scientific basis by way of planting of fruit bearing and other species of trees, soil conservation, DRSM and Crate works, forest fire control and also compensatory afforestation are being carried out under CAMPA for preservation and conservation of the biodiversity of these areas.
- Plantation under JK Green drive mission, Ek Ped Ma ke Naam and Ek Ped Shaheedon ke Naam campaign were conducted in the Wildlife Protected Areas of Kashmir.
- Cleanliness/ plastic free drives conducted within protected areas in association with local communities, Municipalities, Educational Institutions and NGOs.
- Preparation of Management Plans with respect to Dachigam National Park and along with its adjoining Conservation Reserves, Kazinag National Park-Limber WLS- Lachipora WLS (Integrated),Thajwas Wildlife Sanctuary, Rajparian Wildlife Sanctuary, Hirpora Wildlife Sanctuary, Gulmarg Wildlife Sanctuary, Overa-Aru Wildlife Sanctuary and Integrated Management Action Plan for (8) Wetland Conservation Reserves have been completed for effective management.
- Declaration of Eco-Sensitive Zones around National Parks and Wildlife Sanctuaries.
- Population Estimation Census of various wildlife species viz; Hangul, Water-fowl etc. was conducted by the Department successfully.
- The demarcation of boundaries of the protected areas was launched to protect and preserve them.
- A state of art Wild Animal Health Care-cum-research Centre at Dachigam national park has been establishment by the Department of Wildlife Protection for veterinary care of rescued wild animals equipped with surgical theatre, imaging unit and a molecular diagnostic laboratory. Besides, DNA Bank.

- Promotion of Eco-Tourism by way of allowing trekking inside wildlife areas on the designated trek routes.

Simultaneously the conservation of wildlife and herbal resources has become increasingly critical in the face of habitat degradation, illegal exploitation, climate variability, and growing anthropogenic pressures (Turyahabwe. 2021). Recognizing the ecological and economic significance of biodiversity, the Department of Wildlife Protection has adopted a series of preventive measures aimed at curbing the decline of wild fauna and valuable herbal produce. These measures are designed not only to protect species from immediate threats such as poaching and overharvesting but also to strengthen habitat integrity, regulate resource extraction, and promote sustainable use practices. By combining strict enforcement of conservation laws, habitat restoration initiatives, community awareness programmes, monitoring mechanisms, and scientific management strategies, the Department seeks to ensure the long-term preservation of both wildlife populations and medicinal plant resources. The following preventive measures reflect a comprehensive and forward-looking approach toward safeguarding the region's ecological wealth for present and future generations.

In addition to above there are the following preventative measures which are also being taken by the Department of Wildlife Protection to prevent the decline of Wildlife and Herbal Produce

1. Regular patrolling is conducted to prevent wild animal poaching, encroachments, forest damage and grazing within protected areas.
2. **Reforestation and Afforestation:** Planting trees and restoring degraded forests to support biodiversity and stabilize ecosystems that provide habitats for wildlife.
3. Strict enforcement of Wildlife Protection laws Enforcing laws that protect endangered species and combat illegal hunting, trapping, and trade of wildlife.
4. **Wildlife Monitoring Programs:** Monitoring wildlife populations to track their status, assess threats, and implement timely conservation actions and breeding programmes.
5. **Anti-Trafficking Campaigns:** Efforts to curb the illegal trade in wildlife and wildlife products, including herbal medicines derived from endangered plants
6. **Regulation of Wild Plant Harvesting:** Enforcing laws that limit the overharvesting of medicinal plants and wild herbs.
7. **Cultivation of Herbal Plants:** Encouraging the cultivation of high-demand herbs in controlled environments like farms or greenhouses to reduce the pressure on wild populations.
8. **Awareness: Community Involvement:** Educating local communities on the

importance of conserving wildlife and medicinal plants, and encouraging sustainable practices.

9. Declaration of Eco-Sensitive Zones around Protected Area Network Especially National Parks and Sanctuaries to provide protection to wildlife animals in fringe areas.









Rescue, Rehabilitation and; Release of Wild Animals

Chapter 8

Wildlife rehabilitation is the process of caring for injured, sick, orphaned, or displaced wild animals with the goal of releasing them back into their natural habitat. It involves medical treatment, temporary housing, and specialized care for a variety of species, from birds and mammals to reptiles and amphibians. Rescue of wild animals in the current scenario requires coordination and cooperation between people from different backgrounds and different agencies. Different approaches and management techniques are required for rescue of different species of wild animals. It is one of the most challenging and a difficult task to rescue a wild animal and it is equally important to rehabilitate the rescued animals. Restraining wild animals is not an easy job and require highly technical inputs. Methods of restraining involve both physical and chemical restraining. Physical restraint is the use of manual of mechanical means to limit some or all of an animal normal movement for the purpose of examination, collection of samples, drug administration, therapy or experimental manipulations. Chemical restraint includes any form of medication used not to treat illness, but to intentionally inhibit movement (West et.al 2014). This is often required in the veterinary practice to immobilize domestic animals for medical treatments (e.g., gen examination, dentistry, surgery etc.), it is also routinely required in zoo settings, and in wild animals in the field. Wild animals may be immobilized for relocation purposes, bio-measurement, ear-tagging, micro chipping, vaccinations, radio collaring or medication, or performing various surgical corrections. If we again talk about Man animal conflict incidents, which are increasing every day due to several factors some of which include loss of habitat, fragmentation of habitat, loss of animal corridors, unavailability of feeds due to grazing pressure of domestic animals, old age etc (Wani*et.al* 2014) as discussed above. Additionally, the changing climate, loss of natural habitats, and rapid urbanization are the primary factors driving these incidents on rise. Urbanization as per experts is leading to the destruction of wildlife habitats, thereby prompting wild animals to venture into human settlements in search of food, protection and shelter. The increasing trend of human populations has led to the destruction, fragmentation, or alteration of natural habitats, making it increasingly difficult for wild animals to find food and refuge. Another reason for the rising incidents of man animal conflicts is low prey base in forests that has leopards to move into villages and towns where they can easily catch soft prey such as dogs, which are present in abundance near garbage sites and other places. One more contributing factor is

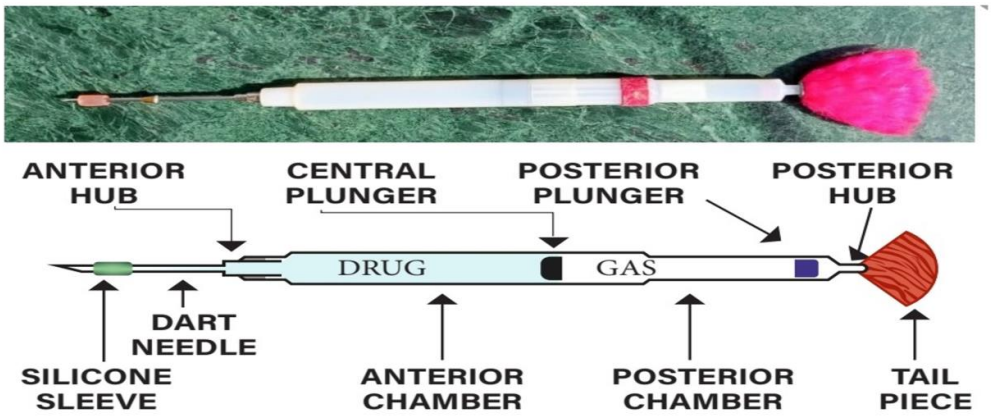
the introduction of invasive species to Kashmir, for instance, wild boars, which were originally introduced by the Maharaja for hunting purposes, have now become a menace for the people of valley. These wild boars are frequently spotted in orchards, gardens, and around human habitation, thereby heightening the likelihood of man-animal conflict. Providing wild animals with secure living and feeding environments can deter them from venturing into inhabited areas. Therefore, the primary focus should be on restoring the natural habitats of wild animals by planting more fruit trees in forests, promoting installation of fencing between forests and orchard lands creating of buffer zones etc. Additionally, increasing the population of herbivores, which serve as prey, can discourage leopards from leaving their natural habitats. Furthermore, leopards require substantial territory for their habitat. Hence, expanding forested areas would provide ample space for leopards to live, feed, and breed. Further the risk of man-animal conflict can be minimized if people exercise caution is implemented to avoid disturbing wildlife habitats. Limiting activities in forests such as livestock grazing and the collection of non-timber forest products can aid in preserving critical habitats and reducing interactions between people and wildlife. There is a need for upgrading of dedicated routes and areas for Bakarwals who accompany their cattle for grazing in the forests. Community know ledge and raising awareness about man-animal conflict is another crucial requirement in reducing such conflicts (Yazezew, 2022). Educating people about the ecological significance of animals and providing them with specific tips on how to mitigate issues can foster a deeper appreciation for nature. Conducting workshops, seminars, and webinars and community events makes it easy to educate people about wildlife and the importance of preserving their habitats. Additionally, it is imperative to incorporate content about man-animal conflict into school textbooks, notice boards, to ensure that future generations are aware of these issues from a foundational level.

To begin with any rescue operations, it mainly includes use of tranquilizing equipment’s like the tranquilizing gun and its accessories. The dartguns must be examined at regular interval and testing should be carried out with practice darts to keep it in good conditions. Darts of different capacities (1 ml, 2 ml, 3 ml, 5ml, 7ml and 10 ml) and material (plastic and metal) must be available along. Cartridge, syringe charger, cartridge holder, barrel cleaner, forceps must be available for inject guns along with pressure pumps and gas for darts etc should be regularly checked and kept available. Needle of different types (barbed, plain) and different sizes (16 mm, 18 mm, 20mm, 22mm, 23mm, 24 mm and25mm) must be there in store. A minimum of two guns must be available for carrying out rescue operation depending upon the use.

Animal group	Example species	Body weight (approx.)	Needle length	Needle gauge	Usual dart site
Small carnivores	Fox, Jackal, Jungle cat	4–12 kg	1.0–1.5 in (25–38 mm)	20–22 G	Thin skin; avoid over-penetration
Medium carnivores	Leopard cat, small dogs	10–25 kg	1.5 in (38 mm)	18–20 G	Thigh/shoulder muscle
Large carnivores	Leopard, Wolf	30–80 kg	1.5–2.0 in (38–50 mm)	16–18 G	Through fur into shoulder muscle
Small herbivores	Barking deer, Goat	15–30 kg	1.0–1.5 in (25–38 mm)	18–20 G	Avoid bony areas
Medium herbivores	Hangul, Deer spp.	80–180 kg	1.5–2.0 in (38–50 mm)	16–18 G	Shoulder/thigh muscles



Pic: A projectile dart gun is a specialized wildlife management tool used to safely administer tranquilizing drugs to wild animals from a distance during rescue, treatment, or translocation operations. And table above show specie specific dart needle length, guage and site of injection for rescue of various wild animals.



Pic: Dart (A specialized, lightweight, non-lethal projectile designed to deliver substances into an animal from a distance).

A projectile dart gun is a specialized immobilization device used in wildlife management for the safe and controlled delivery of anesthetic or sedative agents to free-ranging animals from a distance. It is an essential tool in human–wildlife conflict mitigation, wildlife rescue operations, and medical treatment, translocation, and research activities. The system functions by propelling a dart containing a measured dose of immobilizing drugs toward the target animal, thereby minimizing physical stress and reducing the risk of injury to both the animal and field personnel. Depending on the model, the dart gun may be powered by compressed air, CO_2 cartridges, or blank cartridge charges, allowing for adjustable pressure and range based on the size and species of the animal. The device typically consists of a barrel, pressure chamber or gas chamber, trigger mechanism, safety lock, and sighting system to ensure precision. The pressure or propulsion chamber is calibrated to control dart velocity, ensuring adequate penetration without causing undue trauma. A tranquilization dart which is used in wildlife immobilization generally consists of a drug chamber, which holds the measured anesthetic dose, and a pressure or propellant chamber, which activates upon impact to expel the drug into the animal's muscle. It also contains an internal plunger mechanism that ensures complete delivery of the medication, enabling safe and effective chemical immobilization (Young*et.al* 2010).When used by trained wildlife veterinarians and Rapid Response Teams, the projectile dart gun serves as a critical instrument for humane chemical immobilization, enabling safe capture, clinical intervention, and eventual release of wildlife back into their natural habitat.

Now comes the role of rescue teams to deal with man animal conflict situations which is highly challenging task and a dedicated rescue team or rapid response

teams whose primary work is to do rescue operations is required. There has to be more than one veterinarian, adequate animal keepers, and driver and forest officials to conduct rescue operations successfully. During rescue operations and for dealing with wild animal immobilization, it is of utmost importance that adequate drugs and medicines are available which are fresh and of good quality with good efficacy and potency. Drug of choice is very important in terms of chemical immobilization as different drugs have different effect on different species of animals (Yousuf, 2024). Veterinarians and forest officials must make sure that all the drugs and medicines are available for emergency use along with its antidotes and lifesaving drugs.

Things to remember and SOPs to be followed during wild animal rescue

First important thing is safety of the rescuers, the public as well as the wild animal/bird. Avoid close contact with the animal unless necessary and use appropriate safety gear like gloves, masks, and nets and other operative gears are not available. Evaluate the animal 's condition and environment to determine the best course of action without causing additional stress to the animal so condition assessment is must before planning a rescue operation. Another thing is to minimize animal stress by approaching the animal calmly and avoid loud noises, sudden movements, or bright lights that may cause distress or health hazards to animal. Further specialized tools and technique such as use capture nets, poles, or crates, darts and tranquilizers etc designed for the specific species and present circumstances (Kelly *et.al* 2012). Understanding the behavior and biology of the species being rescued to handle them appropriately with appropriate tranquilizers and technique is very important to have a successful and safe rescue operation (König*et.al* 2020). Then we have to ensure proper containment and ventilation during transport of rescued animal to prevent injury or suffocation especially to sick, injured or pregnant rescued wild animals. We have to minimize direct handling to reduce the risk of zoonotic disease transmission and preserve the animal's natural behavior. In case of injuries or health concerns, veterinary care promptly for diagnosis and treatment is to be undertaken. Simultaneously record keeping of all the rescue operations, including details about the location, species, condition, and actions taken is to be routinely updated. Finally, once the animal is rehabilitated and deemed fit, animal is to be released back into its natural habitat in compliance with local wildlife laws, animal ethics and welfare.





Pics showing training programs of wildlife rescue team and forest staff being undertaken for managing man animal conflict situations.

Handling of Animals

Animal handling is defined as the technique and method of how we respond and interact with the animals within the environment of an animal. Proper handling techniques can reduce animal pain and distress and improve animal welfare. Wildlife capture and handling has the potential to result in serious injury to both the handler and the animal. It should only be undertaken if absolutely necessary. In all operations, handling of live wildlife should be minimized by confiscating the animal without handling it directly e.g., if it is already in a cage that can be moved, use this rather than moving the animal into another transport cage. So we have to use simple techniques and methods which can give least discomfort, stress or pain to a rescued wild animal (Zimmermann, 2009).

We have to maintain patience while rescuing a wild animal, avoid quick movements and loud noises, and never prod an animal when it has nowhere to go. If external expertise is not available on the day of the operation, maintain the animal on site (i.e., at the point of seizure) until assistance is available from experienced personnel. Avoid physical capture of animals by encouraging an animal to enter a transport crate using patience or food as enticement. Animal handling methods require training, skill, and behavioral knowledge of the species you are working with. Some animals usually respond by biting during handling so while rescuing small wild animals, it's a good to wear gloves and use animal muzzles for protection against bites, scratches, and other diseases. Raccoons, skunks, bats, and some foxes are more likely than other mammals to carry rabies, but any wild mammal can carry the disease. There are also several other serious or fatal diseases that can be transmitted to humans from wild animals, so utmost care is to be taken while rescuing a wild animal. Feeding or watering or medication of animals either in their mouth or in the container with them is not allowed without professional trainer or animal keeper or wildlife rehabilitator. Water if placed wrongly in mouth can lead to aspiration pneumonia and even death and if not placed in the appropriate container properly will simply spill, causing the animal to be cold and wet. Always assess the animal's behavior before approaching. Use slow, deliberate movements to avoid startling the animal. For small animals, use cloth or gloves to gently restrain them and for larger animals, use specialized equipment like capture nets, poles, or traps. For reptiles or amphibians, avoid handling with bare hands to prevent injury to the animal or handler as said above (Zimmermann, 2014). Reduce direct physical handling to avoid causing stress. Strictly avoid holding animals by sensitive body parts (e.g., wings, tail) (Lombardi, 2018). Properly managing animals can lead to decreased pain and stress, ultimately benefiting their welfare.



The images depict the proper and humane restraint of wild animals using scientifically approved techniques to ensure handler safety while minimizing stress and injury to the animal. Such controlled restraint is essential for clinical examination, treatment, and safe transport during rescue operations.

Effective wild animal care begins with immediate emergency response and clinical stabilization. Visible traumatic injuries such as fractures, lacerations, or hemorrhage must be addressed through prompt first aid, while critical physiological conditions including dehydration, shock, or hypothermia should be stabilized prior to transport. Hydration should be restored with clean, species-appropriate water; however, feeding should not be initiated without

veterinary consultation to ensure dietary suitability and to avoid metabolic complications. Environmental management plays a crucial role in recovery: rescued animals must be housed in quiet, low-light, temperature-regulated settings with adequate ventilation to minimize stress-induced physiological responses. Strict disease control measures are essential, including the isolation of symptomatic individuals and adherence to rigorous hygiene and biosecurity protocols to prevent cross-contamination. Comprehensive veterinary evaluation should follow without delay, with diagnostic assessment and treatment administered strictly under professional supervision (Zimmermann et al., 2020). Animal management requires a species-specific and evidence-based approach grounded in ecological understanding. Rescue teams must be familiar with the natural history, behavioral ecology, and physiological needs of the species to ensure appropriate handling, enrichment, and temporary care. Quarantine protocols are imperative for newly rescued individuals to monitor for infectious diseases and parasitic infestations (Zubair et al., 2021). Continuous behavioral observation should be undertaken to detect signs of stress, aggression, or abnormal activity, with systematic documentation of feeding patterns, mobility, and overall health status. Temporary enclosures must be secure, escape-proof, and protective against predators, while also approximating natural habitat features to reduce captivity-related stress and support eventual rehabilitation or release.

Examination of wild animals before planning for release

Before releasing a rescued wild animal back into its natural habitat, a thorough clinical examination and diagnosis is essential to ensure that the animal is physically fit, disease-free, behaviorally competent, and capable of survival in the wild without posing risk to other wildlife or humans.

This process begins with a general physical examination, assessing body condition, hydration status, injuries, wounds, fractures, parasitic infestations, and signs of stress or shock. Vital parameters such as temperature, respiration, and heart rate are recorded.

A detailed clinical diagnosis follows, which may include:

- Hematological and biochemical tests to detect infections, organ dysfunction, or nutritional deficiencies.
- Screening for zoonotic and communicable diseases.
- Fecal examination for endo-parasites and external examination for ecto-parasites.
- Radiography or imaging in cases of suspected fractures or internal injuries.

The animal's behavioral assessment is equally important. It must show natural instincts such as alertness, fear of humans, ability to forage, and species-specific survival responses. Animals habituated to humans are generally unsuitable for release.

A period of observation and rehabilitation is maintained to monitor recovery, feeding behavior, mobility, and stress response. Vaccination, deworming, fluid therapy, wound management, and nutritional support are provided as required. Finally, only when the animal is declared clinically stable, disease-free, and behaviorally fit, it is selected for release in a suitable habitat, preferably near its rescue location, following standard wildlife release protocols.



Images depicting diagnostic procedures highlight the critical role of wildlife diagnostics in comprehensive clinical evaluation, enabling accurate assessment of trauma, infection, metabolic imbalance, and overall physiological status in rescued wild animals.

Evaluation before release in wildlife rescue and rehabilitation is also important in ensuring that an animal is fit to survive independently in its natural habitat and does not pose a risk to other wildlife or humans. This evaluation includes a comprehensive physical examination to assess body condition, healing of injuries, freedom from disease, and overall physiological stability, supported where necessary by laboratory tests and imaging. Pre-release evaluation of rescued wild animals must include special attention to pregnancy, as releasing a gravid female without proper assessment can endanger both the mother and the unborn young. Ultrasonography (USG) is a vital, non-invasive diagnostic tool used to confirm pregnancy, determine fetal viability, estimate gestational stage, and detect any complications such as uterine infections or fetal distress. Alongside routine physical examination and laboratory screening, USG helps veterinarians decide whether the animal is fit for immediate release or requires continued care until parturition. Pregnant animals often need a longer observation and rehabilitation period to ensure adequate nutrition, strength, and stress tolerance. Releasing such animals prematurely may lead to miscarriage, neonatal mortality, or inability to protect the offspring in the wild. Therefore, incorporating USG into pre-release evaluation ensures informed decision-making that safeguards reproductive success and contributes to the conservation of the species.



Images depict the pre-release evaluation of wild animals, ensuring clinical fitness, behavioral readiness, and ecological suitability prior to their safe return to natural habitats.

Release of wild animals

The release of wild animals after rescue, treatment, or rehabilitation is a carefully planned process aimed at restoring the animal to its natural habitat with the best chance of survival. Before release, the animal must be clinically stable, free from infection, physically fit, and capable of feeding, moving, and defending itself independently. Minimal human imprinting, appropriate body condition, and normal behavioral responses are essential criteria. The release site should ideally be close to the original capture location or within suitable natural habitat with adequate food, water, shelter, and low human disturbance. Timing of release preferably during cooler hours of the day—helps reduce stress and disorientation. Soft release methods, where the animal is acclimatized briefly before full freedom, may be used in some cases. Proper documentation and, where possible, post-release monitoring ensure that the animal successfully reintegrates into the wild, making release not merely an endpoint of treatment but a critical step in wildlife conservation and ethical rescue practice. Wild animals are released back into the wild only after a structured process that ensures they are physically fit, behaviorally normal, and capable of independent survival. The release begins with a final veterinary assessment confirming recovery from injuries or illness, adequate body condition, normal mobility, feeding ability, and absence of infection or human imprinting. Standard Operating Procedures (SOPs) require selecting a suitable release site preferably the original capture location or a habitat with sufficient food, water, shelter, and minimal human disturbance along with releasing the animal during cooler, low-stress hours. Proper transport in ventilated crates, minimal handling, and crowd control at the site are essential to prevent stress. In some cases, a soft release (brief acclimatization in a temporary enclosure) is used before full freedom. Documentation of the case history, tagging or marking when appropriate, and post-release monitoring through tracking or field observation are also part of recommended practice. Wild animals rescued and rehabilitated should be released in locations that maximize their chances of survival while maintaining ecological balance and minimizing human conflict. Ideally, the release site is the original capture location, as the animal is already familiar with the terrain, shelter, prey or forage availability, water sources, and escape routes. If this is not feasible, the alternative site must closely match the species' natural habitat in terms of vegetation, altitude, climate, and food resources, and should lie within the species' known distribution range. The area should have low human disturbance, minimal road traffic, and limited risk of immediate conflict with settlements or livestock. It must also be free from territorial pressure by dominant individuals of the same species that could lead to aggression. Protected areas, forest interiors, wildlife corridors, or buffer zones are generally preferred over fragmented landscapes. Seasonal considerations, time of day (preferably cooler hours), and weather conditions are also important to reduce

stress during release. However, there are limitations like exact original territories may be unknown, animals may be weakened despite treatment, monitoring after release is often difficult, and there is always a risk of the animal returning to human habitation or failing to adapt. Environmental pressures, habitat fragmentation, and stress from captivity further complicate successful reintegration (Ciuti *et al* 2012). Thus, wildlife release is a cautious, protocol-driven process balancing animal welfare, ecological suitability, and practical field constraints.





Post-rehabilitation release of rescued wild animal species following comprehensive health assessment and veterinary examination.

Transportation of animals

The transportation of animals is the intentional movement of non-human animals by means of transport. The transportation of animals involves the safe and efficient movement of animals from one place to another, whether for agricultural, commercial, or personal purposes. This can include transporting livestock, pets, or exotic animals. Common categories of animals which are transported include livestock, destined for sale or slaughter, zoological specimens, laboratory animal race, horses, pets, and wild animals being rescued or relocated. As per guidelines of central zoo authority the transportation of animals must follow the below mentioned protocols as under:

The animal should be separated from the herd, if needed, sufficiently in advance before transport and complete health checkup should be done before transport for assessing its health conditions.

- Animals in good health only should be transported. Sub-adult animals should be preferred for transportation.
- Pregnant or females which have recently given birth should be avoided for transport.
- Infants and too young, incapable of feeding themselves should also not be transported unless prior arrangements have been made for taking all due care for the same.
- The antlered animals in velvet should not be transported.
- The related papers like animal history cards, treatment cards, health certificate should accompany animal while transportation.
- Necessary arrangements for quarantine at the recipient station should be arranged in advance.
- The dimensions of the transportation containers for mammalian species should be such that the animal is not be able to turn around or to summer sault.
- It is important that all transportation containers should have inner surfaces which are completely free of any projecting nails, screws, ends of mesh or any other sharp material, which could cause injury to the animal.
- The transportation container should have adequate air circulation at all times. There should be additional ventilation by means of holes of suitable size in all walls of the container.
- Suitable lifting handles or gripers bars should be provided and when the containers will be heavily loaded, the hooks for crane slings and facilities for handling by fork-lift should also be fitted.
- On long journeys, the animals should be provided suitable bedding materials such as straw or hessian pad.

- Arrangements for feeding and watering as per the requirement of the species and duration of the journey should be provided.
- The animals which might have been sedated before their transportation should be transported only under the supervision of a qualified veterinarian
- The handling of animals during the transportation should be avoided to the possible extent. The animals should be disturbed as little as possible during the transportation.
- The transportation of animals should be avoided during extreme weather conditions like dry hot summer and very cold winter.
  The journey should preferably be performed during day time. The time between 11:00 A.M. to 4:00 P.M. may be avoided during hot summers and nights during winter
- While transporting the animals, due screening of the staff involved in transportation of animal should be made and it must be ensured that they do not infect of any such diseases that can infect the animal
- The accompanying Veterinarian should carry all necessary drugs, medicines, first aid kit, restraining equipment's and drugs, which may be required during emergency.





The image illustrates the preparation of a specialized artificial transport crate at the veterinary unit, along with reinforced rescue cages equipped with cross-ventilation, designed to ensure secure, stress-minimized, and bio secure transportation of wild animals during rescue, clinical treatment, and relocation operations.

Human–Wildlife Interaction Management in Wildlife (Division Shopian)

Chapter 9

Sohail Ahmad Wagay ACF/ Wildlife Warden Shopian



Human–Wildlife Interaction (HWI), more accurately reflecting the complex spectrum of encounters between people and wildlife, has emerged as one of the most persistent conservation challenges across the Himalayan region. In the Kashmir Valley, rapid demographic expansion, changing land-use patterns, infrastructure development, and increasing dependence on forest-linked livelihoods have intensified interactions between humans and wildlife.

Wildlife Division Shopian occupies a particularly sensitive position within this regional matrix. The Division functions as a transitional landscape where dense rural and peri-urban settlements directly about biologically rich forest ecosystems. Agricultural intensification, large-scale orchard expansion, enhanced road connectivity, and continued reliance on forest resources for fuel wood, fodder, and grazing have substantially reduced the spatial separation between people and wildlife.

Ecologically, the Division forms part of a larger landscape mosaic facilitating seasonal movement and dispersal of wildlife between protected areas, forest patches, and surrounding habitats. Habitat fragmentation has increasingly compelled wildlife to traverse human-dominated landscapes in search of food, shelter, and breeding opportunities. While many such interactions are non-confrontational, the probability of escalation into conflict remains significant, with implications for human safety, wildlife conservation, and public perception of conservation institutions. Against this backdrop, management of Human–Wildlife Interaction has emerged as a core operational priority for Wildlife Division Shopian.

Ecological Characteristics and Drivers of Interaction

The faunal composition of Wildlife Division Shopian includes adaptable and wide-ranging species such as the common leopard (Panthera pardus) and the Asiatic black bear (Ursus thibetanus). These species demonstrate behavioral flexibility and opportunistic foraging strategies, enabling them to persist within fragmented and human-modified landscapes. Seasonal food scarcity within forest interiors, combined with the availability of crops, orchards, and livestock at forest edges, frequently draws wildlife closer to human habitations.

In addition to ecological drivers, socio-economic factors including population growth, expansion of settlement boundaries, evolving agricultural practices, and increased human mobility have amplified the scale and complexity of interactions. Climatic variability and extreme weather events further influence wildlife movement and resource distribution, often pushing animals into marginal or unfamiliar habitats. Consequently, Human Wildlife Interaction in this landscape represents a structural challenge rooted in land-use change, climate dynamics, and development pressures rather than isolated incidents.

Scope, Methodology, and Purpose of Documentation

This document presents a systematically compiled account of Human–Wildlife Interaction management in Wildlife Division Shopian from the financial year 2020–21 onwards. The analysis is based on an integrated methodological framework combining quantitative records and qualitative field observations. Primary data sources include Control Room registers, range-level conflict diaries, rescue and response logs, veterinary treatment records, post-release monitoring data, field inspection reports, and corroborated photographic and camera-trap evidence.

The purpose of this documentation is threefold

1. To analyze spatial and temporal trends in Human–Wildlife Interaction;
2. To evaluate the effectiveness of mitigation and response mechanisms; and
3. To document adaptive strategies and best practices evolved through field experience.

The publication is intended to serve as a reference for planners, policymakers, researchers, and field managers engaged in conflict mitigation and coexistence-based conservation within human-dominated landscapes.

Magnitude and Nature of Interaction Incidents

Between the financial years 2021–22 and 2025–26 (till date), Wildlife Division Shopian recorded a total of 2,986 Human–Wildlife Interaction incidents. These incidents ranged from wildlife straying into residential areas and accidental entrapment in human infrastructure to high-risk encounters involving human injury or fatality, as well as complex emergencies requiring coordinated departmental response.

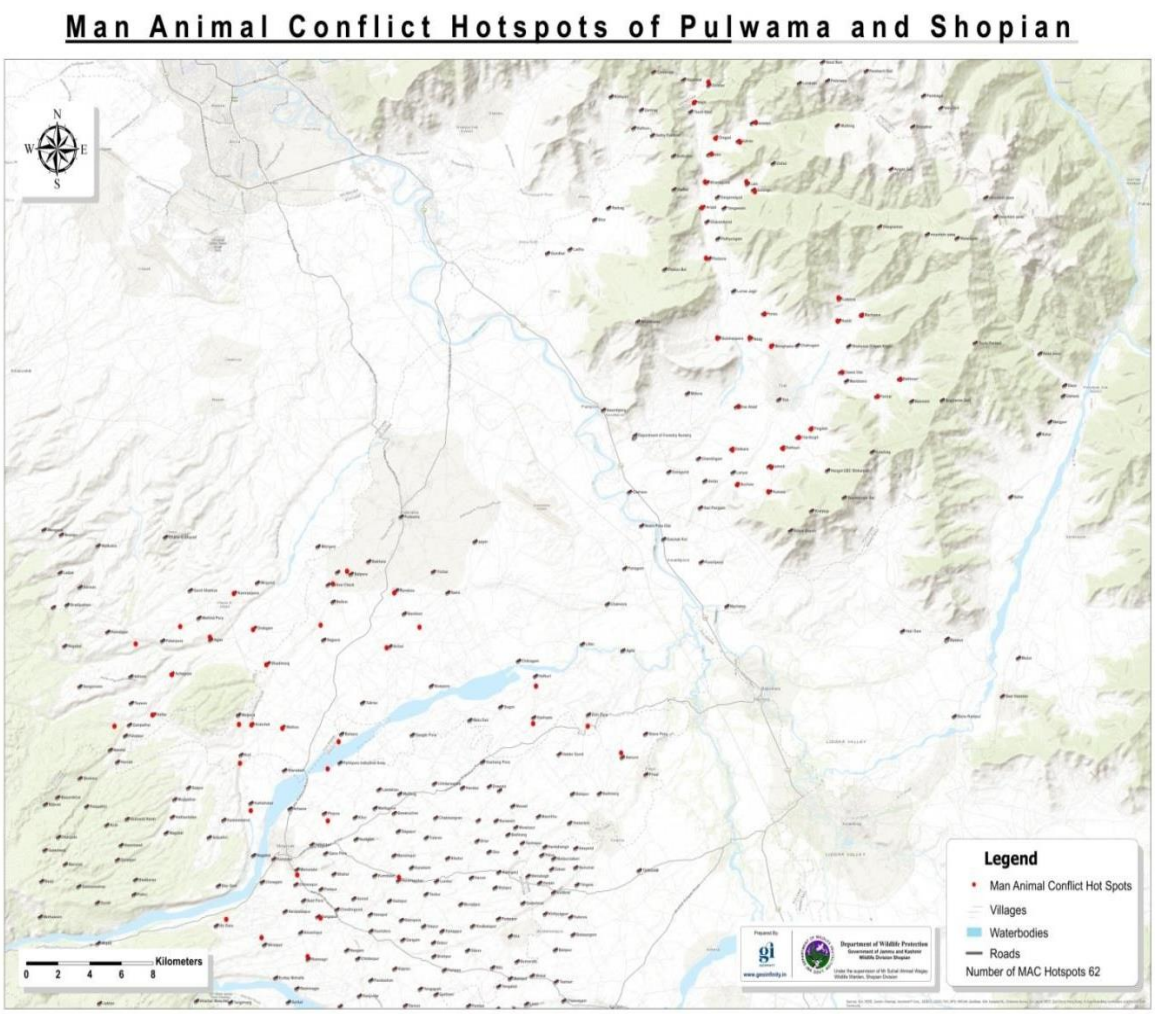
A substantial proportion of incidents did not result in direct harm and were resolved through precautionary and preventive interventions, including guiding animals back to forested areas, crowd regulation, and dissemination of situational advisories. The volume of reported incidents reflects both the ecological sensitivity of the landscape and the strengthening of reporting mechanisms through functional Control Rooms and increased public awareness. Each incident, irrespective of outcome, demanded timely assessment and response, underscoring the operational pressures faced by frontline staff.

Institutional Response Framework and Outcomes

To address the growing challenge of Human–Wildlife Interaction, Wildlife Division Shopian has established a structured, multi-tiered response framework comprising Control Rooms, Rapid Response Teams, range-level field staff, and veterinary units. Operations are governed by clearly defined Standard Operating Procedures emphasizing human safety, animal welfare, and non-invasive conflict resolution.

During the reporting period

- 265 animals were safely trapped and translocate;
- 69 animals were tranquilized and translocate under veterinary supervision;
- 2,057 incidents were resolved through non-invasive measures such as guided movement, safe passage, driven back, habitat-based redirection, and crowd control.
- No. of cages installed 550
- Despite sustained mitigation efforts, three human fatalities and ninety-five human injuries were recorded. An amount of ₹71.78 lakh was disbursed as exgratia relief in accordance with established norms. These outcomes reflect improved institutional preparedness, effective inter-unit coordination, and enhanced capacity to manage high-frequency interaction scenarios in a humane and scientifically informed manner.



Man-animal Conflict Hot spots of Shopian and Pulwama District

Information Regarding Existing Wildlife Control Rooms and Proposed Control Rooms				
Division	**Name of the Control Room**	**Location**	**Geo Location**	**Status**
Shopian Wildlife Division	Wildlife Control room Shopian	Division Office Shopian	33 44 32 N 74 50 23 E	Existing
	Wildlife Control room Tral	Range office Tral	33.937435 N 75.127356 E	
	Wildlife Control room Khangund	Range office Khangund	34.025557 N 75.071518 E	
	Central Wildlife Control room Pulwama	Circular Road Pulwama	33.861029 N 74.908116 E	
	Wildlife Control Room Abhama	Abhama Keller	33 49 19 N 74 46 27 N	Proposed

District/Tehsil wise Man Wild Animal Conflict Hotspots of UT of Jammu and Kashmir based on conflict diaries related to recurring Human Deaths/Injuries (January 2020-December 2025)

Division	District	Tehsil	Hotspot Villages (with GPS locations if available)
Shopian Wildlife Division	Shopian	Shopian	Sedow (33.66153 N, 74.7933 E)
	Shopian	Shopian	Jamnagar (33.667972 N 74 83.6071 E)
	Shopian	Shopian	Chotipora (33.411 N, 74.8420 E)
	Shopian	Shopian	Amshipora (33.686969 N, 74.85382 E)
	Shopian	Shopian	Mimander (33.647917 N 74.866503 E)
	Shopian	Shopian	Pinjoora (33.743978 N, 74.850586 E)
	Shopian	Shopian	Balpora (33.759422 N, 74.820731 E)
	Shopian	Keegam	Wathoo (33.75525 N, 74.839253 E)
	Shopian	Shopian	Nadapora (33.75525 N, 74.808085 E)
	Shopian	Keller	Kralchek (33.776472 N, 74.761789 E)
	Shopian	Keller	Keller (33.784123 N, 74.761789 E)
	Shopian	Keller	Moshwara (33.765414 N, 74.796425 E)
	Shopian	Keller	Zampathri (33.779043 N, 74.736844 E)
	Shopian	Zainpora	Zainpora (33.775384 N, 75.005432 E)
	Shopian	Zainpora	Awneero kralchek (33.78141 N, 75.033335 E)
	Shopian	Chitragam	Chatragam (33.776465 N, 74.973769 E)
	Shopian	Chitragam	Heff Shirmal (33.4736 N, 74.5812 E)
	Shopian	Shopian	Pehlipora Industrial Area (33.755967 N, 74.857846 E)
	Shopian	Hermain	Nagisharan(33.705022 N, 74.705148 E)
	Pulwama	Pulwama	Bonura Drug Farm (33.845698 N, 74.890945 E)
	Pulwama	Pulwama	Jandwal (33.852186 N, 74.90024 E)
	Pulwama	Pulwama	Tiken (33.843702 N, 74.872426 E)
	Pulwama	Pulwama	Arihal (33.820324 N, 74.881343 E)
	Pulwama	Rajpora	Rajpora (33.822318 N, 74.853756 E)
	Pulwama	Rajpora	Gulshanabad (33.828012 N, 74.844316 E)
	Pulwama	Rajpora	Shadimarg (33.4718 N, 74.499 E)
	Pulwama	Rajpora	Drabgam (33.819473 N, 74.816465 E)
	Pulwama	Rajpora	Aglar Kandi (33.816844 N, 74.791031 E)
	Pulwama	Rajpora	Achgoz (33.798307 N, 74.763532 E)
	Pulwama	Rajpora	Abhama (33.797734 N, 74.741803 E)
	Pulwama	Rajpora	Sangerwani (33.786207 N, 74710461 E)

	Pulwama	**Rajpora**	**Kamrazipora (33.836787 N, 74.804529 E)**
	Pulwama	**Tral**	**Padibal (33.563023 N 75.070214 E)**
	Pulwama	**Tral**	**Dadsara 33.899833 N 75.082769 E**
	Pulwama	**Tral**	**Parigham 33.863297 N 75.072546 E**
	Pulwama	**Pulwama**	**Rohmu 33.853946 N 74.833261 E**
	Pulwama	**Tral**	**Padghampora 33.542150 N 75.000539 E**
	Pulwama	**Tral**	**Reenzpora 33.512610 N 74.595160 E**
	Pulwama	**Tral**	**Shaltokun 33.877494 N 74.995211 E**
	Pulwama	**Tral**	**Bohu 33.543587 N 75.014306 E**
	Pulwama	**Tral**	**Koil 33.873943 N 74.941884 E**
	Pulwama	**Tral**	**Nawhard 33.851097 N 74.937774 E**
	Pulwama	**Tral**	**Mandoora 33.937694 N 75.152015 E**
	Pulwama	**Tral**	**Rathsuna 33.902884 N 75.115057 E**
	Pulwama	**Tral**	**Lalpora (Khalil) 33.963795 N 75.147789 E**
	Pulwama	**Newa**	**Parigam 33.938485 N 74.883238 E**
	Pulwama	**Tral**	**Panzgam 33.504556 N 75.012873 E**
	Pulwama	**Aripal**	**Nanar N:33.929976 E:75.07 1884**
	Pulwama	**Aripal**	**Aripal N:33.019392 E:75.074996**
	Pulwama	**Aripal**	**Karpora N:33.5523 E:75429**
	Pulwama	**Aripal**	**Kuchmullah N:33.9556 E: 75.101428**
	Pulwama	**Aripal**	**Gamraz N:33.946382 E:75.098675**
	Pulwama	**Aripal**	**Chatrigam N:33.950827 E: 75.121738**
	Pulwama	**Aripal**	**Arigam N:33.93589 E: 75.109008**
	Pulwama	**Aripal**	**Gang N:33.958671 E:75087784**
	Pulwama	**Aripal**	**Lurgam N:33.96921 E:75.09597**
	Pulwama	**Aripal**	**Mongama N:33.955 92 E: 75.117122**
	Pulwama	**Aripal**	**Gulabagh N:33.93271 E:75.084883**
	Pulwama	**Aripal**	**Gadpora N:33.995028 E: 75.080643**

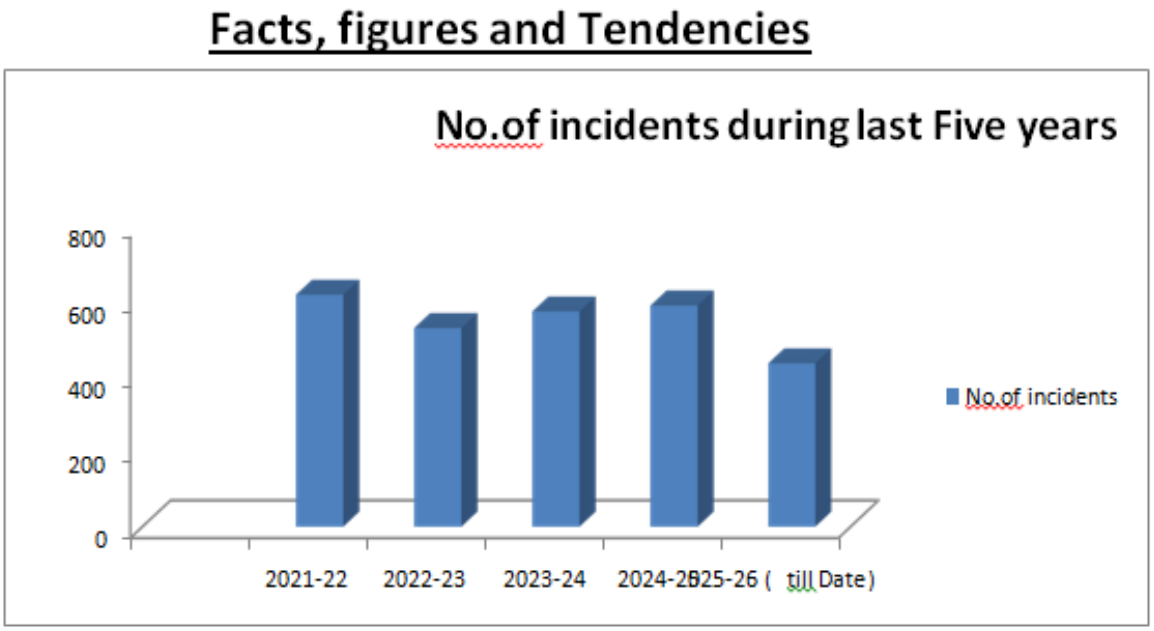
A village or any other location shall be classified as a 'Conflict Hotspot' if, within a single year, it records five or more incidents of human–wildlife conflict, resulting in human fatalities or grievous injuries.

Table: Showing Human–Wildlife Interaction during last five years

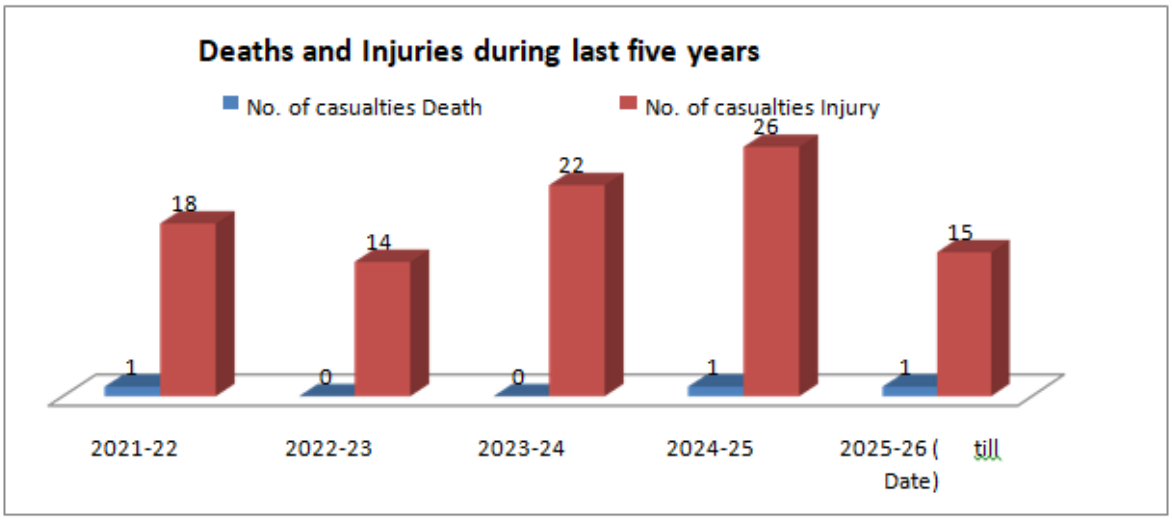
S.No	Year	No.of incidents	No. of casualties	
			Death	Injury
1	2021-22	617	1	18
2	2022-23	528	0	14
3	2023-24	572	0	22
4	2024-25	588	1	26
5	2025-26 (till Date)	434	1	15

Annexure 1:
Man- Wild Animal Conflict Diary of UT of Jammu and Kashmir January 2020-December 2025

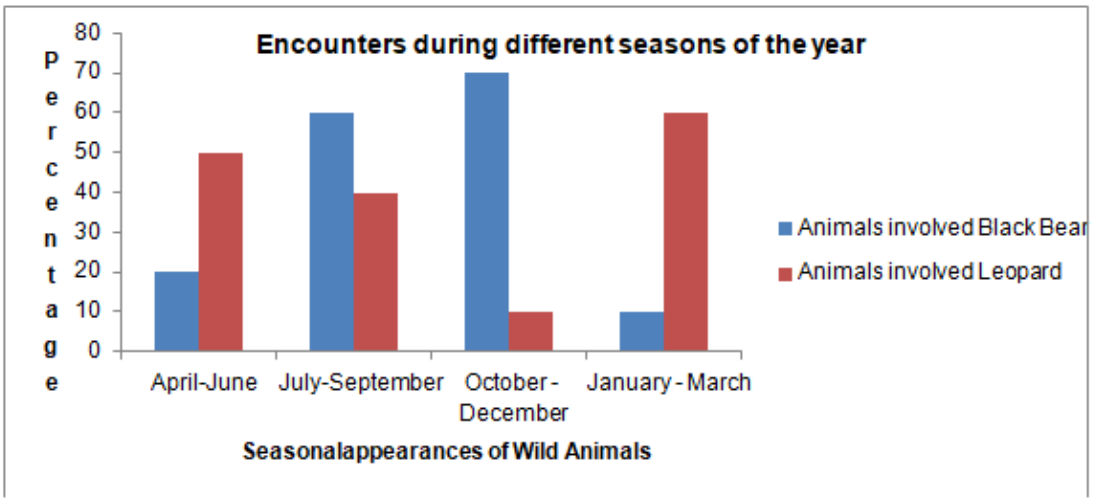
	Financial Year	Total No. of conflict incidents	Total No. of Animals trapped and Translocated	Total No. of Animals tranquilized and Translocated	Total No. of conflicts resolved (Safe passage given)	Total No. of persons killed /injured		Total No. of Locations cages installed	Total No of other aversive Techniques	Total No. of awareness drives conducted	Amount of Ex-gratia Paid In Lakhs	
						Death	Injury				Death	Injury
Shopian Wildlife Division	2021-22	617	23	22	466	01	18	104		2	6.00	11.91
	2022-23	527	22	5	404	0	14	94		2	0	17.90
	2023-24	572	52	15	363	0	22	142		0	2.00	12.97
	2024-25	588	62	15	376	01	26	133		2	6.00	19.25
	2025-26 (Till date)	682	106	12	448	01	15	115		1	5.00	9.75
Total:		2986	265	69	2057	03	95	588		7	19.00	71.78

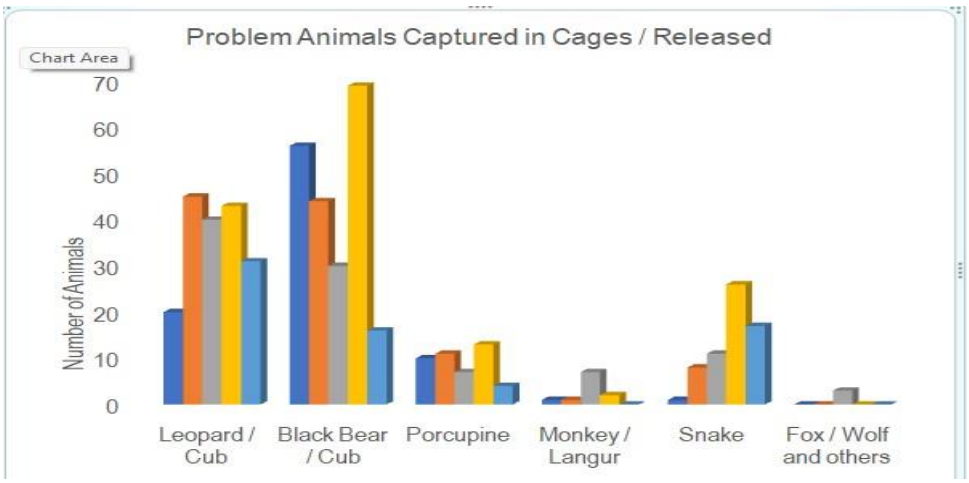


Graph showing No. of incidents during last years

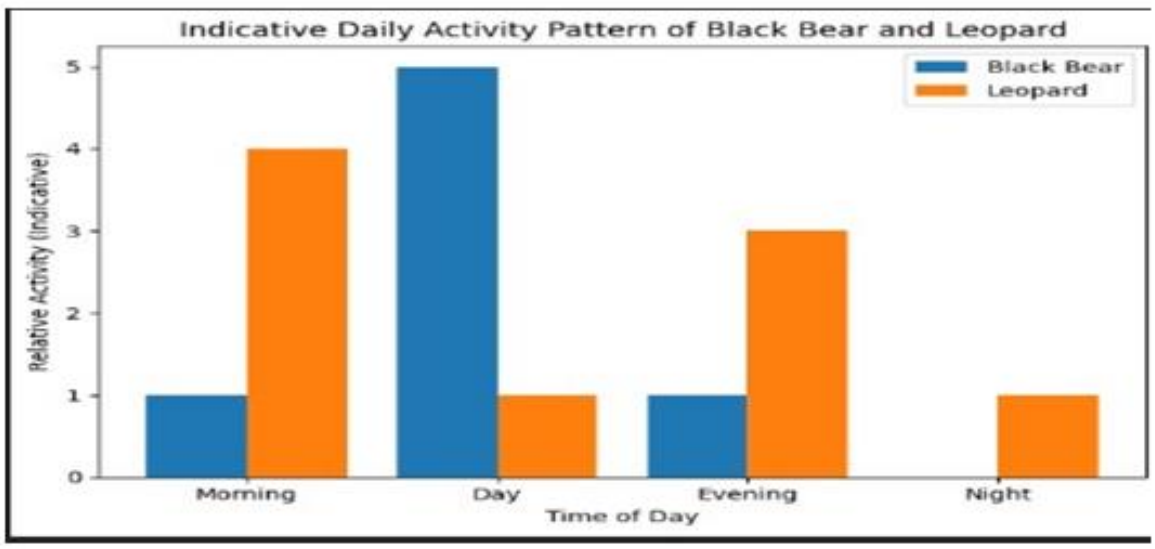


Graph Showing Deaths and injuries during last five years





Number of Problem Animals captured in Cages/Released during Last Five Years



Graph showing peak incident activity

Spatial Distribution and Conflict Hotspots

Systematic spatial analysis of incident data enabled the identification of recurring interaction hotspots, particularly those involving human injury or fatality. This mapping exercise has informed targeted deployment of response teams, prioritization of awareness programmes, and focused preventive planning. Within Shopian District, high frequency zones include Shopian, Keller, Zainpora, Chitragam, and Hermain, while in Pulwama District; prominent hotspots were identified in Pulwama, Rajpora, Tral, and Aripal. These areas are typically characterized by forest-edge settlements, fragmented habitats, intensive orchard cultivation, and active wildlife movement corridors. Administrative boundaries were strictly adhered to during hotspot delineation to ensure jurisdictional clarity and accountability.

Community Awareness and Informal Voluntary Support

Human–Wildlife Interaction management has been indirectly strengthened by growing community awareness and informal voluntary support. Certain local volunteers commonly referred to as the "MAC Brothers," operate on a purely voluntary basis. It is categorically clarified that these individuals have no formal designation, authority, or operational role within the Department of Wildlife Protection. Their involvement is limited to sharing real-time information and alerting Control Rooms regarding wildlife movement. While the Department does not rely on such volunteers for decision-making or enforcement, their contributions reflect increasing community awareness and shared responsibility, which are essential for long-term coexistence.





pics showing public awareness programs and field surveys being undertaken by Shopian division during Man animal conflict situations

Table shows list of items available for managing man animal conflict situations at Shopian division

S. No	Name of the Item
1	Tranquilizing Guns (Double Barrel / Single Barrel)
2	Capture Poles
3	Stun Guns
4	Monkey Guns
5	Capture Nets
6	Trail Cameras / Camera Traps
7	GPS
8	Snake Catchers / Reptile Tongs
9	Aluminium Folding Ladder
10	Manila Ropes
11	Rescue Safety Nets
12	Smart Sticks
13	Motor Cycle Helmet

14	Automating Trapping Cages with Bait Apartments
15	Automatic Trapping Cages
16	Poly Carbonate Shields
17	Snake Hooks
18	Snake Rescue Bags
19	Rescue Snake Gloves
20	Stretchers
21	Porcupine Nets
22	Fabricated Leopard Trapping Cages

Jurisdictional Clarification on Compensation on damage to properties

It is explicitly clarified that Wildlife Division Shopian has no role whatsoever in the assessment, verification, processing, or disbursement of compensation related to crop damage or livestock depredation. The Division does not maintain records of such claims and has never processed any case under compensation schemes, including the Pradhan Mantri Fasal Bima Yojana.

Case Study I (Notable Achievement) Rescue and Rehabilitation of a Female Leopard with Cubs Khangund Range (Pulwama District)

One of the most significant and well-documented Human–Wildlife Conflict (HWC) mitigation interventions in Wildlife Division Shopian was reported from the Khangund Range of Tral Wildlife Sanctuary, Pulwama District. The incident involved a female leopard (Panthera pardus) with three dependent cubs repeatedly sighted near human habitation, agricultural fields, and livestock areas, posing potential risks to both human safety and wildlife survival.
Considering the ecological sensitivity of the case particularly the need to preserve maternal bonding and prevent cub orphaning a carefully planned, science-based rescue operation was initiated. A multidisciplinary team comprising trained field staff, veterinary personnel, and rescue experts was mobilized, and the operation was conducted strictly in accordance with Standard Operating Procedures to ensure minimal stress and safe handling.

The female leopard and her cubs were safely tranquilized and shifted to the Rescue Centre at Hirpora, where they remained under continuous veterinary and behavioural observation for three days. Care protocols ensured that the cubs remained with their mother at all times. Following confirmation of stable health and normal maternal behaviour, the family was released into a suitable Protected Area under the direct supervision of the Wildlife Warden, Shopian. Post-release camera-trap monitoring confirmed successful acclimatization, normal movement patterns, and continued association between the mother and cubs, establishing this intervention as a benchmark in ethical wildlife management.

Photographic Documentation (Khangund Rescue) Rescue Centre, Hirpora: The rescued female leopard resting with her three cubs under close veterinary observation and care during the rehabilitation period.





Maternal Care at Rescue Facility: Visual documentation showing the intact mother–cub bond during temporary captivity, highlighting stress-minimized handling. The picture is also available above which shows post-release evidence: Camera-trap image confirming successful release and movement of the leopard in the natural habitat near the constructed shelter within the Protected Area.

Case Study II Leopard and Cubs Rescue Operation Sedow Area

A similar high-risk situation was reported from the Sedow area, where a female leopard with three cubs was frequently observed near human settlements. In view of the risk of accidental encounters and public panic, Wildlife Division Shopian responded promptly through its Control Room mechanism. Trained personnel were deployed to regulate public movement and secure the area, and the rescue was carried out using low-disturbance techniques. The animals were provided assisted feeding, stabilization, and low-stimulation housing to maintain maternal bonding, under continuous veterinary supervision. After behavioral assessment and habitat suitability evaluation, the leopard and her

cubs were released into an identified natural habitat. Post-release camera-trap evidence confirmed normal ranging behavior and intact family structure, demonstrating effective management of repeat conflict scenarios.

Photographic Documentation (Sedow Rescue Operation)



Camera-trap Confirmation at Release Site: Night-time camera-trap images capturing the female leopard with her cubs inside the natural shelter, confirming successful acclimatization and post-release presence in the willd.



On-site Care of Cubs: Wildlife staff providing assisted feeding and immediate care to the rescued leopard cub at Sedow, ensuring stabilization prior to release.



Temporary Holding and Monitoring: The rescued leopard housed in a secure cage with proper bedding and water during the short observation period before release, ensuring minimal stress and safety.



Cub Observation During Rescue Phase: Close-up documentation of a rescued leopard cub during temporary holding, reflecting healthy condition and careful handling prior to reunification and release.

Case Study IIIRescue, Treatment, and Release of an Asiatic Black Bear (Ursus thibetanus)

In another notable intervention, Wildlife Division Shopian rescued a severely weakened Asiatic black bear from the Tral area. The animal exhibited signs of exhaustion and malnutrition and required immediate medical attention.

Given the need for specialized veterinary care, the bear was transferred to Dachigam, where it underwent comprehensive treatment and post-treatment observation in accordance with established veterinary protocols. Upon full recovery and certification of fitness by authorized veterinary experts, the bear was released into a suitable natural habitat. This case highlights effective inter-divisional coordination and the Department's strong commitment to animal welfare, scientific management, and ethical conservation practices.

Conclusion and Way Forward

Experience from Wildlife Division Shopian demonstrates that coexistence-oriented conservation is achievable even in densely populated, resource-dependent landscapes. Timely response, scientific planning, non-invasive interventions, and sustained community engagement have been central to reducing risks and building public trust.

Future priorities include strengthening early-warning systems, expanding post release monitoring, protecting wildlife corridors, integrating GIS-based analytics, enhancing staff capacity, and adopting climate-resilient habitat management strategies. This documentation serves both as a record of achievements and as a dynamic framework for adaptive management, reaffirming the Department's commitment to conserving Jammu & Kashmir's wildlife alongside human well-being.

Comprehensive Data on Human Animal Conflict

Chapter 10

Mr. Altaf Hussain Dentoo
(Wildlife Warden Wetlands)

Introductory Context

Seriousness of Human–Wildlife Conflict Human–wildlife conflict (HWC) has emerged as a serious and persistent governance challenge in Budgam district. Rapid expansion of human habitations towards forest and its peripheries, coupled with changing land-use patterns, has significantly intensified the human–animal interface. Habitat fragmentation and the availability of anthropogenic food sources have resulted in frequent wildlife incursions into residential areas, necessitating continuous institutional response and structured mitigation planning.

Jurisdiction of the Wetland Division in Budgam.

The Wetland Division exercises jurisdiction over ecologically sensitive wetland systems and whole of the District Budgam Comprising of Tehsils Budgam, Beerwah, Chadoora, Khansahib, Khag, Charisharief (Charari Sharief), B.K. Pora, Narbal, and Magam, where forest edges, or chards, and human habitations converge. These transitional landscapes have become critical zones for human wildlife interactions. Mandated Role in Human Wildlife Conflict Management the Division is mandated to:

- Attend and manage reported HWC incidents.
- Deploy trained rapid response teams for rescue, tranquilization, and safe animal relocation.
- Coordinate with local administration, police, to ensure human safety.
- Interface of Forests, Orchards, and Human Habitations Budgam's mosaic of forests, orchards, Ravines and Gorges, and expanding settlements creates multiple conflict interfaces, particularly along forest wetland–habitation belts.

District/Tehsil wise Man- Wild Animal Conflict Hotspots of UT of Jammu and Kashmir based on conflict diaries related to recurring Human Deaths/Injuries (January 2020-December 2025).

Division	District	Tehsil	Hotspot Villages (with GPS locations if available)
Wetlands division Kashmir	Budgam	**Khag**	Khag 34° 0'32.68"N 74°32'15.66"E
		Beerwah	Atina Beerwah 34° 1'4.38"N 74°37'13.27"E
		Magam	Bandgam 34 3.497 N 74 38.774 E
		Beerwah	Hardumalapora 34 2.320 N 74 37.449 E
		Beerwah	Chewdara 34 1.746 N Shehpora 74 35.892 E
		Khan Sahib	Khan sahib 33 57.255 N 74 38.127 E
		Khan Sahib	Raiyar 33 53.325 N 74 37.687 E
		Budgam	Ompora 34 1.225 N 74 44.076 E
		Budgam	Mamath 33 59.786 74 42.890 E
		Chadoora	Loolipora 33 52.643 N 74 45.065 E
		Chadoora	Rangar/ Hushroo 33 56.529 N 74 46.149 E
		Char-I-Shareef	Nowhar 33 52.398 N 74 46.335 E
		Char-I-Shareef	Tilsara 33 51.602 N 74 45.721 E

Location of Existing/Proposed Control Rooms

District	Tehsil	Name of the Control Room	Location	Remarks
Srinagar	Shaltang	Divisional Control room Hokersar	34 6.711 N 74 43.218 E	Existing Control Room
Budgam	Beerwah	Control Room Beerwah	34 00.736 N 74 35.726 E	Proposed Control Room
Budgam	Chadoora	Control Room Chadoora	33 56.694 N 74 47.909 E	Proposed Control Room
Budgam	Budgam	Control Room Budgam	34 1.260 N 74 44.063 E	Proposed Control Room

Year wise abstract of Rescue and rehabilitation of Wild animals by the Wildlife Field functionaries of Wetlands Division Kashmir in last 10 years and this year up to ending 01/2026

S. No.	Year	Driven Back/ Safe passage (A)	Killed (B)	Dead (C)	Tranquilized/ Rescued (D)	Cages installed	Total A+B+C+D	Human Damage caused by Wild animals	
								No. of Deaths	No. of Injuries.
1.	2015-16	85	Nil	01	02	15	88	Nil	06
2.	2016-17	109	Nil	Nil	03	11	112	01	07
3.	2017-18	126	Nil	01	04	30	131	02	11
4.	2018-19	88	Nil	08	08	26	104	01	04
5.	2019-20	114	Nil	01	32	53	147	Nil	07
6.	2020-21	65	Nil	Nil	09	14	74	Nil	06
7.	2021-22	343	Nil	Nil	37	120	380	02	07
8.	2022-23	249	Nil	04	24	58	277	0	01
9.	2023-24	179	Nil	13	26	96	218	02	01
10.	2024-25	259	04	03	43	134	309	02	01
11.	2025-26 Up to ending 12/2025	**146**	**02**	**04**	**37**	**106**	**189**	Nil	02

Year wise detail of animal tranquilized in the jurisdiction of Wetlands Division

Year	No. of animals tranquilized		Total Animals Tranquilized
	Black Bear	Leopard	
2020-21	03	05	08
2021-22	01	10	11
2022-23	01	04	05
2023-24	01	06	07
2024-25	04	08	12
2025-26 up to 12/2025	04	Nil	04

Year wise abstract of Compensation Cases (Deaths/ Injuries) and status of compensation paid/ pending from the year 2014-15

	No. of Death Cases	No. of Injury cases	Compensation Paid		Amount of compensation paid	
			Death	Injuries	Death	Injuries
2014-15	0	5	0	5	0.00	1.15
2015-16	0	6	0	6	0.00	1.55
2016-17	1	7	1	7	3.00	3.30
2017-18	2	11	2	11	6.00	2.3228
2018-19	1	4	1	4	3.00	2.6750
2019-20	0	7	0	7	0.00	4.37
2020-21	0	6	0	6	0.00	3.31
2021-22	2	7	2	7	6.00	7.15
2022-23	0	1	0	1	0.00	1.00
2023-24	2	1	2	1	10.00	2.00
2024-25	2	1	2	1	10.00	2.00
2025-26	0	2	0	0	0.00	0.00
Total	**10**	**58**	**10**	**56**	**38.00**	**30.8278**

Information with respect to Human deaths & other damages due to conflict during last 10 years and the current year (2020-25)

Year	Human Deaths (May specify the species of wildlife in conflict	Human injuries (May specify the species of wildlife in conflict	Livestock Deaths (May specify the species of wildlife in conflict	livestock injuries (May specify the species of wildlife in conflict	Crop damage (May specify the species of wildlife in conflict)	Damage of property
2015-16	Nil	06 {Black Bear=03} {Leopard=03}	Nil	Nil	Nil	Nil
2016-17	01 {Black Bear=01}	07 {Black Bear=07}	Nil	Nil	Nil	Nil
2017-18	02 {Black Bear=01} {Leopard=01}	11 {Black Bear=11}	Nil	Nil	Nil	Nil
2018-19	01 {Leopard=01}	04 {Black Bear=04}	Nil	Nil	Nil	Nil
2019-20	Nil	07 {Black Bear=07}	Nil	Nil	Nil	Nil

2020-21	Nil	06 {Black Bear=01} {Leopard=05}	Nil	Nil	Nil	Nil
2021-22	02 {Leopard=02}	07 {Black Bear=07}	Nil	Nil	Nil	Nil
2022-23	Nil	01 {Leopard=01}	Nil	Nil	Nil	Nil
2023-24	02 {Leopard=02}	01 {Leopard=01}	Nil	Nil	Nil	Nil
2024-25	02 {Black Bear=01} {Leopard=01}	01 {Black Bear=01}	Nil	Nil	Nil	Nil
2025-26 up to ending 01/2026	Nil	02 {Black Bear=02}	Nil	Nil	Nil	Nil

Brief Note regarding the deaths reported by Wetlands Division, Kashmir Srinagar during the year 2024

1. Deceased namely Rakesh Kumar (4 Years) S/o Ajeet Kumar (Labourer working at Brick kiln 7HD, Najin, Beerwa) R/O Bhalua, Sabhri Bihar was attacked by Leopard on 30-09-2024 at about 8:30 P.M near Brick Kiln (7HD) Beerwah, Budgam and the dead body of the child was recovered at a distance of about 500 Mts from the place of incident.
2. Ghulam Ahmad Lone S/O Ghulam Mohd Lone R/O Check Mohalla, Sugen Yarinar, Tehsil: Khag, District: - Budgam was attacked and killed by Black Bear on 01-08-2024 at about 4:00 P.M near Nallah Dalnar (Forest area) when he was collecting grass for his cattle. Further, rescue squad of Man-animal conflict, Control Room immediately rushed to spot and have tacked cognizance of the case and authenticated that the deceased was killed by Black Bear.
3. Ms Rabia Nisar D/O Nisar Ahmad Dar R/O Samsan, Tehsil: Khan Sahib, District: - Budgam was attacked by Leopard on 11-03-2024 at about 7:3o P.M near her residential house premises at Samsan, Budgam. She was immediately taken to District Hospital Budgam by her relatives for necessary treatment. However, Doctors have declared her brought dead.
4. Ms Toiba Jan D/O Mushtaq Ahmad Khan R/O Hariwani, Tehsil: Khan Sahib, District: - Budgam was lifted by Leopard on 28-03-2024 at about 8:00

P.M near her residential house premises at Hariwani, Budgam. However, her dead body was recovered outside her village and was immediately taken to Sub District Hospital Khan Sahib where the Doctors have declared her brought dead.

Out of the four deaths, two have been reported during 2023-24 and the other two during 2024-25, the compensation in all cases has been disbursed during FY 2024-25

The initiatives taken by this Division to mitigate human-wildlife conflicts are as under

- Establishment of control Rooms (24x7) for tackling Man- wild animal conflicts and for the protection of the wild animals.
- Identification of Man Animal Conflict Hotspots for preventive measures
- Providing of tranquilizing equipment's/Tranquilizing medicines /Automatic cages/nets to the field staff dealing with Man Conflict situations so that Problematic animals can be tranquilized well in time and loss to the life and property can be averted.
- As and when massages are being received regarding roaming of wild animal in human habitations, rescue squads are being accordingly deputed to conflict spots for safe guarding the life and property of the people.
- Installation of Automatic Trapping Cages at required spots.
- Installation of camera traps
- Setting up of temporary rescue camps in case conflict is severe
- Regular surveillance and patrolling of the Man Animal conflict zone for identification, trapping and tranquilizing the wild animal involved
- In certain cases, due to close vicinity of the natural habitat the wild animal is driven away and given safe passage into his natural habitat.
- Training of frontline staff for tackling of Man- Wild situations so that loss to the life of people/wild animal can be minimized.
- Circulation of Do's and Don'ts through social/print/electronic media in order acquaint people that how to avoid Man-wild animal conflict incidents.
- Conducting of Awareness programmes in order to aware people how to safeguard themselves while conflict situations.

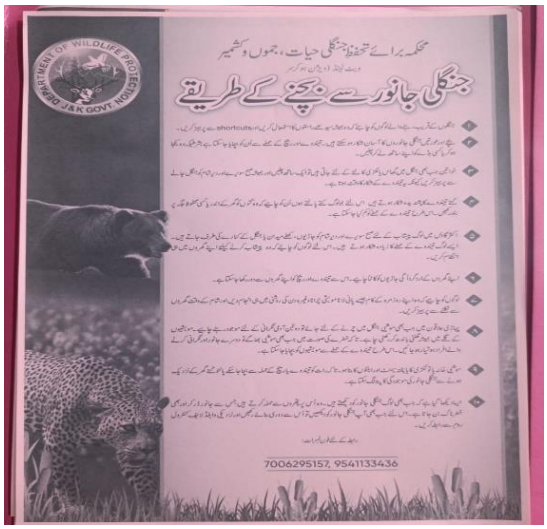
Reasons / Causes of Man-Wild Animal conflict

The rising levels of man-animal conflicts at various locations of District Budgam are due to close proximity between human habitations and wild habitat.

Animals involved are mainly leopards and black bears. Conflicts taking place inside populated areas owe to the presence of food availability in the form of dogs and growing conversion of agricultural lands into orchards.The data regarding human injuries and mortalities caused during conflicts in last few years indicate rising levels of man- wild animal conflicts in Budgam. The leopard and Asiatic black bear were mainly involved in causing several forms of conflict.

Following are the main major causes/threats of man-Wild animal conflicts

- The human population growth and expansion.
- Habitat degradation and fragmentation.
- Land use transformation.
- Increasing densities of livestock grazing in forest areas.
- Mismanagement of Solid waste.



AI-Driven Solutions for Mitigating Human-Animal Conflict

1. Contextual Observations

Human-animal conflict remains a pressing challenge across diverse landscapes, including wetlands, forest fringes, and peri-urban areas. The increasing overlap of human activity with wildlife habitats necessitates innovative, technology-driven interventions. AI-based solutions hold promise in strengthening early warning systems, predictive analytics, and real-time monitoring to reduce conflict incidents while safeguarding ecological integrity.

2. Scope of AI-Driven Solutions

The following areas are identified as priority domains for AI application

- **Predictive Modeling:** Use of GPS movement data, camera trap imagery, and historical conflict records to forecast potential conflict hotspots.
- **Early Warning Systems:** AI-enabled alerts based on sensor inputs (infrared, acoustic, vibration) and geo-tagged patrol reports.
- **Decision Support Tools:** Integration of datasets into AIKosh for training models that assist field staff in rapid response.
- **Community Engagement:** AI-driven communication platforms to disseminate timely advisories to local communities in vernacular languages.
- **Policy Integration:** Linking AI outputs with enforcement protocols under the Wildlife (Protection) Act, 1972 for legally sound interventions.

3. Access to Relevant Datasets

For effective training and validation of AI solutions, the following datasets are critical

- Camera traps images/videos (species identification, movement patterns).
- GPS collar data and patrol route logs.
- Historical incident records of conflict cases.
- Sensor-based datasets (infrared, vibration, acoustic).
- Geo-tagged field reports and community complaint registers.
- **Recommendation:** Establish a secure, centralized repository under AIKosh with standardized metadata protocols to ensure authenticity, interoperability, and controlled access.

4. Stakeholder Engagement

- States/UTs expressing interest in AI-driven conflict mitigation should be formally listed, with details of datasets offered and stage of engagement (Exploratory / Confirmed / Pilot-ready).
- Jury Panel nominations should include:
- MoEFCC representatives for policy oversight.
- State Forest/Wildlife Department officials for field-level perspectives.
- Autonomous bodies/research institutions for technical validation.
- Domain experts in wildlife ecology, GIS, and AI applications.

Photographs of Man Animal Conflict







Tackling Human Wildlife Conflict (North Division Sopore)

Chapter 11

Mr.Intisar Suhail
(Wildlife warden North)



Tackling Human Wildlife In North



Wildlife Division, Sopore

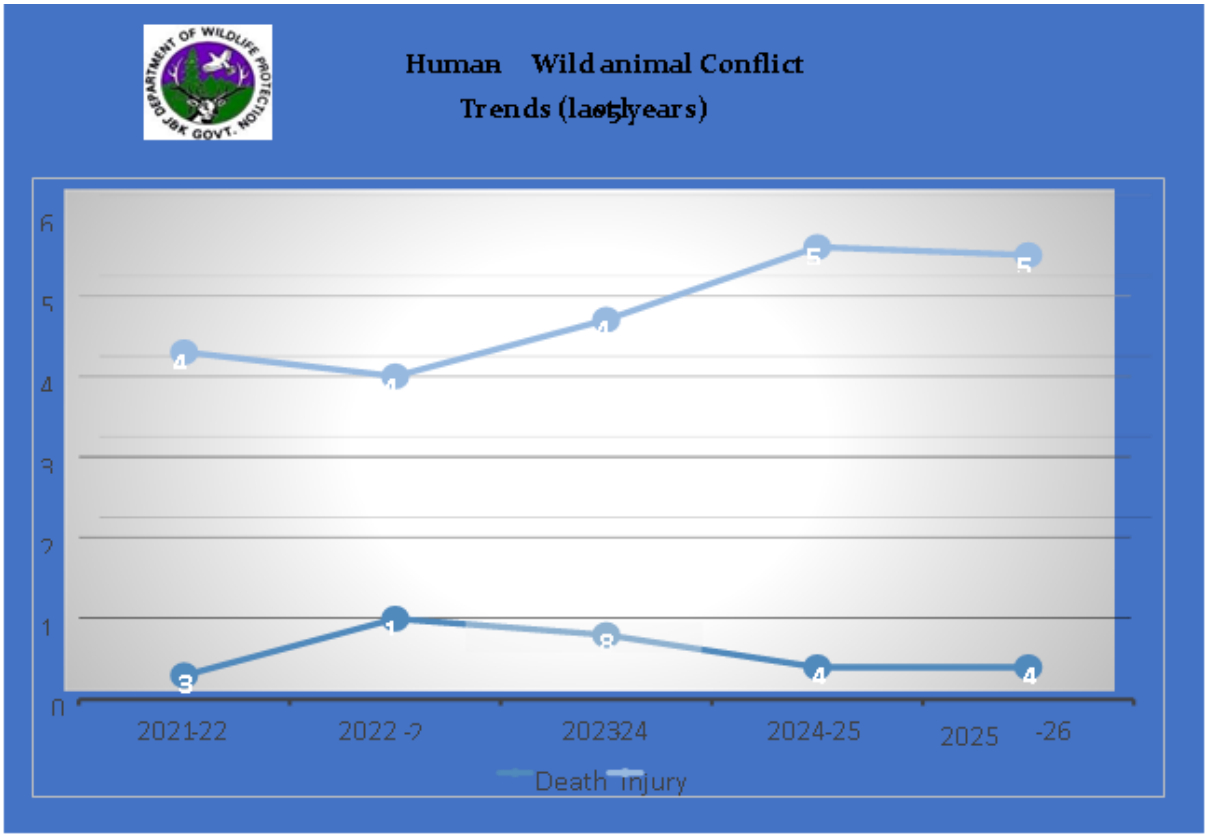
DEPARTMENT OF WILDLIFE PROTECTION J&K GOVT.

Wildlife Division, North Sopore

Three districts of north Kashmir namely Baramulla, Kupwara and Bandipora covering a geographical area of around 9000 sq km encompass a landscape characterized by a tapestry of Himalayan mountains, verdant valleys and dense coniferous forests dominated by Deodar, Fir, and Pine, interspersed with pristine water bodies like Jhelum, Kishanganga and Wular.

This region features rugged mountains, snow-capped peaks, lush meadows, and is home to rich biodiversity, making it a hub for wildlife and adventure. Contrasting the snowy high-altitude zones are the fertile lowlands with expanses of agriculture fields and orchards which sustain the lives and livelihoods of the 26 lakh souls inhabiting the region.

The area is home to **6** notified Wildlife Protected Areas (PAs) including **1** National Park, **3** Wildlife Sanctuaries & **2** Conservation Reserves, spread over two districts of Baramulla and Bandipora. Kupwara district, however, is unrepresented on the Protected Area Network. Almost all the major faunal elements of the Western Himalayas are represented in the PAs which include Markhor, Brown Bear, Black Bear, Musk deer, Goral, Leopard and Wolf. Wildlife Division, North Kashmir entrusted with managing the Wildlife Protected areas of North Kashmir also has the responsibility of managing and mitigating the Human-Wildlife Conflict in the three districts. Human-wildlife conflict is broadly defined as a “negative encounter between people and wild animals resulting in damage, injury, or death for either party, disrupting coexistence”. As per the fifteen-year data maintained by the Wildlife Protection Department, the effects of human-wildlife conflict have been severest in north Kashmir as compared to the other areas in Jammu & Kashmir.



Human-Wild animal Conflict Deaths/ Injuries (last 05 years)

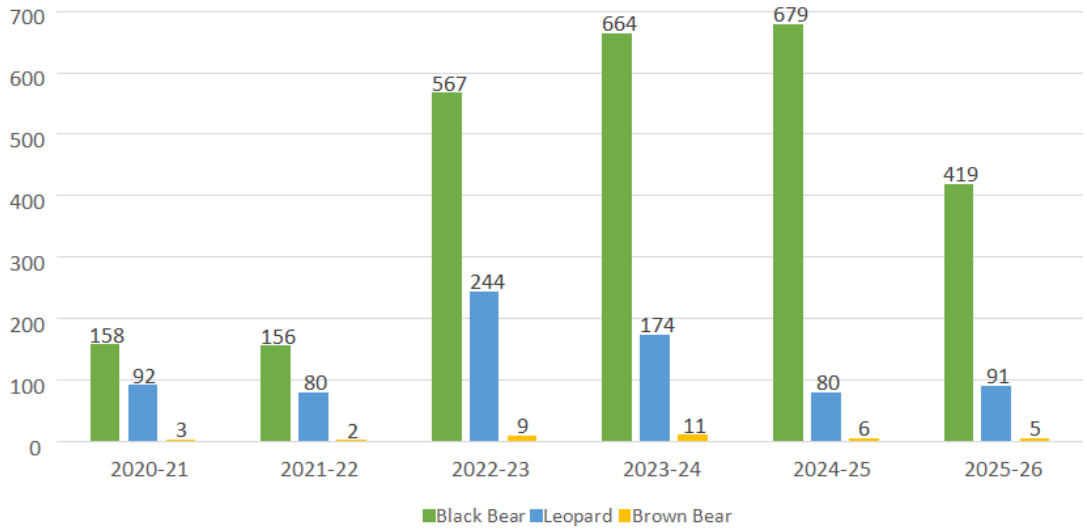
Year	No. of Human deaths	No. of Human injuries	Ex-gratia paid (in lakhs)
2021-22	3	43	16.00
2022-23	10	40	45.10
2023-24	8	47	54.05
2024-25	4	56	83.90
2025-26 (up to Dec 25)	4	55	18.15
Total	**29**	**241**	**217.2**

Human-Wild animal Conflict

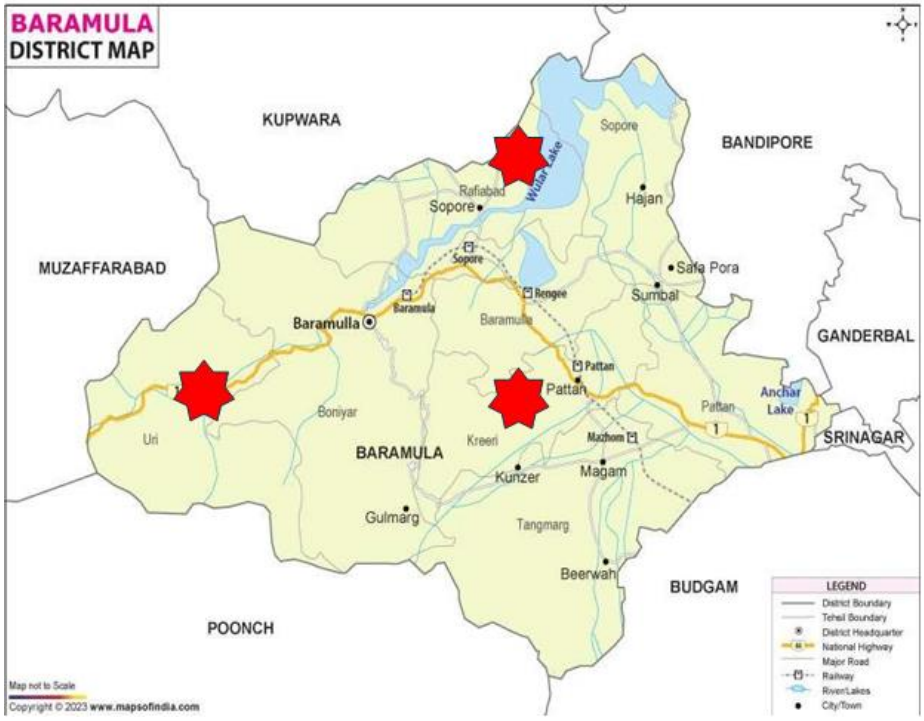
Details of Calls Received (last 06 years)

Year	Black Bear		Brown Bear		Leopard		Canids (Jackal/ Wolf/Fox)		Civet		Porcupine		Snake	
	Driven back	Captured & released	Driven back	Captured & released	Driven back	Captured & released	Driven back	Captured & released	Driven back	Captured & released	Driven back	Captured & released	Driven back	Captured & released
2020-21	109	49	03	00	82	10	01	00	09	05	11	08	00	00
2021-22	124	32	00	02	75	05	01	00	00	01	01	01	00	02
2022-23	503	64	04	05	227	17	17	05	08	07	27	15	01	18
2023-24	556	108	09	02	152	22	06	01	08	09	42	20	28	20
2024-25	579	100	04	02	62	18	15	01	11	07	36	22	16	47
2025-26	371	48	03	02	78	13	10	04	15	09	21	15	17	34
Total	2242	401	23	13	676	85	50	11	51	38	138	81	62	121
Calls	2643		36		761		61		89		219		183	
Total Calls attended: 3992														

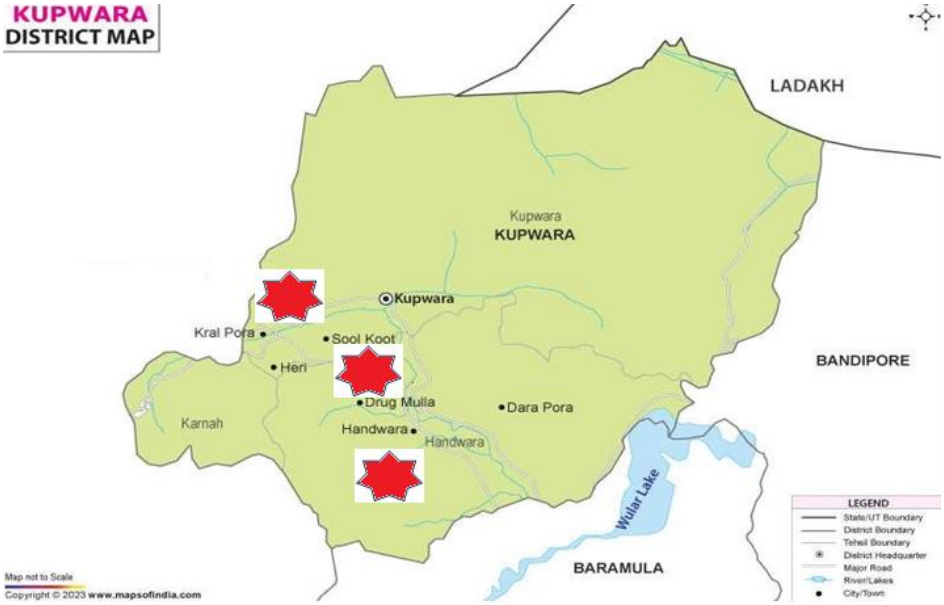
Human-Wild animal Conflict
Black Bear-Leopard-Brown Bear Calls Received
(Last 06 years)



(Hotspots: Baramulla)



The map illustrates the distinctive hotspots of human–animal conflict within the North Division, particularly in the Baramulla district, highlighting spatial clusters of recurrent incidents along forest fringes and settlement interfaces.



The map illustrates the distinctive hotspots of human–animal conflict within the North Division, particularly in the Kupwara district, highlighting spatial clusters of recurrent incidents along forest fringes and settlement interfaces

(Hotspots: Bandipora)



The map illustrates the distinctive hotspots of human–animal conflict within the North Division, particularly in the Bandipora district, highlighting spatial clusters of recurrent incidents along forest fringes and settlement interfaces.

Human-Wild Animal Conflict Details of Control Rooms & Equipment

S. No	Location	District	Staff		Equipment		
			Permanent	Casual	Tranquillizing Gun	Cages	Rescue Van
01	Division Office, Sopore	Baramulla	03	08	01	15	01
02	Range Office, Baramulla	Baramulla	02	15	01	10	00
03	Waterkhani, Dragmulla	Kupwara	05	06	01	06	00
04	Handwara	Kupwara	05	06	00	08	00
05	Langate	Kupwara	04	06	00	06	00
06	Range Office,Tangmarg	Baramulla	01	10	01	10	01
07	Chitternar,Bandipora	Bandipora	01	12	01	10	01
TOTAL			21	63	05	65	03

Human - Wild animal Conflict
In Pictures



Leopard rescued at Rashanpora, Kupwara



Black Bear atop a tree at Brat Kalan Sopore

Human-Wild animal Conflict in Pictures (North Division)



Black Bear recued at Baramulla



Installation of capture cage



Death of a Black Bear due to electrocution

Human-Wild animal Conflict In Pictures







Awareness Campaigns: Sensitizing Army personnel, College students & locals in Kupwara

Human-Wild animal Conflict
In Pictures



Awareness Campaigns: Educating School Children & Village Communities in Baramulla

Human-Wild animal Conflict In Pictures







Awareness Campaigns: Stake holder meetings with locals

Human–Wildlife Interaction Management in Wildlife Division South Bijbehara

Chapter 12

Mr. Sajad Ahmad Bhat
Wildlife Warden South

Human–Wildlife Interaction refers to the increasing incidences of conflict between human populations and wildlife in the region, primarily arising from overlapping habitats, competition for resources, and human encroachment into forested and wildlife areas. Such interactions often result in negative impacts on human life, livestock, property, and the environment. This conflict has emerged as a significant conservation and socio-economic issue in Kashmir, particularly in districts containing protected areas, wildlife sanctuaries, and forest landscapes.

Wildlife Division South occupies a particularly sensitive position within the Kashmir region. The Division functions as a transitional landscape where dense rural and semi-urban settlements closely interface with biologically rich forest ecosystems. Agricultural intensification, large-scale expansion of orchards, improved road connectivity, and continued dependence on forest resources for fuel wood, fodder, and grazing have substantially reduced the spatial separation between human habitations and wildlife habitats, leading to habitat loss and fragmentation.

Ecologically, the Division forms part of a broader landscape mosaic that facilitates seasonal movement and dispersal of wildlife between protected areas, forest patches, and adjoining habitats. Increasing habitat fragmentation has compelled wildlife to traverse human-dominated landscapes in search of food, shelter, and breeding opportunities. Although many such interactions remain non-confrontational, the likelihood of escalation into conflict is significant, with serious implications for human safety, wildlife conservation, and public perception of conservation institutions. Against this backdrop, the management of Human–Wildlife Interaction has emerged as a core operational priority for Wildlife Division South.

Ecological Characteristics and Drivers of Interaction

Wildlife Division South supports a diverse assemblage of large, wide-ranging mammals, notably the Common Leopard (*Panthera pardus*), Brown Bear

(*Ursus arctos*), and Asiatic Black Bear (*Ursus thibetanus*). These species possess high levels of behavioural plasticity and adaptive foraging behaviour, allowing them to survive in landscapes increasingly altered by human activity. Diminishing availability of natural food within forest interiors, together with easy access to agricultural crops, fruit orchards, and livestock along forest peripheries, frequently attracts wildlife towards human settlements.

Human–wildlife interactions in the Division are further shaped by socio-economic pressures, including rising human populations, outward expansion of habitation areas, shifts in land-use and agricultural practices, and enhanced connectivity through roads and transport networks. In parallel, climatic variability, including erratic snowfall, prolonged dry spells, and extreme weather events, alters habitat conditions and resource distribution, often forcing wildlife to move beyond traditional ranges. As a result, Human–Wildlife Interaction in Wildlife Division South constitutes a long-term, landscape-level management concern driven by cumulative land-use change, climate influences, and developmental activities, rather than isolated conflict events.

Scope, Methodology, and Purpose of Documentation

This document provides a consolidated overview of Human–Wildlife Interaction management undertaken by Wildlife Division South since the financial year 2020–21. The assessment adopts a mixed-method approach, drawing upon both quantitative datasets and qualitative field-based inputs. Key sources of information include Control Room registers, range-wise interaction records, wildlife rescue and response logs, veterinary intervention details, post-release tracking and monitoring notes, site inspection reports, and validated photographic and camera-trap documentation.

The Documentation has been Prepared with the Following Objectives

1. To identify and interpret spatial as well as temporal trends associated with Human–Wildlife Interaction;
2. To review the performance and outcomes of existing mitigation, rescue, and response measures; and
3. To record field-tested adaptive management practices and operational lessons.

   The document is intended to function as a knowledge resource for planners, decision-makers, researchers, and field functionaries involved in wildlife conflict mitigation and the advancement of coexistence-oriented conservation strategies in human-dominated landscapes.

Magnitude and Nature of Interaction Incidents

During the period from the financial year 2021–22 up to 2025–26 (till date), Wildlife Division South documented a total of 3,290 instances of Human Wildlife Interaction. These incidents encompassed a broad spectrum, including wildlife entering inhabited areas, animals becoming inadvertently trapped in human structures, and high-risk situations involving human injury or loss of life, as well as complex emergencies necessitating coordinated inter-departmental action.

A large share of these occurrences did not culminate in direct harm and were addressed through preventive and precautionary responses such as safely herding animals back into forest zones, managing public presence at incident sites, and issuing real-time advisories to local communities. The number of reported incidents is indicative not only of the ecological vulnerability of the landscape but also of improved detection and reporting facilitated by operational Control Rooms and heightened public engagement. Every reported case, irrespective of its eventual outcome, required swift evaluation and intervention, underscoring the continuous operational load borne by frontline wildlife staff.

Institutional Response Framework and Outcomes

To address the escalating challenge of Human–Wildlife Interaction, Wildlife Division South has instituted a structured, multi-tier response framework comprising Control Rooms, Rapid Response Teams, range-level field personnel, and dedicated veterinary units, operating round-the-clock in identified hotspot areas. Operations are guided by clearly defined Standard Operating Procedures, emphasizing human safety, animal welfare, non-invasive conflict mitigation, and rapid decision-making based on field conditions.

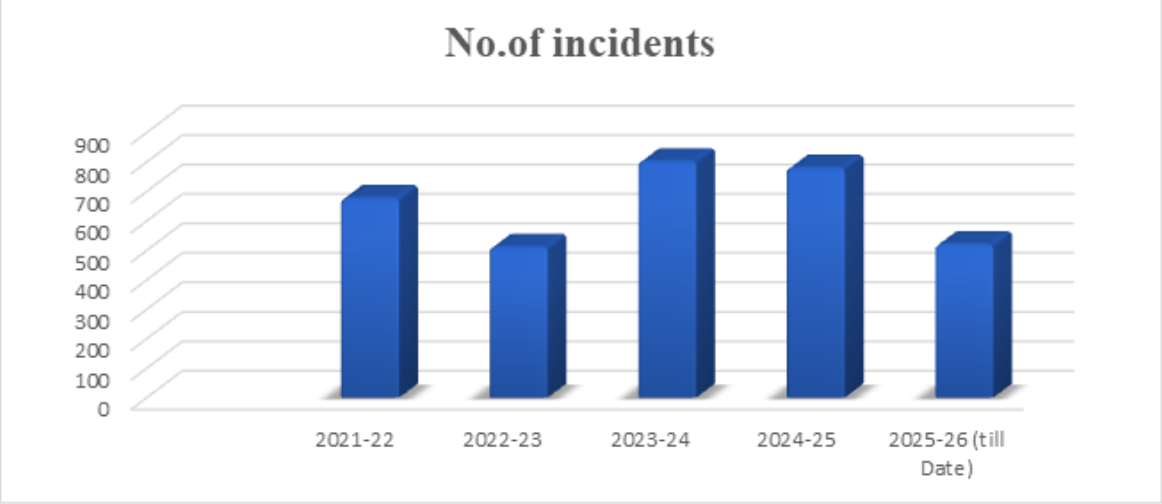
- During the reporting period, the Division undertook the following interventions:
  555 animals were safely trapped and translocate to suitable habitats;
- 102 animals were tranquilized and translocated under strict veterinary supervision, ensuring minimal stress and post-release survival;
- 3,290 incidents were effectively managed through non-invasive interventions such as guided movement, facilitation of safe passage, driving animals back into forested habitats, habitat-based redirection, and systematic crowd control;
- 819 cages were installed at identified vulnerable locations to prevent wildlife entry into human habitations and to facilitate safe capture where required.

Despite sustained mitigation and response efforts, seventeen human fatalities and one hundred twenty-six human injuries were recorded during the period. An amount of ₹143.93 lakh was disbursed as ex-gratia relief to affected families in accordance with prescribed government norms. In addition, regular coordination meetings, community awareness programmes, and inter-departmental collaboration with Police, Health, and Revenue authorities were undertaken to enhance preparedness and response efficiency. Collectively, these measures reflect strengthened institutional readiness, improved coordination across operational units, and an enhanced capacity to manage high-frequency Human–Wildlife Interaction scenarios in a humane, responsive, and scientifically informed manner.

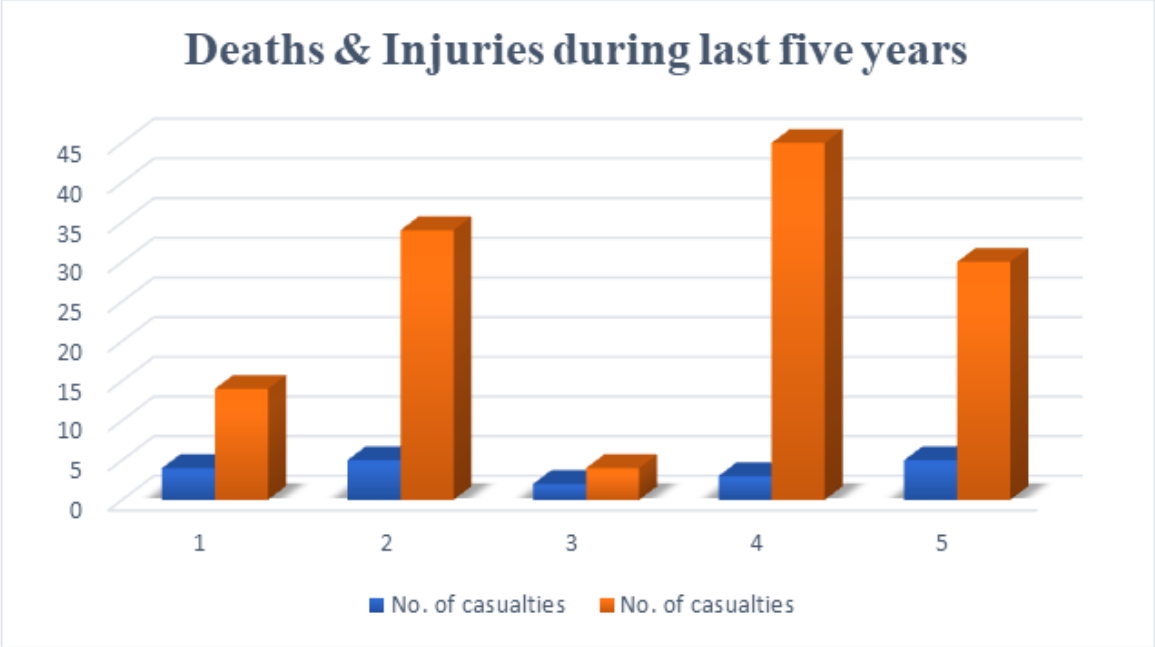
Table: Showing Human–Wildlife Interaction during last five years

S.No	Year	No.of incidents	No. of casualties	
			Death	Injury
1	2021-22	677	4	14
2	2022-23	511	5	34
3	2023-24	802	2	4
4	2024-25	780	3	45
5	2025-26 (till Date)	520	5	30

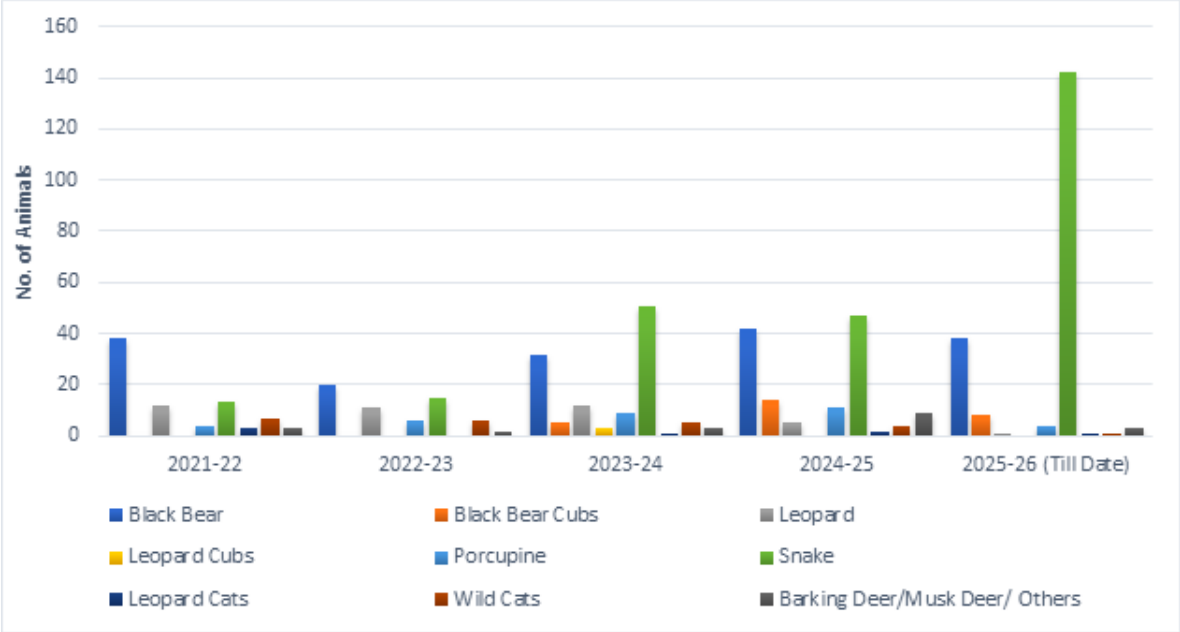
Facts, Figures and Tendencies



Graph showing No. of incidents during last years



Graph Showing Deaths and injuries during last five years

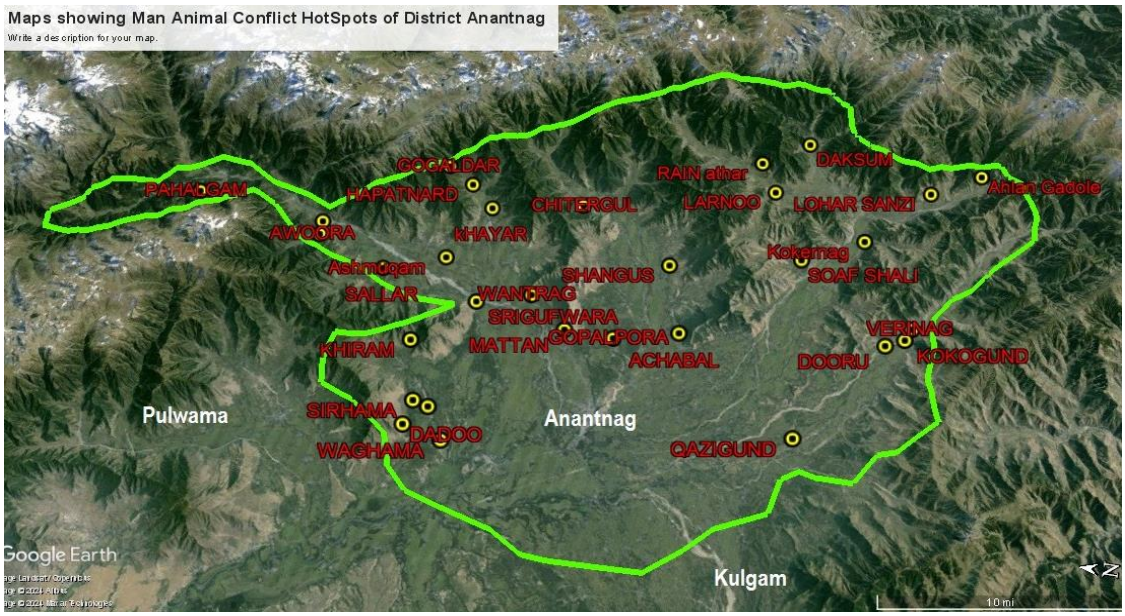


Graph Showing Animals Captured in Cages/Released during last five years

Spatial Distribution and Conflict Hotspots

Systematic spatial analysis of incident records enabled the identification of recurring Human–Wildlife Interaction hotspots, particularly locations associated with higher frequencies of human injury or fatality. This spatial mapping exercise has provided an evidence-based foundation for the targeted deployment of Rapid Response Teams, prioritisation of awareness and outreach

programmes, and formulation of focused preventive and mitigation strategies. Within Anantnag District, high-frequency interaction zones were identified in Gadool, Loharsanzi, Larnoo, Hapathnaar, Khayar, Gogaldar, Dandran, Badigam, Kharim Ashdar, Dadoo, Ahalan, Soaf Shali, Batgund, and Lowermunda. In Kulgam District, prominent hotspots were recorded in D.H. Pora, Nandmarg, H.M. Gori, Branal Lamer, Adigam, and Kund. These locations are predominantly characterised by forest-edge habitations, fragmented wildlife habitats, intensive orchard-based land use, and the presence of active wildlife movement corridors, which collectively increase the probability of interaction.
For the purpose of hotspot delineation and operational planning, administrative boundaries were strictly adhered to in order to maintain jurisdictional clarity, ensure accountability, and facilitate coordinated inter-agency response. The identified hotspots continue to guide area-specific interventions, seasonal preparedness planning, and allocation of resources.



Community Awareness and Informal Voluntary Support

Human–Wildlife Interaction management efforts have also been indirectly reinforced by increasing levels of community awareness and informal voluntary participation. In certain areas, local volunteers—commonly referred to as the "MAC Brothers"—have been active on a purely voluntary basis. It is categorically clarified that these individuals hold no formal designation, statutory authority, or operational role within the Department of Wildlife Protection.

Their involvement is limited strictly to sharing timely information and alerting Control Rooms regarding wildlife movement in their respective localities. While the Department does not depend on such volunteers for operational

decision-making, enforcement, or response actions, their role reflects growing public awareness and a sense of shared responsibility. Such community-level vigilance, when appropriately channelled, contributes positively to early warning, risk reduction, and the broader objective of fostering long-term human–wildlife coexistence.



Table shows Human Wildlife interaction equipment purchased

S No	Name of the Item
1	Tranquilizing Guns (Double Barrel / Single Barrel)
2	Capture Poles
3	Stun Guns
4	Monkey Guns
5	Capture Nets
6	Trail Cameras / Camera Traps
7	GPS
8	Snake Catchers / Reptile Tongs
9	Aluminum Folding Ladder
10	Manila Ropes
11	Rescue Safety Nets
12	Smart Sticks
13	Motor Cycle/ Helmet
14	Automating Trapping Cages with Bait Apartments
15	Automatic Trapping Cages
16	Poly Carbonate Shields
17	Snake Hooks
18	Snake Rescue Bags
19	Rescue Snake Gloves
20	Stretchers
21	Porcupine Nets
22	Fabricated Leopard Trapping Cages
24	Fabricated Bear cages

Jurisdictional Clarification on Compensation for Property Damage

It is explicitly clarified that Wildlife Division South has no role whatsoever in the assessment, verification, processing, or disbursement of compensation pertaining to damage to crops or loss of livestock. The Division does not maintain any records of such claims and has not processed any cases under compensation-related schemes, including the Pradhan Mantri Fasal Bima Yojana (PMFBY).

Conclusion and Way Forward

The analysis of Human–Wildlife Interaction in Wildlife Division South underscores that such interactions are no longer sporadic or isolated events but represent a persistent, landscape-level management challenge driven by habitat fragmentation, land-use change, climatic variability, and increasing human

presence along forest fringes. The consistently high volume of incidents, coupled with occasional human casualties and property damage, highlights the ecological sensitivity of the Division and the operational pressures faced by frontline wildlife personnel.

Notwithstanding these challenges, the structured response framework established by the Division—including functional Control Rooms, Rapid Response Teams, veterinary support, and clearly defined Standard Operating Procedures—has significantly enhanced preparedness and response capacity. The emphasis on non-invasive mitigation, rapid intervention, and coordinated inter-departmental action has contributed to effective management of the majority of incidents while prioritizing human safety and animal welfare.

Going forward, sustained efforts are required to further strengthen coexistence-based management approaches. Priority areas include refinement of spatial hotspot mapping using GIS-based tools, seasonal risk forecasting, expansion of community awareness programmes, and targeted interventions in high-conflict zones. Strengthening habitat management in forest-edge areas, improving early-warning mechanisms, and enhancing coordination with Revenue, Police, Health, and Disaster Management authorities will remain critical.

In parallel, continued capacity-building of field staff, augmentation of rescue and veterinary infrastructure, and systematic documentation of field experiences and best practices will be essential for adaptive management. Community engagement, while remaining informal and non-operational, should be encouraged in the form of timely information sharing and awareness, thereby fostering shared responsibility without compromising statutory roles.

In conclusion, effective management of Human–Wildlife Interaction in Wildlife Division South will depend on a balanced integration of ecological understanding, responsive governance, community awareness, and long-term landscape-level planning. The way forward lies in strengthening institutional resilience while promoting coexistence between human populations and wildlife in an increasingly shared environment.

Human–Wildlife Interaction Management in Wildlife (Central Division)

Chapter 13

Human–Wildlife Interaction Management in the Wildlife (Central Division), particularly in the areas of Dachigam and Ganderbal, remains a critical component of conservation governance in the region. Owing to the proximity of human settlements to forest boundaries and protected landscapes, especially around Dachigam National Park, incidents of wildlife movement into peripheral villages are periodically reported. Species such as leopards, Himalayan black bears, and other wild fauna frequently traverse these landscapes in search of food and habitat connectivity, leading to interactions with local communities. The Central Division, through coordinated efforts of field staff, Rapid Response Teams, and wildlife veterinarians, ensures timely response to distress calls, safe tranquilization where necessary, rescue of injured animals, and awareness programmes for community sensitization. In Ganderbal and adjoining areas, continuous monitoring of conflict-prone zones, habitat management, and public outreach initiatives has strengthened mitigation strategies, promoting a balanced approach between wildlife conservation and human safety.

The Data Pertaining Man Animal Conflict from Central Division as Received is below as under

Man- Wild Animal Conflict Diary of UT of Jammu and Kashmir January 2020-December 2025 (Central Division Srinagar)

Division	Total No. of conflict incidents	Total No. of Animals trapped and translocated	Total No. of Animals tranquilized and Translocated	Total No. of conflicts resolved (Safe passage given)	Total No. of persons killed /injured		Total No. of Locations cages installed	Total No of other aversive Techniques	Total No. of awareness drives conducted	Amount of Ex-gratia Paid In Lakhs	
					Death	Injury				Death	Injury
Wildlife Warden Central Division Srinagar	633	436	147	296	05	133	320		320	14.00	39.15
Total:	**633**	**436**	**147**	**296**	**05**	**133**	**320**		**320**	**14.00**	**39.15**

District/Tehsil wise Man- Wild Animal Conflict Hotspots of UT of Jammu and Kashmir based on conflict diaries related to recurring Human Deaths/Injuries (January 2020-December 2025). (Central Division)

Division	District	Tehsil	Hotspot Villages	(with GPS locations if available)
Wildlife Warden Central Division Srinagar	Srinagar	Hazratbal	Khimber	34 11 29 74 51 53
			Faquir Gujree	34 11 35 74 55 01
			Dardkhover	34 11 02 74 55 34
			Shahrasbal	34 10 13 74 54 45
			Mulnar	34 09 16 74 55 48
		Khanyar	Pahloo Brain	34 05 37 74 54 29
			Raj Bawan	34 04 56 74 52 20
			Golf Course	34 05 15 74 52 15
			Karan Mahal	34 04 36 74 51 10
	Ganderbal	Lar	Karnihama Lar	34 14.453 74 44.437
		Lar	Repora upper lar	34 25.591 74 74.294
		Lar	Chountwaliwar lar	34 27.976 74 75.820
		Kangan	Wani mohalla kangan	34 27.505 74 88.421
		Kangan	Anderwan kangan	34 30.442 74 81.167
		Ganderbal	Hadoora ganderbal	34 18.656 74 84.820
		Lar	Manigam	34 28.050 74 79.118
		Lar	Shah sahib qalander lar	34 15.346 74 45.068
		Kangan	Akhal kangan	34 25.037 74 90.935
	Pulwama	Pampore	Bhatten Khrew	34 03 47.184 75 01 22.458
			Mandakpal Ladhoo	33 59 51.02 74 59 37.08
	Srinagar	Panthachowk	Zawoora	34 03 0.50 74 55.280
			Army Camp Khonmoh	34 03 41.262 74 56 15.042

***A village or any other location shall be classified as a 'Conflict Hotspot' if, within a single year, it records five or more incidents of human–wildlife conflict, resulting in human fatalities or grievous injuries.**

When Conflict Breeds Contagion: Disease at Human Wildlife Interface

Chapter 14

Dr. Iyman Binti Fayaz,
Dr. Mohammad Mateen Zehgeer

Although humans and wild animals have coexisted for thousands of years, it is thought that increased anthropogenic activity in recent decades—such as changes in land use and population growth—has increased interactions between humans and wild vertebrates, increasing the risk of disease spill over to human population. In addition to altering natural landscapes, human activities like urbanization, deforestation, wildlife exploitation, tourism, and climate change brought on by human habitation of the planet act as catalysts for the emergence of zoonotic diseases, which raises the prevalence of zoonoses that are already well-known. Conflict between humans and wildlife arises when human aims negatively affect wildlife needs or when wildlife behaviour and needs negatively affect human aspirations. The coexistence of humans and wildlife is severely hampered by this, which frequently has negative effects on both parties. HWC (Human Wildlife Conflict) has a wide range of effects, including social, ecological, and economic ones (Dickman, 2010). Crop destruction, decreased farm production, grazing land competition, and animal predation are common causes of agricultural losses. In addition, Infrastructure damage, human injuries or deaths, and the transmission of zoonotic illnesses from wildlife impact the existing ecological balance. Furthermore, disputes frequently exacerbate unfavourable perceptions of conservation efforts, especially when protected areas are created or enlarged, causing tension between local residents and conservation projects (Daszak *et.al* 2000).

Global public health is seriously threatened by the rise of zoonotic diseases, especially those that come from wildlife. Wildlife species are a vast and unidentified reservoir for newly emerging infectious illnesses that can seriously endanger biodiversity and human health worldwide. About 75% of all newly discovered infectious diseases are caused by these pathogens, which are spread from animals to people, with 70% of them coming from wildlife. The growing prevalence and consequences of these illnesses highlight the critical need for thorough investigation and preventative actions to slow their spread. New viral diseases like severe acute respiratory syndrome (SARS), avian influenza A/H7N9, H5N1, Middle East respiratory syndrome (MERS), Nipah virus disease, Ebola haemorrhagic fever, Influenza A (H1N1) pandemic, and the

current COVID-19 disease have emerged as a result of the global increase in human-animal interfaces and the mixing of various animal species in human-dense markets. SARS, which was caused by SARS-CoV3, struck the world in 2002 (Syed *et.al* 2024). Ten years later, MERS coronavirus, another new corona virus that started in animals and spread to humans, emerged. The Ebola virus is another lethal zoonotic virus that is receiving a lot of attention from the global public health community. African nations have had numerous Ebola virus outbreaks over the past 40 years, with Case Fatality Rates ranging from 60% to 90%. (Lute*et al* 2016).

Spillover transmission primarily involves humans, animals and the environments with which they interact. Numerous methods exist for zoonotic diseases to propagate when there is a wildlife reservoir. Many zoonotic agents can be directly transferred from wildlife to people. For example, skin contact with a sick, dead, or infected rat or hare can transmit the tularemia-causing bacteria Francisella tularensis. However, the bites of an infected animal (saliva) spread the rabies virus. Rats transmit hantaviruses to humans by aerosols found in rodent waste dust.Hunting and butchering, bush meat markets, and the importation of live animals are some of the facets of the wildlife trade that offer remarkable chances for effective disease transmission from wildlife to humans(Holbrook, 2017). Zoonotic Viral Diseases including Human immunodeficiency virus/simian immunodeficiency virus-associated acquired immune deficiency syndrome AIDS is caused by two of the 26 strains of the simian immunodeficiency virus (SIV) that are present in African primates HIV-1 and HIV-2 originate from strains of chimpanzees (Pan troglodytes) and sooty mangabey (Cercocebus torquatus), respectively. According to available data and genetic research, the spread of these SIV strains to humans was rare, although it has happened at least seven times in the past century. On the Malaysian peninsula, a novel, extremely contagious respiratory and neurological disease in pigs caused by The Nipah virus was discovered between 1998 and 1999. Changes in animal reservoirs, such as arthropod vectors and microorganisms, brought about by urban expansion increase the danger of emergence, particularly with regard to the spread of environmental and tick-borne pathogens. It is believed that animals with zoonotic illnesses are more prevalent in metropolitan environments because they require more energy (Distefano, 2005). This is due to the fact that these creatures are drawn to cities by the wealth of food, warmth, and shelter. An increased risk of zoonotic diseases is linked to deforestation, which is a result of the growing human population (Inskip & Zimmermann 2009). One of the above-mentioned factors alone does not cause infectious diseases to spread; rather, a variety of human behaviours increase the likelihood of transmission(Gargili *et al.*, 2017)

Conclusion

Because of the intricate interplay between ecological, societal, and human behavioural elements, zoonotic illnesses continue to be a significant public health concern. It is important to understand how urbanization, deforestation, wildlife exploitation, and climate change have a significant impact on increasing zoonotic hazards. Both established and newly discovered zoonotic illnesses highlight the necessity of close monitoring and preventative control measures. The One Health approach, in particular, emphasizes the significance of striking a balance between animal welfare, environmental sustainability, and human health concerns when it comes to managing these diseases. To put it briefly, zoonotic diseases are infectious illnesses that humans can contract from wildlife, and precautions must be taken to avoid their effects.

Relief and Rehabilitation Mechanisms in Human–Wildlife Conflict

Chapter 15

Relief and rehabilitation mechanisms in human wildlife conflict refer to structured institutional measures designed to provide immediate assistance, financial compensation, and long-term livelihood support to individuals and communities affected by wildlife-related damage, injury, or loss. These mechanisms in the context of human wildlife conflict represent an essential pillar of modern conservation governance, designed to mitigate the socio-economic and humanitarian impacts arising from wildlife-related incidents. With increasing habitat fragmentation, land-use transformation, and human encroachment into natural ecosystems, communities residing along forest fringes and in conflict-prone landscapes are disproportionately affected through loss of life, bodily injury, crop damage, livestock depredation, and destruction of property. In such circumstances, well-structured relief frameworks comprising compensation schemes, ex gratia assistance, medical aid, livelihood restoration measures, and community-based rehabilitation initiatives function not merely as financial redress systems but also as strategic instruments for fostering public confidence and discouraging retaliatory actions against wildlife. The timely and transparent implementation of these measures reinforces institutional credibility, advances principles of coexistence, and aligns biodiversity conservation goals with social equity and community welfare objectives.

Compensation for victims of human wildlife conflict is a very critical component of wildlife management and community engagement, especially in regions like the Kashmir Valley, where frequent interactions between humans and species such as leopards, Asiatic black bears, wild boars, monkeys, and occasionally Hangul deer lead to livestock loss, crop damage, property destruction, and sometimes human injury or fatalities. The importance of compensation lies in reducing retaliatory killings of wildlife, promoting coexistence, building trust between local communities and forest authorities, and encouraging timely reporting of conflict incidents. In Kashmir, the procedure for claiming compensation typically begins with the victim submitting a written report to the local Forest Range Office or Wildlife Department, detailing the nature of the incident, date, location, species involved, and extent of loss, often supported by photographs, eyewitness accounts, or veterinary certification in the case of livestock. The officials then conduct a field verification to assess the damage, verify the species responsible (using

pugmarks, camera traps, or direct evidence), and evaluate the monetary value based on standard government rates for livestock, crops, or property loss. Once verified, a recommendation is sent to the higher authorities, such as the Divisional Forest Officer or Conservator of Forests, for sanctioning the payment. Rules stipulate that compensation is often limited to officially recognized losses, with specific rates for cattle, sheep, goats, orchards, and crops, and usually excludes losses arising from negligence, poor animal husbandry, or unprotected storage of crops. The scheme also emphasizes timely payment, as delays reduce trust and may encourage illegal retaliatory actions against wildlife. In Kashmir, compensation is particularly important due to the region's high forest–human interface, rugged terrain that increases the likelihood of animal entry into villages, and the economic dependence of local communities on livestock and orchards, making losses more impactful. By ensuring fair and efficient compensation, authorities not only mitigate economic hardship but also strengthen local cooperation, enhance reporting of wildlife incidents, and support conservation objectives by preventing harm to protected species. The criteria and mechanism for operating compensation for victims of man–animal conflict in Kashmir are designed to provide timely relief to affected communities while promoting coexistence with wildlife.

The compensation and ex gratia framework for human–wildlife conflict in Jammu & Kashmir operates under clearly defined criteria and procedural safeguards to ensure transparency, accountability, and timely relief to affected individuals. Compensation is provided for specific categories of loss, including livestock predation (death or injury of cattle, sheep, goats, horses, etc.), crop damage caused primarily by herbivorous wildlife such as wild boars, monkeys, and deer, human injuries or fatalities resulting from wildlife attacks, and property damage to houses, sheds, or related structures directly attributable to wild animals. Eligibility is restricted to incidents caused by recognized wild or protected species—such as leopards, bears, Hangul, wild boars, and monkeys while losses caused by domestic animals, stray dogs, or unverified species are generally excluded. The scheme also considers the adoption of reasonable preventive measures; claims may be declined where negligence is established, such as failure to secure livestock in predator-proof enclosures or to protect crops through basic safeguarding measures. Applicants are required to submit a formal complaint to the concerned Forest Range Office or Wildlife Department, supported by documentary evidence including photographs, veterinary certificates, witness statements, or crop valuation records.

Upon receipt of a complaint, wildlife or forest officials conduct a field verification to confirm the incident, examining pugmarks, scat, feeding patterns, camera trap evidence, and other forensic indicators to ascertain the species responsible. The extent of loss is then assessed in accordance with government-

prescribed rates, while ex gratia payments for human injury or death are determined based on the severity of harm and statutory norms. Following verification, the Range Officer or Divisional Forest Officer submits a recommendation for sanction by the competent authority, typically the Conservator of Forests or Chief Wildlife Warden. Once approved, compensation or ex gratia relief is disbursed through official banking or treasury channels, with emphasis on prompt payment to prevent retaliatory actions against wildlife. All incidents and payments are systematically recorded in official databases to facilitate mapping of conflict hotspots, strategic deployment of Rapid Response Teams, and formulation of long-term mitigation measures.

In the Kashmir Valley, where dense forest interfaces, extensive orchards, and rugged terrain contribute to frequent human–wildlife interactions, the compensation mechanism serves not only as economic relief but also as a critical confidence-building measure between communities and conservation authorities. The scheme is presently governed by Government Order No. 139-JK (FST) of 2023 dated 28.06.2023, issued by the Forest, Ecology & Environment Department, which revised and enhanced earlier relief norms. Under the updated structure, compensation for death or permanent disability due to wildlife attacks has been significantly increased—reportedly up to approximately ₹5 lakh—while grievous injuries attract relief of around ₹2 lakh and minor injuries approximately ₹25,000. These revisions align the Union Territory's relief framework with centrally supported standards and respond to the rising incidence of conflict. Notably, between 2023–24 and 2024–25, a cumulative amount of ₹2.76 crore was disbursed as compensation and ex gratia relief to affected families. The enhanced provisions reflect a deliberate policy shift aimed at encouraging transparent reporting, reducing retaliatory harm to wildlife, and promoting sustainable coexistence, while recognizing both the economic and emotional impact borne by affected communities.

This mechanism of providing relief and rehabilitation constitute a cornerstone of effective human–wildlife conflict management, seamlessly integrating conservation objectives with community welfare. Through the provision of timely compensation, medical assistance, livelihood support, and structured rehabilitation measures, these frameworks alleviate the immediate socio-economic burdens on affected households while enhancing public confidence in wildlife governance. Beyond addressing financial losses, such mechanisms uphold principles of social equity, strengthen community resilience, and reduce retaliatory actions against wildlife. A transparent, efficient, and responsive relief system not only reinforces coexistence strategies but also ensures that conservation initiatives are implemented in a manner that aligns with human safety, dignity, and long-term socio-economic sustainability.

Relief and rehabilitation mechanisms in the context of human animal conflict in Kashmir play a vital role in balancing the dual objectives of wildlife conservation and community welfare. By providing timely compensation, medical assistance, and support for livelihood restoration, these measures address the immediate socio-economic and emotional impacts of conflict incidents on affected families. They also serve as essential tools for building public trust in conservation authorities, fostering resilience among vulnerable communities, and discouraging retaliatory actions against wildlife. When implemented transparently and efficiently, such mechanisms not only mitigate losses but also strengthen coexistence strategies, ensuring that conservation goals are pursued in harmony with human safety, dignity, and long-term socio-economic stability in the region.

Table Shows Division-wise detail of number of human causalities reported during the last five years is given under

Year	Division	No. of Deaths	No. of Injuries	Compensation Paid (Rs. in lacs)	
				Death	Injury
2021-22	Central	2	11	6.00	12.15
	North	3	43	3.00	13.00
	South	4	14	15.00	16.79
	Shopian	1	18	6.00	11.91
	Wetlands	2	7	6.00	7.15
	Total:	**12**	**93**	**36.00**	**61.00**
2022-23	Central	0	10	0	6.60
	North	10	40	36.00	9.10
	South	5	34	15.05	8.00
	Shopian	0	14	0	17.90
	Wetlands	0	1	0	1.00
	Total:	**15**	**99**	**51.05**	**42.60**
2023-24	Central	0	8	0	9.40
	North	7	54	29.50	24.55
	South	2	4	8.50	7.00
	Shopian	0	22	2.00	12.82
	Wetlands	2	1	10.00	2.00
	Total:	**11**	**89**	**50.00**	**55.77**
2024-25	Central	1	18	5.00	11.25
	North	6	62	54.40	29.50
	South	2	34	9.50	13.55
	Shopian	1	9	6.00	19.25
	Wetlands	2	1	10.00	2.00

	Total:	**12**	**124**	**84.90**	**75.55**
2025-26 till date	Central	0	21	0	8.50
	North	4	116	10.00	18.15
	South	5	59	5.00	45.09
	Shopian	1	38	0.50	9.25
	Wetlands	0	2	0	2.00
	Total:	**10**	**236**	**15.50**	**82.99**

The table below presents a division-wise summary of human casualties including deaths and injuries reported in Kashmir over the past five years due to human–animal conflict. It also details the corresponding ex-gratia and compensation payments disbursed to affected individuals, reflecting the efforts of the Department of wildfe protection kashmir in providing timely relief and support.

Government of Jammu and Kashmir
Forest, Ecology & Environment Department
Civil Secretariat, Jammu/Srinagar.
*****

Subject: **Enhancement of ex-gratia relief to the victims of human-wildlife conflict.**

Reference: (i) Minutes of the 4th meeting of the Wildlife Board for Union Territory of Jammu and Kashmir held at Srinagar on 06.06.2023, issued vide endorsement No.WLP/Tech/2023/274-98, dated 16.06.2023.

(ii) Letter No. CWW-Estb/114/2023-03/692, dated 20.06.2023, from PCCF(WL)/Chief Wildlife Warden, J&K.

Government Order No.: 139-JK(FST) of 2023
Dated: 28 /06/2023

In supersession of Government Order No. 244-FST of 2014, dated 23.07.2014, sanction is hereby accorded to enhancement of ex-gratia relief on account of death/incapacitation/ injury caused to human life by wild animals during man-animal conflicts. The revised rate of ex-gratia relief now payable to the victims shall be as per the following description:

S.No	Category of cases	Rate of ex-gratia relief
(a)	Death Permanent incapacitation	Rs. 5,00,000/-
(b)	Grievous Injury (an injury which may not result in permanent disability but requires hospitalization for more than 48 hours for recovering from the injury)	Rs. 2,00,000/-
(c)	Minor injury (an injury which is of First Aid nature or which does not require hospitalization for duration more than 48 hours)	Cost of treatment upto Rs.25,000/-

The current compensation and relief framework for human–wildlife conflict in Jammu & Kashmir is governed by **Government Order No. 139-JK (FST) of 2023**, issued on 28 June 2023 by the Forest, Ecology & Environment Department has been a big relief for victims. This order revised and enhanced the previous norms to provide more substantial and equitable support to individuals affected by wildlife-related incidents. Under the updated provisions, victims who suffer death or permanent disability as a result of wildlife attacks are now entitled to compensation of up to approximately **₹5 lakh**, reflecting a significant increase from earlier rates. Individuals sustaining grievous injuries receive relief of around **₹2 lakh**, while those with minor injuries are eligible for approximately **₹25,000**. These enhancements aim not only to provide timely financial support for affected families but also to encourage reporting of incidents, reduce retaliatory harm to wildlife, and strengthen the broader human–wildlife conflict management framework in the region.

Image show Government Order No. 139-JK (FST) of 2023 significantly revised and enhanced the ex-gratia compensation framework for human–wildlife conflict victims in Jammu & Kashmir, ensuring greater financial relief and equitable support













Images depicting victims of human–wildlife conflict, highlighting the physical impact and seriousness of wild animal attacks on affected individuals.

Awareness, Advocacy, and Community Mobilization in Wildlife Conflict Prevention

Chapter 16

Man animal conflict as we all know refers to the negative interactions between humans and wildlife resulting in losses to human life, damage to property, and retaliatory harm to animals. In the Kashmir Valley, a landscape of rich biodiversity and dense human settlement, these conflicts have grown increasingly complex due to habitat fragmentation, expanding agriculture, steep terrain, and cultural patterns of forest use. Awareness programs are extremely crucial in mitigating conflict by promoting coexistence, informed response, and local stewardship. Awareness programmes and community sensitization form the backbone of any effective strategy to mitigate man–animal conflict, particularly in ecologically sensitive and densely inhabited regions such as the Kashmir Valley. Man–animal conflict in Kashmir is not merely an ecological issue but a social, economic, and psychological one that directly affects the daily lives of villagers, farmers, herders, and forest-dependent communities. The Valley's unique topography marked by thick forests, orchards, agricultural fields, mountainous terrain, and human habitations located in close proximity to wildlife habitats creates frequent zones of interaction between humans and animals such as the Himalayan black bear, leopard, wild boar, and other species. As natural habitats shrink and food availability within forests declines due to anthropogenic pressures, wildlife increasingly ventures into human settlements, leading to crop damage, livestock predation, injuries, and sometimes fatalities. In this context, awareness programmes are not supplementary measures but essential tools that aim to equip communities with knowledge, preparedness, and a sense of shared responsibility towards coexistence.

Context of Man–Animal Conflict in Kashmir Valley

Nestled within the northwestern Himalaya, the Kashmir Valley represents a complex socio-ecological landscape shaped by alpine massifs, contiguous temperate forests, fluvial networks, and intensively cultivated plains. This mosaic of habitats sustains a diverse faunal community, including the Himalayan black bear, common leopard, wild boar, Himalayan ibex, and a rich assemblage of resident and migratory bird species, underscoring the Valley's ecological significance and conservation value. Yet, accelerating demographic pressures, spatial expansion of human settlements, agricultural intensification, progressive habitat fragmentation, and climate-induced ecological shifts have reconfigured traditional wildlife ranges. These transformations have narrowed

the interface between human and wild spaces, thereby amplifying the frequency, intensity, and socio-economic consequences of human–wildlife conflict in the region. These encounters manifest as crop damage, livestock predation, human injuries and fatalities, property loss, and economic and psychological distress for local communities. In this context, awareness programs have emerged as a critical tool for mitigating conflict and promoting coexistence. Such programs aim to educate communities about wildlife behavior, ecological roles, and safe practices, while fostering proactive engagement in conservation and conflict reporting. By integrating education through schools, village workshops, media campaigns, and field demonstrations, these initiatives help build local capacity, encourage responsible behavior, and reduce retaliatory actions such as poaching, poisoning, or habitat destruction. Furthermore, awareness programs play a vital role in establishing trust and collaboration between residents, government authorities, and conservation organizations, thereby creating a participatory framework for sustainable conflict management. In the Kashmir Valley, where human–wildlife interactions are both frequent and complex, these programs not only serve as preventive and educational measures but also underpin broader strategies for ecological stewardship, community resilience, and long-term coexistence.

Awareness programs are structured and systematic initiatives aimed at educating, informing, and sensitizing communities about critical issues, with a particular focus here on the dynamics, causes, and management of human–animal conflict. These programs are designed to increase public understanding of wildlife behavior, ecological roles, and the underlying factors that drive interactions between humans and animals. By enhancing knowledge, they promote safe practices that minimize the risk of conflict, such as proper livestock management, crop protection measures, and cautious behavior in forested or wildlife-prone areas. In addition to fostering preventive measures, awareness programs encourage active community participation in conservation efforts, early reporting of wildlife incidents, and collaboration with government authorities and conservation organizations. They also play a vital role in building trust and cooperation between local communities, wildlife management agencies, and non-governmental conservation stakeholders, thereby creating a foundation for sustainable coexistence (Hill, 2004). These initiatives are delivered through multiple channels, including educational interventions in schools, community meetings and workshops, media campaigns via radio, television, and social media, as well as direct field engagement and demonstration activities, ensuring that the message reaches diverse audiences effectively and encourages meaningful participation in wildlife conflict mitigation.

Effective awareness programmes in the context of human–wildlife conflict are designed to achieve multiple interrelated objectives that strengthen coexistence and community resilience. Primarily, such initiatives aim to enhance public knowledge by disseminating accurate and science-based information about wildlife species, their habitats, behavioral patterns, and the ecological factors underlying conflict incidents. Beyond information dissemination, these programmes seek to transform attitudes by fostering a shift from fear, hostility, and retaliatory tendencies toward a culture of coexistence, shared stewardship, and ecological responsibility. A further objective is to promote safe and preventive practices, including livestock protection measures, crop-guarding techniques, safe conduct during wildlife encounters, and adherence to reporting protocols. Awareness efforts also endeavor to strengthen local capacity by empowering communities to participate in wildlife monitoring, data collection, and conflict mitigation strategies. Importantly, they facilitate constructive policy dialogue by amplifying community perspectives and integrating grassroots experiences into governance and conservation frameworks (Hockings and Humle 2009).

The key components of such programmes typically encompass education, outreach, media engagement, and stakeholder collaboration. Educational interventions include integration of wildlife conservation themes into school curricula, establishment of wildlife clubs, and organization of storytelling sessions, debates, and art competitions to cultivate ecological sensitivity among young learners. Community-level workshops and village seminars focus on conflict prevention strategies, early-warning systems, emergency response protocols, and compensation procedures. Printed informational materials—such as leaflets, posters, and practical manuals in local languages including Kashmiri and Urdu—serve as accessible reference tools explaining animal behaviour and safety measures. Media and technology further amplify outreach through radio and television campaigns tailored to rural audiences, as well as social media initiatives featuring short videos, info graphics, and awareness messages adapted for diverse demographic groups. In conflict-prone areas, mobile-based early-warning alerts regarding leopard or bear sightings provide timely information to enhance preparedness and reduce risk (Gore *et.al* 2006). Equally critical is stakeholder engagement: Forest and Wildlife Departments conduct training for Rapid Response Teams and disseminate information on compensation mechanisms, local leaders and Panchayats mobilize community participation and oversight and non-governmental and conservation organizations contribute through workshops, resource mobilization, and monitoring support. Collectively, these components create a comprehensive framework for sustainable conflict mitigation and community-based conservation (Habib*et.al* 2015).

Public outreach initiatives in the Kashmir Valley are strategically designed to cultivate informed coexistence by enhancing community understanding of wildlife ecology, behavioral dynamics, and evidence-based conflict mitigation practices. A significant proportion of conflict incidents intensify not merely because of animal presence, but due to fear-driven reactions, misinformation, and limited awareness of species-specific behavioral responses under stress. For instance, seasonal foraging patterns draw bears into orchards during peak fruiting periods, while leopards are often attracted to peri-urban spaces in pursuit of feral or stray dogs. In the absence of structured awareness, such encounters frequently trigger impulsive crowd behavior that escalates risk for both humans and wildlife. Through systematically coordinated campaigns led by the Wildlife Department, field biologists, veterinarians, &conservation stakeholders, local communities are sensitized to ecological drivers of animal movement, early indicators of wildlife presence, and scientifically recommended response protocols that prioritize safety, restraint, and non-retaliatory action (Baynham*et.al* 2018).

Community awareness in Kashmir also focuses on preventive practices that reduce the likelihood of wildlife entering settlements. Villagers are encouraged to adopt livestock protection measures such as constructing predator-proof sheds, using proper night enclosures, and avoiding open grazing near forest fringes during vulnerable hours. Farmers are sensitized to the use of crop protection techniques, timely harvesting, fencing, and night vigilance during seasons when wild boar and bears are known to raid fields. Awareness sessions often stress the importance of proper waste disposal, as food waste and leftover crops near houses attract animals into residential areas. These practical behavioural changes, when adopted collectively by a community, significantly reduce opportunities for conflict.

A crucial component of awareness programmes in the Valley is education at the school level. Schools serve as effective platforms for instilling long-term understanding of wildlife conservation and coexistence among children, who in turn influence their families. Wildlife clubs, painting competitions, debates, and interactive sessions with wildlife officials help young students understand the ecological role of animals and the importance of responding responsibly during encounters. Over time, such education creates a generation that is less fearful and more informed about wildlife behavior, which indirectly contributes to reducing conflict situations.

Media and communication channels have also become important tools for spreading awareness in Kashmir. Local radio broadcasts, television programmes, social media messages, and printed posters in Kashmiri and Urdu languages disseminate safety guidelines and advisories during peak conflict

seasons. In many areas, mobile messaging groups and WhatsApp networks have been created where villagers share real-time information about wildlife sightings, enabling timely response from the Wildlife Department and alerting nearby residents to take precautions. This form of community-based information sharing has proven effective in preventing surprise encounters and panic.

Another important aspect of community awareness is building trust between local populations and wildlife authorities. Often, resentment against wildlife arises not only from losses but also from delays in compensation and lack of communication with officials. When people are aware that there are formal systems to address their grievances and losses, they are less likely to resort to retaliatory actions such as poisoning or harming animals. Dialogue-based workshops involving village elders, panchayat members, and wildlife officials help bridge this trust gap and encourage collaborative conflict management. Despite these efforts, awareness programmes in Kashmir face several challenges, including difficult terrain, scattered settlements, limited resources, and varying literacy levels among rural populations. Cultural beliefs, fear of wild animals, and deeply rooted perceptions of wildlife as threats can also hinder the effectiveness of awareness messages. Therefore, awareness initiatives must be continuous, culturally sensitive, and tailored to local contexts rather than being one-time campaigns. Use of local language, folk narratives, and examples drawn from community experiences makes such programmes more relatable and impactful.

Conclusively we can say awareness programmes and community engagement initiatives constitute a cornerstone of sustainable human animal conflict management. While technical interventions such as rapid response teams, compensation mechanisms, and habitat management are essential, their long-term success depends fundamentally on informed, prepared, and cooperative communities. By enhancing ecological literacy, fostering positive behavioral change, and strengthening local participation, awareness programmes transform conflict mitigation from a reactive administrative exercise into a shared societal responsibility. They not only reduce risk and prevent avoidable incidents but also build trust between communities and conservation authorities. Ultimately, enduring coexistence between humans and wildlife can only be achieved when awareness evolves into collective stewardship where conservation is understood not as an external imposition, but as a common duty rooted in knowledge, empathy, and mutual respect.







Awareness and training initiatives organised in the Kashmir Valley to strengthen community engagement in human–wildlife conflict mitigation.

Operational Advisories and Public Safety Guidelines in Human–Wildlife Conflict

Chapter 17

Awareness, advocacy, and community mobilization in wildlife conflict prevention constitute integrated social strategies designed to mitigate adverse interactions between humans and wild animals. These approaches emphasize informed decision-making, participatory engagement, and collective responsibility by equipping communities with relevant knowledge, strengthening their capacity to articulate concerns, and fostering coordinated action. Operational Advisories and Public Safety Guidelines are structured instructions issued to communities and field personnel to prevent, manage, and respond safely to human–wildlife conflict, minimizing risk to both people and animals. These are the official guidelines issued by the Wildlife Department and Forest authorities to help local communities prevent, reduce, and safely respond to encounters with wild animals such as leopards, black bears, wild boars, and monkeys. These advisories are crucial in the Kashmir Valley, where human settlements often border forested areas and orchards, making conflict frequent. During incidents of man–animal conflict, the Department of Wildlife issues a series of advisories and instructions aimed at protecting both human life and the animal involved while preventing panic and further escalation of the situation. These advisories typically instruct the public to avoid crowding the conflict site, as large gatherings often agitate the animal and increase the risk of attack. People are advised to remain indoors, keep children and elderly persons safe, and secure livestock and pets. Residents are cautioned not to attempt to chase, injure, or provoke the animal, and to immediately inform the nearest wildlife control room or field staff instead of spreading rumors. The department also instructs villagers to maintain silence in the area, switch off loudspeakers and vehicle horns, and avoid using flashlights or fire that may disturb the animal's natural escape route. Specific guidance is given to farmers to avoid going alone into orchards, crop fields, or forest fringes during early morning and late evening hours when wildlife movement is highest. Instructions are often circulated through local announcements, social media, and coordination with police and district administration to manage crowds and traffic. At the same time, the advisories emphasize cooperation with wildlife staff during rescue, tranquilization, or capture operations, warning people not to interfere in technical procedures. These measures are designed not only to ensure immediate public safety but also to allow trained personnel to handle the situation scientifically, reducing harm to wildlife and preventing repeated conflict in the same area.

Common advisories and precautionary instructions issued during human animal conflict situations are designed to promote public safety while ensuring wildlife protection. Residents are strongly advised to avoid venturing alone into forested areas, wildlife corridors, or fringe zones particularly during dawn, dusk, and nighttime hours when predators are most active. In the event of a wildlife sighting, individuals are instructed to remain calm and refrain from chasing, shouting at, or provoking the animal, as such actions may trigger defensive or aggressive responses. Livestock management remains a critical preventive measure; animals should be housed in secure, predator-proof enclosures during the night, and grazing should not be undertaken in isolation. The use of bells or other noise-emitting devices is encouraged to deter predators and alert herders to potential danger. Proper waste management is equally essential, as the disposal of kitchen refuse or edible scraps near residential areas attracts stray animals and indirectly lures predators into human settlements. Maintaining clear visibility by trimming bushes and shrubs around habitations reduces concealment opportunities for wildlife, while adequate outdoor lighting and the use of trained watchdogs enhance early warning and vigilance. Citizens are also directed to report sightings or incidents immediately to designated forest or wildlife control rooms to facilitate prompt response by Rapid Response Teams. These advisories serve multiple purposes and significantly reduce the risk of human injuries and fatalities, discourage retaliatory harm to protected species such as leopards and bears, and minimize conflict through informed behavioral practices and improved livestock and waste management. Moreover, they enhance community understanding of wildlife ecology and conflict dynamics, fostering responsible coexistence. By ensuring timely reporting and coordinated intervention, such guidelines strengthen the operational efficiency of forest and wildlife authorities, ultimately safeguarding both human lives and wildlife populations (Jadhav& Barua 2012).In Kashmir, where dense forests, orchards, and rugged terrain make direct encounters more likely, these advisories are essential for coexistence, ensuring that humans can live safely while protecting the local wildlife populations.

Authorities regularly issue advisories and safety instructions to help people reduce the risk of man–animal conflict and protect both human life and wildlife. These advisories emphasize that residents especially women and children should avoid entering forested areas alone, particularly during early morning and late evening hours, when predators such as leopards and black bears are most active, movement in groups is strongly encouraged to reduce vulnerability. Locals are advised not to chase, approach, or make loud noises if a wild animal is sighted, as this can provoke defensive or aggressive behavior from the animal and escalate the situation. Livestock should be attended by multiple people, and attaching bells or sound devices to cattle is recommended to deter predators. Households near forests are told to avoid dumping kitchen waste nearby, as

food scraps attract stray dogs and other wildlife, which in turn can draw predators closer to human settlements. Clearing bushes and shrubs around homes improves visibility and reduces hiding spots for wildlife; while the construction of "leopard-proof" cattle sheds using sturdy materials helps secure livestock at night. People are encouraged to complete outdoor activities during daylight, maintain proper lighting around homes, and keep a watchdog to alert residents of unusual animal presence. Contact numbers for control rooms set up by the Wildlife Department are included in advisories so that distress calls can be addressed promptly by rapid-response teams. These instructions are part of a broader effort to enhance awareness, encourage responsible behavior, and reduce harmful encounters between humans and wild animals in Kashmir's complex forest–human interface.







The image depicts an official advisory from the Jammu & Kashmir Wildlife Protection Department, outlining key "Do's and Don'ts" for safely managing human–wildlife conflict situations.

From Crisis Intervention to Conservation: The Expanding Role of Wildlife Veterinarians

Chapter 18



Dr. Mohsin Ali Gazi



Wildlife veterinarians occupy a strategically significant position at the human–wildlife interface, a dynamic space increasingly shaped by habitat fragmentation, anthropogenic pressures, and ecological disruption that precipitate conflict scenarios. Their mandate extends well beyond conventional clinical intervention to encompass emergency response, chemical immobilization, rescue and translocation, disease surveillance, rehabilitation, and population health management. In contemporary conflict landscapes, they operate as multidisciplinary professionals integrating veterinary science with conservation biology, public health, risk assessment, and regulatory frameworks—while navigating complex ethical and welfare considerations. This evolving professional trajectory signifies a paradigmatic shift from episodic crisis management to comprehensive, evidence-based, and preventive approaches that safeguard animal welfare, ensure human safety, strengthen ecosystem resilience, and advance the broader objective of sustainable coexistence. The role of a wildlife veterinarian during man animal conflict is central to ensuring both public safety and animal welfare while maintaining ecological balance. In conflict situations such as when leopards stray into human settlements, bears attack livestock, or ungulates damage crops—the wildlife veterinarian becomes a key technical expert in planning and executing safe capture operations. They determine appropriate tranquilization protocols, calculate species-specific drug dosages, supervise darting procedures, and monitor the animal's vital parameters during immobilization to prevent stress-related mortality. Once restrained, the veterinarian conducts a thorough clinical examination to identify injuries, infections, dehydration, fractures, or trauma caused by mob aggression, vehicular collisions, or habitat displacement, and provides immediate medical treatment where necessary. They assess whether the animal is diseased, aged, injured, orphaned, or simply disoriented due to

habitat encroachment, which helps authorities decide whether the animal should be released, rehabilitated, translocated, or kept in captivity. The veterinarian also plays a crucial role in zoonotic disease surveillance by screening for conditions such as rabies or canine distemper, thereby safeguarding both human communities and wildlife populations under the One Health framework. Before release, they ensure the animal is physically fit, free from contagious disease, behaviorally capable of survival, and suitable for the selected habitat. Additionally, wildlife veterinarians prepare medico-legal documentation, post-mortem reports in case of animal or human fatalities, and technical reports required under wildlife protection laws, contributing to transparency and compensation processes. Beyond emergency response, they advise forest and wildlife staff on standard operating procedures and participate in public awareness efforts to reduce panic, retaliation, and recurrence of conflict. Thus, the wildlife veterinarian functions not merely as a clinician but as a crisis manager, conservation scientist, public health safeguard, and ethical custodian at the human–wildlife interface (Karanth& Kudalkar 2017).

The survival of humans, animals, and plants depends on the health of their ecosystems so by protecting wildlife health, we safeguard biodiversity and invest in a healthier, more sustainable future. Wild animal health care aims to identify and promote solutions for more effective monitoring and early detection of diseases through animal regular heath check control programs which is a key component of animal welfare. Wildlife veterinarian has not only a broad education in comparative medicine but also are also highly trained in recognizing, diagnosing and understanding disease impact on public health as well as on individuals, populations and whole ecosystems. Their skills and expertise turn them into valuable key players in planning, implementing and effectively assisting rescue and rehabilitation, both in-situ and ex-situ conservation methods and rescue of animals in distress and conservation of worldwide fauna flora, and protection of animal welfare in whole. Wildlife veterinarians play a vital role in both conservation efforts and mitigating human-wildlife conflict throughout world. They are managing health and well-being of wild animals, both in the wild and captivity. They also work to mitigate the negative impacts of human-wildlife conflict on both humans and wildlife. Wildlife veterinarians play a vital role in the capture of menace-causing wild animals. They are responsible for ensuring that the capture process is safe and humane for both for the animal and the capture team. Wildlife veterinarians typically work with other professionals, such as forest rangers, wildlife biologists, and capture experts, to develop and implement a capture plan. The capture plan is tailored to the specific species of animal being captured, and it takes into account the animal‘s age, sex, health condition, and the environment in which it is being captured. Before attempting capture, veterinarians consider the biological aspects of the targeted species, the immobilization techniques

required, and the transport methods for captured animals. Chemical restraint employed by the wildlife veterinarians has to been successfully conducted to relocate or treat animals in the captivity as well as in the wild resulting in the rescue of many rare and critically endangered species in order to minimize risks of anesthesia to the subject animals. Wildlife Veterinarians also need to be able to react appropriately using the correct equipment with sufficient skill to deal with anything that may go wrong during the capture. Use of anesthetics, dose of medicine, route of administration, type of needle, size of gauge, dart pressure, site of tranquilization, position of restraining, and use of appropriate antidotes is all the domain of a wildlife veterinarian (Vogel nest and Woods, 2008). The fate of rescued animals in terms of stress management during rescue and rehabilitation is all together a technical part that can be best judged by a veterinarian who can understand animal pain, discomfort, stress level, and other symptom-based ailments of rescued animals. Once a capture plan has been developed, wildlife veterinarians are responsible for selecting the appropriate capture drugs and dosages. They are also managing monitoring of the animal‘s health during the capture process and providing veterinary care as needed. After the animal has been captured, wildlife veterinarians are assessing its health and fitness for release. Wildlife veterinarian has a mandate for providing immediate medical/health care to injured or sick wildlife with necessary medications, control of immobilization equipment, and first aid provisions. Wildlife veterinarians ensure the availability of emergency medicines, transport containers, and other essential resources to effectively manage wildlife health emergencies. The specialized equipment‘s, darts, cages, and other operative gears used during mitigating of human-wildlife conflict are also animal specific and can be best be decided by a veterinarian as far as the technicality of the issue is concerned.

All the rescue operations in valley are being augmented with the training programmes and practical demonstrations to frontline warriors throughout year and that too is being conducted by a wildlife veterinarian. The role of wildlife veterinarians in conservation and human-wildlife conflict mitigation in India is of utmost importance. Their expertise in understanding wildlife, managing disease outbreaks, and implementing conservation strategies is instrumental in maintaining the delicate balance between human settlements and wildlife habitats. By collaborating with various stakeholders and utilizing scientific knowledge, wildlife veterinarians contribute significantly to the preservation of overall unique biodiversity. Furthermore the sensitivity of involvement of scheduled wild animals, technicality of the process and professionalism in managing MAC (Man animal Conflict), and overall animal welfare the monitoring rescue operations w.r.t MAC strictly a domain of a wildlife veterinarian. Although a strong support of respective wildlife wardens, foresters, range officers, frontline workers, health institutions, police, disaster

management teams has to be a part of any rescue operation but SOP‘s for planning and mitigation has to be strictly followed as per directions and guidelines conveyed by CZA (central zoo authority) and can be best undertaken under the supervision of a wildlife veterinarian only.

Wildlife veterinarians also play a fundamental after man animal conflict/ post conflict by ensuring ecological recovery, animal welfare, public health safety, and institutional accountability. Once an immediate conflict situation—such as an attack, rescue, capture, or translocation—has been resolved, the wildlife veterinarian undertakes a detailed clinical reassessment of the animal to evaluate internal injuries, stress-induced physiological disturbances, dehydration, shock, or latent infections that may not have been evident during initial intervention. They design and supervise rehabilitation protocols that include wound management, nutritional therapy, behavioral monitoring, and controlled recovery in rescue or holding facilities where necessary. In cases of release or translocation, the veterinarian certifies the animal’s physical fitness, reproductive status, disease-free condition, and behavioral competence, while advising on habitat suitability to prevent recurrence of conflict (Kansky*et.al* 2014). Where fatalities occur—human or animal—they conduct scientific post-mortem examinations to determine the precise cause of death, generate medico-legal documentation, and assist authorities in compensation and legal procedures under wildlife protection laws. Additionally, wildlife veterinarians contribute to post-conflict disease surveillance by screening for zoonotic threats and recommending quarantine or vaccination measures when required, thereby strengthening the One Health framework. Beyond medical responsibilities, they analyze the causes and patterns of the incident, provide technical recommendations to improve standard operating procedures, and participate in community outreach efforts aimed at preventing retaliatory harm and promoting coexistence. Thus, in the post-conflict phase, the wildlife veterinarian emerges as a rehabilitation expert, forensic investigator, public health sentinel, and strategic advisor in sustainable human–wildlife conflict management (Krishna 2025).

In the end, the wildlife veterinarian occupies a uniquely critical position in the management of man–animal conflict, functioning at the intersection of science, ethics, law, and conservation. Their role extends far beyond clinical intervention, encompassing emergency response, humane capture, disease surveillance, rehabilitation, legal documentation, and strategic advisory responsibilities. In increasingly fragmented landscapes where human expansion intensifies encounters with wildlife, the veterinarian becomes a stabilizing force—ensuring that responses to conflict are guided by scientific rigor rather than panic or retaliation. By safeguarding animal welfare while simultaneously protecting human life and public health, wildlife veterinarians embody the

principles of the One Health framework and contribute to sustainable conflict mitigation. Ultimately, effective management of man–animal conflict depends not only on policy and enforcement but also on the expertise, judgment, and ethical commitment of wildlife veterinarians, whose work sustains both biodiversity and social harmony in shared ecosystems.

Emerging Technologies for Predictive Monitoring and Mitigation of Human–Wildlife Conflict

Chapter 19

Emerging technological advancements in the governance of human wildlife conflict encompass the strategic deployment of advanced digital, geospatial, and computational systems to systematically monitor, anticipate, and attenuate adverse human–animal interactions. The high-resolution remote sensing, integration of GPS-based telemetry, artificial intelligence–driven analytics, unmanned aerial surveillance platforms, and interconnected sensor networks facilitates continuous data acquisition, dynamic spatial risk mapping, and sophisticated modelling of wildlife movement ecology. These technology-enabled architectures enhance situational awareness, strengthen early warning mechanisms, and institutionalize data-informed decision-making processes. By recalibrating management paradigms from reactive containment toward anticipatory, precision-oriented intervention frameworks, such innovations reinforce public safety imperatives, advance animal welfare safeguards, and promote resilient and sustainable coexistence at the increasingly complex human–wildlife interface.

The convergence of geospatial intelligence, GPS-based telemetry, high-resolution remote sensing, unmanned aerial platforms, automated camera trapping, and artificial intelligence has substantially augmented the capacity of wildlife agencies to identify conflict prone landscapes, model animal movement trajectories, and initiate pre-emptive interventions. Such technology enabled systems advance precision governance by facilitating robust data integration, dynamic risk mapping, and informed policy responses. Moving beyond reactive containment strategies, these predictive monitoring paradigms institutionalize a proactive, science driven approach that enhances public safety, strengthens animal welfare safeguards, and reinforces ecological resilience at the increasingly contested human wildlife interface.

In recent years, the management of human wildlife conflict has increasingly moved beyond traditional response mechanisms toward technologically driven, data-oriented interventions. Escalating encounters between humans and wild animals particularly in ecologically sensitive and densely inhabited regions have necessitated faster detection systems, scientific tracking, and predictive monitoring tools. The integration of technologies such as Closed-Circuit Television (CCTV), GPS collaring, unmanned aerial vehicles (drones), and Artificial Intelligence (AI) has fundamentally reshaped conflict surveillance and

mitigation strategies. These innovations enable real-time monitoring, precise animal tracking, spatial mapping of conflict hotspots, and evidence-based decision-making, thereby shifting wildlife management from a reactive approach to a proactive and preventive framework. This chapter explores the scope, functioning, and implications of these technological interventions in conflict monitoring, while also reflecting on their operational challenges and ethical considerations.

The use of technology in monitoring and mitigating human wildlife conflict has significantly transformed wildlife management practices, particularly in sensitive and conflict prone landscapes such as Kashmir. Closed-Circuit Television (CCTV) cameras have emerged as an essential surveillance tool in both urban peripheries and forest fringes. Proper installation and site selection for placement of these CCTV cameras at strategic points such as livestock enclosures, village entry routes, crop fields, and forest boundaries, CCTV systems help wildlife departments monitor animal movement patterns in real time. They assist in distinguishing between species such as identifying whether a predator is a leopard or a feral dog thereby enabling targeted response rather than indiscriminate action. CCTV footage also provides evidentiary value for compensation claims, verification of livestock depredation, and assessment of human casualties, thus increasing transparency and reducing disputes.

On the other hand, GPS collaring has revolutionized the scientific management of conflict prone animals. By fitting radio or GPS enabled collars on species such as leopards, bears, or other wild animals, wildlife authorities can track their spatial movement, territorial range, and dispersal behavior. This technology allows early warning alerts when collared animals approach human habitations, thereby preventing encounters. It also generates valuable ecological data regarding habitat use, seasonal migration, and corridor dependency, which helps in long-term landscape planning and mitigation strategies. However, collaring requires skilled veterinary intervention as we have discussed above in our early chapter on identification of wild animal species, ethical considerations, and periodic monitoring to ensure animal welfare (Kenward, 2001).

Drones, or unmanned aerial vehicles (UAVs), have also become indispensable for rapid response operations in difficult terrains and are probing to be very effective and result oriented. In mountainous and forested regions, drones enable wildlife teams to scan large areas quickly, locate trapped or injured animals, and assess crowd situations during conflict incidents. Thermal imaging drones are particularly useful for detecting animals in dense vegetation or during night operations. They reduce the need for risky ground patrols and help in coordinating tranquilization or rescue operations with precision. Moreover,

drone footage can be used for habitat assessment and monitoring encroachments that exacerbate conflict (Ahmed & Singh, 2022).

Nowadays Artificial Intelligence (AI) and machine learning systems further enhance conflict monitoring by analyzing large datasets derived from camera traps, CCTV footage, GPS tracking, and field reports. AI-based image recognition can automatically identify species from images, differentiate between animals, and detect abnormal movement patterns. Predictive modeling tools use historical conflict data to identify hotspots and forecast potential conflict zones, enabling pre-emptive deployment of response teams. AI-driven early warning systems, integrated with mobile applications and SMS based alert networks, have emerged as critical tools in contemporary wildlife conflict mitigation. By detecting and transmitting real-time information on wildlife movement to nearby communities, these systems enhance situational awareness and enable timely preventive action. Notwithstanding their precision and operational efficiency, their sustained effectiveness is contingent upon robust data architecture, technical proficiency, institutional funding, and, most importantly, community participation and trust (Christin, 2019).

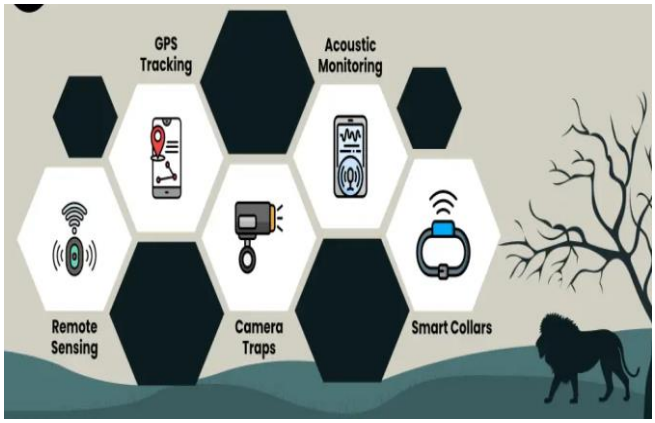
Taken together, the deployment of CCTV surveillance, GPS collaring, unmanned aerial systems (drones), and AI-enabled analytics signifies a paradigmatic transition from reactive, incident-based response mechanisms to proactive, data-driven, and evidence-informed wildlife governance. This technological consolidation strengthens predictive capacity, improves response coordination, and reduces human and animal casualties. Yet, technological sophistication alone cannot secure durable solutions. Sustainable coexistence requires that digital interventions operate in synergy with community engagement frameworks, habitat restoration initiatives, and coherent policy design. Technology, therefore, must function as an enabling instrument augmenting, not displacing, participatory conservation and ecological stewardship.

Despite their transformative potential, the use of CCTV, GPS collaring, drones, and Artificial Intelligence in conflict monitoring is not without significant limitations and drawbacks. Technological systems are often expensive to procure, maintain, and upgrade, placing financial strain on wildlife departments that already operate under constrained budgets. CCTV cameras may suffer from limited coverage, poor resolution, power failures, weather-related damage, or vandalism, particularly in remote and conflict-prone areas. GPS collaring, while scientifically valuable, involves invasive capture and tranquilization procedures that pose risks to animal welfare, may alter natural behavior, and require continuous technical monitoring to prevent collar malfunction or injury. Drones, though effective for rapid surveillance, are restricted by battery life, regulatory

permissions, adverse weather conditions, and the risk of disturbing wildlife if not operated carefully. Artificial Intelligence systems depend heavily on high-quality datasets; inaccurate or incomplete data can produce flawed predictions, false alerts, or misidentification of species. Moreover, technological reliance may create a false sense of control, diverting attention from deeper structural causes of conflict such as habitat fragmentation, land-use change, and inadequate compensation frameworks. Issues of data privacy, cyber security, technical expertise shortages, and lack of community trust further complicate implementation. Therefore, while technology enhances monitoring capacity, its limitations underscore the need for cautious deployment, ethical safeguards, capacity building, and integration with ecological and community-based approaches rather than treating it as a standalone solution (Kellenberg, 2018).

In the end the integration of CCTV surveillance, GPS collaring, drone technology, and Artificial Intelligence represents a transformative shift in the governance of human wildlife conflict, moving the framework from crisis response to anticipatory management. These technologies collectively enhance situational awareness, improve accuracy in species identification, enable real-time tracking of conflict-prone animals, and facilitate data-driven policy formulation. CCTV systems strengthen transparency and accountability; GPS collaring deepens ecological understanding of animal movement and habitat use; drones improve operational efficiency in difficult terrains; and AI enables predictive modeling and hotspot mapping that can prevent conflicts before they escalate. Yet, technological sophistication alone cannot guarantee coexistence. The effectiveness of these tools depends on institutional capacity, inter-departmental coordination, ethical wildlife handling, data integrity, and sustained community engagement. Overreliance on technology without parallel investment in habitat restoration, compensation mechanisms, and public awareness may risk reducing conflict to a technical problem rather than a socio-ecological reality. Therefore, technology must be viewed not as a substitute for ecological wisdom and participatory governance, but as a complementary instrument that strengthens informed decision-making. When responsibly deployed within a holistic conservation framework, these innovations hold significant promise for fostering safer landscapes and more sustainable human–wildlife coexistence.









Images showing Integration of emerging technologies and analytics revolutionizing rapid response and precision-driven wildlife rescue operations.

Neuroendocrine Stress Dynamics in Wildlife at the Human–Wildlife Interface

Chapter 20

Neuroendocrine stress dynamics in wildlife at the human–wildlife interface represent a significant domain within conservation physiology and wildlife veterinary science. Escalating habitat fragmentation, anthropogenic pressures, capture and translocation procedures, and direct conflict encounters trigger intricate neuroendocrine mechanisms—most notably activation of the hypothalamicpituitaryadrenal axis leading to increased glucocorticoid secretion and widespread physiological adjustments. Although acute stress responses may confer adaptive survival advantages, chronic or repeated exposure to stressors can compromise immunological function, reproductive performance, metabolic regulation, and overall biological fitness. A comprehensive understanding of these neurohormonal processes is indispensable for the development of scientifically grounded intervention protocols that mitigate distress during conflict response operations. Embedding neuroendocrine perspectives within wildlife management frameworks advances welfare-centric practices, strengthens conservation efficacy, and supports resilient coexistence within increasingly anthropogenically influenced landscapes.

Stress management in wild animals during human–animal conflict has emerged as a critical yet often underexplored dimension of wildlife governance and conservation practice. Encounters arising from habitat encroachment, urban expansion, retaliatory aggression, rescue operations, or translocation procedures subject wild animals to intense physiological and psychological stress. Elevated stress levels can disrupt hormonal balance, suppress immune function, impair reproductive capacity, and alter natural behavior, thereby reducing survival prospects even after release back into the wild. In conflict situations, animals may experience acute stress due to crowd pressure, noise, injury, tranquilization, capture, and prolonged confinement, while chronic stress may result from repeated habitat disturbance and food scarcity. Effective conflict management, therefore, must extend beyond ensuring human safety to incorporating scientifically informed protocols that minimize distress during capture, handling, transportation, treatment, and rehabilitation. This includes the use of appropriate tranquilization techniques, minimizing handling time, ensuring quiet and controlled rescue environments, providing species-specific holding conditions, and conducting careful post-release monitoring. Integrating veterinary science, behavioral ecology, and ethical wildlife practices is essential to prevent stress-induced mortality and maladaptive behavior. Recognizing stress management as central to humane and sustainable conflict mitigation

reinforces the broader objective of coexistence by safeguarding not only human communities but also the physiological integrity and welfare of wild animals. Stress has often been described as the state of the animal when it has difficulties to adapt to environmental or physical constraints. Wild animals are frequently or constantly exposed to stressful stimuli, as they are all either predator or prey. Unlike domestic animals, wild animals are exposed to environmental stress, food deprivation, parasite infestation and numerous untreated diseases. In animals stress is a biological and physiological response to external or internal challenges. It can be a natural and necessary reaction of an individual to certain stimuli. This stress response is characterized by the activation of the animal‘s stress system, particularly the hypothalamic-pituitary-adrenal axis, which controls the release of stress hormones such as cortisol and adrenaline (Kagawa & Mugiya 2000). Stress in animals has a variety of causes some of which include environmental stressors like climate changes in temperature, rainfall patterns, seasonal cycles, extreme weather that can affect the availability of food, water, and shelter and other factors necessary for survival of an animal. Another factor that is mostly experienced in wild animals is acute stress due to presence of predators usually involves fight-or flight mechanism leading to adrenaline rush causing changes in animal physiology (Martin, 2011). One more factor that contribute to animal stress is pollution, including noise, light, chemical pollutants, and plastic waste etc, has become one of the leading causes of stress in wildlife. Noise pollution from traffic, aircraft, or construction, mining etc can disrupt communication, breeding, and feeding behaviors and mating behaviors in animals. Toxic pollutants in the water, air, and soil can also cause physical harm, alter reproductive success and survival rates and affect the overall health of wild animals. We have seen animals in free range or captivity due to scarcity or shortage of food and water or during periods of drought, seasonal changes, does experience stress due to competition for food with other individuals or species and produce stress. Additionally human activities such as deforestation, urbanization, or agricultural expansion led to habitat Fragmentation which again becomes a serious cause of stress in wild animals. As far as animal physiology is concerned the spread of diseases among wildlife populations or sudden disease outbreak can lead to stress due to the potential for widespread illness and death. Pathogens entering animal body can weaken their immune systems, making them more vulnerable to other stressors leading to serious health hazards. Orphaned, injured or sick, accidental wild animals that fear chance of predation or hunting easily fall into category of stressed animals through physical pain and impaired ability to find food for survival. One more commonly occurring factor is interaction of humans with wild animals viz man animal conflicts, hunting, poaching, and the destruction of habitats through urbanization also become a source of stress for wild animals. The presence of humans, especially in areas where animals are not accustomed to human interaction, can lead to altered behaviors, abandonment of animal shelters or

territories, also causes overall increase in stress levels affecting animal health. So there is a need for regulating tourism with sustainable tourism practices that limit human-wildlife interaction can help reduce the stress on animals in popular wildlife reserves and parks. Now if we observe the impact of the stress on the wild animals it can range from immediate changes in behavior to long-term health problems that affect mental health, physical fitness and overall animal life. Repeated exposure to stress factors can cause the continuous release of stress hormones such as cortisol and adrenaline and can impair the animal ‘s immune systems, leaving them more vulnerable to infections and diseases, digestive problems, respiratory diseases and hormonal imbalances, affecting animal‘s health and wellbeing (Lamarque et al., 2009). In some species, it is observed that stress can suppress reproductive hormone production, leading to reduced fertility or even complete reproductive failure. Additionally, repeated mental stress alters the serotonin and dopamine levels in an animal‘s brain. This, in turn, can cause repetitive and frequently harmful animal behavior that result in a loss of energy. Stressed animals may show signs of excessive vocalization, decreased appetite, and changes in sleeping patterns, poor grooming habits, hiding away from people or other animals, and aggression.

Conclusion

In conclusion, stress management in wild animals during human–animal conflict is not an auxiliary concern but a central pillar of humane and scientifically sound wildlife governance. Conflict interventions that overlook the physiological and psychological strain experienced by animal’s risk causing long-term harm that may manifest as post-release mortality, abnormal aggression, reproductive failure, or displacement into new conflict zones. Acute stress during capture, tranquilization, transport, and confinement can escalate into chronic health complications if not mitigated through careful planning and professional handling. Therefore, effective conflict management must incorporate standardized protocols that prioritize minimal handling time, species-specific sedation practices, controlled environments, veterinary supervision, and systematic post-release monitoring. Equally important is the training of field personnel in recognizing signs of distress and preventing crowd-induced panic situations. By embedding stress reduction strategies into rescue and rehabilitation frameworks, wildlife authorities can enhance survival outcomes, preserve natural behavior, and prevent recurring conflict cycles. Ultimately, safeguarding animal welfare during conflict is inseparable from ensuring ecological stability and promoting a balanced model of coexistence, where conservation efforts uphold both ethical responsibility and long-term sustainability. Preserving and restoring natural habitats is one of the most effective ways to reduce stress in wildlife. By reducing habitat fragmentation and protecting ecosystems from human encroachment, deforestations, poaching

and hunting, animals can live in environments that meet their physical and behavioral needs, reducing stressors and promoting healthy wildlife. Another thing is reducing or minimizing incidences of man-wildlife conflicts through effective conservation strategies like habitat restoration, proper waste management, afforestation, creating buffer zones and thus reduce stress. Educating the public about the impacts of human activities on wildlife stress is an important thing for conservation and preservation of wildlife. Raising awareness about the effects of pollution, habitat destruction, proper waste disposal, creating buffer zones between forests and human habitats, explaining importance of wildlife, and nature can prevent stress and preserve our biodiversity (Achidago and Changjie 2026). Thus, addressing these stressors through conservation efforts, habitat protection, and responsible human interaction with wildlife is essential for safeguarding the health and survival of wildlife species and ensuring the balance of ecosystems worldwide.

Future Directions and latest Method of Wild Animal Capture in Man–Animal Conflict

Chapter 21

Human wildlife conflict has progressively transformed from an occasional conservation concern into a persistent and multifaceted socioecological challenge, driven by factors such as rapid urban expansion, habitat fragmentation, climate variability, and evolving land-use patterns. As human settlements continue to expand into wildlife habitats, traditional management approaches—largely limited to emergency rescue operations, ex gratia compensation payments, and temporary containment measures have proven insufficient to address the deeper, structural causes of human–wildlife conflict. Consequently, contemporary human wildlife conflict management necessitates a paradigm shift from crisis-driven interventions toward preventive, adaptive, and participatory frameworks that integrate ecological, social, and governance considerations. This includes the adoption of emerging technologies for real-time monitoring and early warning, landscape-level planning to maintain connectivity and minimize human–animal overlap, and climate-resilient strategies that anticipate shifts in wildlife behavior and habitat availability (Frank *et.al* 2019). Complementing these technical and spatial interventions, legal reforms and community-based governance models are increasingly recognized as critical mechanisms for promoting coexistence, ensuring equitable resource access, and fostering local stewardship of wildlife. Simultaneously, ethical dimensions encompassing animal welfare, human safety, and fairness in compensation must be carefully incorporated into policy and operational design to maintain legitimacy and public trust. This chapter examines the evolving contours of human wildlife conflict management, highlighting innovative strategies, institutional reforms, and interdisciplinary approaches that collectively offer sustainable pathways for coexistence in landscapes where human and wildlife interests are inextricably intertwined.

As landscapes become increasingly shared spaces rather than segregated domains, the future of conflict management must move beyond reactive compensation models and sporadic rescue operations toward anticipatory, interdisciplinary, and community-centered frameworks. The future of human wildlife conflict management lies in reimagining coexistence not as an idealistic aspiration but as a structured, evidence-based policy objective grounded in ecological science, technological innovation, and social justice.

A critical future direction in human wildlife conflict management lies in adopting landscape level planning rather than relying solely on site-specific interventions. Many conflicts arise from disrupted ecological corridors, shrinking habitats, and unregulated land-use changes, making it essential to integrate wildlife connectivity into regional development and urban planning. This approach ensures the continuity of habitats between protected areas while minimizing fragmentation, and can be facilitated through spatial planning tools, Geographic Information Systems (GIS), and predictive modeling to identify conflict hotspots and inform zoning regulations. Infrastructure development including highways, railways, and urban expansion must incorporate wildlife crossings, underpasses, and buffer zones as integral components rather than afterthoughts, with sustainable land use governance central to addressing the structural drivers of conflict. Equally important is the active participation of local communities, who have traditionally been treated as passive recipients of advisories or compensation. Future strategies must embrace participatory governance, integrating local knowledge, traditional practices, and lived experiences into policy design. Community-based monitoring systems, rapid response volunteer networks, and decentralized reporting mechanisms can enhance early warning capabilities, while transparent and timely compensation frameworks reinforce public trust. Livelihood diversification programs, including eco-tourism, crop insurance, and alternative income generation, can further reduce economic vulnerability and foster positive attitudes toward conservation.

Technological innovation will continue to play a transformative role in conflict management, but its application must be smart, integrated, and ethically guided. Artificial Intelligence, machine learning algorithms, bioacoustics monitoring, satellite imagery, and real-time alert systems can feed into centralized platforms to create dynamic conflict prediction models, while mobile-based applications empower communities with timely information about wildlife movement. Technology must remain accessible and affordable, serving as a tool for empowerment rather than surveillance alone. Climate change adaptation is another essential component, as altered rainfall patterns, droughts, and shifting vegetation zones are already influencing animal behavior and movement (Kellenberg, 2018). Effective mitigation strategies should incorporate climate-resilient habitat restoration, water provisioning within forests, and adaptive seasonal management, informed by collaborative research between wildlife departments and academic institutions.

Legal and policy reform is equally crucial, as current wildlife protection laws often prioritize species conservation without adequately addressing the socio-economic realities of affected communities. A balanced framework must harmonize human safety, livelihood security, and conservation objectives, with

clear protocols for rescue, rehabilitation, relocation, and, where necessary, the humane management of habitual conflict animals. Inter-departmental coordinationacross wildlife, agriculture, revenue, disaster management, and local management is essential to reduce bureaucratic delays during emergencies. Capacity building and professional training remain indispensable, ensuring that wildlife veterinarians, forest officers, drone operators, data analysts, and community volunteers are equipped to handle increasingly complex scenarios. Specialized conflict response units with modern tranquilization equipment, forensic tools, and advanced communication systems can enhance operational efficiency, while interdisciplinary research combining ecology, sociology, criminology, and public policy strengthens both theoretical and practical understanding of conflict dynamics.

Finally, the future of humanwildlife conflict management must embrace a philosophical shift from domination to coexistence, from emergency response to preventive design, and from isolated interventions to systemic reform. Conflict is not merely an environmental problem but a socio-ecological phenomenon embedded in patterns of development, inequality, and governance. Sustainable solutions will therefore require integrated approaches that combine science, technology, community participation, legal reform, and ethical reflection. If guided by inclusivity, evidence, and foresight, future conflict management can transform contested landscapes into negotiated spaces of shared survival, ensuring both human dignity and ecological integrity (Tuia, 2022).

Regarding modern wildlife capture methodologies have undergone a marked transformation from rudimentary trapping and high-intensity pursuit techniques to carefully structured, welfare-oriented systems grounded in veterinary science, conservation physiology, and behavioral ecology. Contemporary approaches prioritize minimization of capture stress, prevention of injury, biosecurity compliance, and post-capture monitoring, reflecting internationally accepted conservation standards such as those promoted by the International Union for Conservation of Nature. Capture operations are now typically preceded by ecological assessment, movement analysis, and logistical planning to ensure species-appropriate methods are employed with minimal ecological disruption.
Among large ungulates, the boma capture system represents a highly effective and ethically refined technique, particularly for herd-based translocations and population management. Widely implemented in African conservation landscapes, including protected areas managed by South African National Parks, this method involves the strategic construction of funnel-shaped drive lanes leading into a reinforced temporary enclosure (boma). Animals are gradually and calmly guided into the enclosure through low-stress herding using vehicles, mounted personnel, or controlled drives, thereby avoiding prolonged chases that may precipitate hyperthermia or capture myopathy. Once confined

within the boma, animals can be individually segregated for veterinary examination, disease screening, tagging, collaring, or preparation for transport. The structured environment allows systematic processing while significantly reducing trauma and mortality risk compared to free-range darting of multiple individuals.

In open or expansive landscapes where corral-based systems are impractical, helicopter-assisted chemical immobilization remains a cornerstone of large mammal capture. Specially trained wildlife veterinarians deploy precision dart rifles from helicopters to administer immobilizing agents—often combining potent opioids with sedatives and reversible antagonists—allowing for rapid induction and controlled recovery. Advances in dart technology now include telemetry transmitters, impact confirmation systems, and improved projectile design to reduce tissue trauma. Continuous aerial tracking ensures the animal is monitored throughout induction, minimizing risks such as drowning, falls, or predation during sedation. The refinement of balanced an aesthetic protocols has significantly enhanced physiological stability and post-release survival.

Where aerial operations are not feasible, ground-based remote chemical immobilization offers a sophisticated alternative. Modern CO_2- or gas-powered dart rifles equipped with laser optics, GPS-enabled dart tracking, and impact sensors allow for accurate drug delivery in dense forests or rugged terrain. These systems are frequently employed for large carnivores such as big cats and bears. Real-time physiological monitoring—including heart rate, respiration, oxygen saturation, and body temperature—has become standard practice during immobilization, enabling prompt veterinary intervention and reducing the incidence of capture-related complications.

Mechanical capture techniques have similarly evolved. Drop nets are strategically suspended over baited sites and remotely triggered once target animals assemble beneath them, allowing rapid group capture without extended pursuit. Net-gunning, commonly deployed from helicopters or vehicles, uses projectile nets to entangle animals at close range; contemporary net designs are lighter, optimized for rapid deployment, and engineered to minimize limb injuries. These methods are especially useful for cervids and medium-sized ungulates and are supported by rapid-response ground teams trained in swift restraint and sedation to prevent stress escalation.

For medium-sized mammals and carnivores, box traps, culvert traps, and clover traps have been modernized with integrated camera traps, GSM-based alert systems, and remote monitoring platforms to ensure animals are attended promptly after capture. Humane design improvements such as padded doors, offset triggers, and soft-catch mechanisms reduce the risk of physical injury. In

conflict-prone landscapes, modular corral traps with one-way gate systems are increasingly used for species such as wild pigs and large carnivores. These steel-panel structures can be remotely triggered, allowing selective capture while minimizing disturbance to non-target species.

Technological integration now plays a pivotal role in capture planning and execution. Drone-assisted surveillance, equipped with high-resolution optical and thermal imaging sensors, facilitates real-time tracking of animals in dense vegetation and supports safe monitoring during chemical induction. Geographic Information Systems (GIS) and Artificial Intelligence (AI)-driven predictive modeling are employed to map movement corridors, identify conflict hotspots, and determine optimal seasonal windows for intervention. Such data-driven planning reduces unnecessary capture attempts and enhances operational efficiency.

Emerging approaches include controlled bait-delivered immobilization systems under strict regulatory oversight, particularly in urban–wildlife interface zones where direct darting is logistically challenging. Additionally, telemetry-linked GPS collars and bio loggers now enable continuous behavioral and physiological monitoring before and after capture, providing valuable data on stress responses, habitat use, and post-release adaptation. Collectively, these advanced capture techniques reflect a paradigm shift from reactive wildlife restraint toward evidence-based, ethically grounded wildlife management. Emphasis on veterinary supervision, stress physiology, biosecurity, and long-term monitoring underscores the contemporary commitment to balancing conservation objectives with the highest standards of animal welfare and ecological responsibility.

Conclusively the future of human wildlife conflict management lies in embracing a holistic, forward-looking approach that recognizes conflict as an enduring feature of shared landscapes rather than a temporary aberration.

Sustainable solutions will depend on integrating scientific research, technological innovation, community participation, climate adaptation, and responsive legal frameworks into a coherent governance model. Moving beyond reactive compensation and emergency response, future strategies must prioritize preventive planning through habitat connectivity, land use regulation, and early warning systems while ensuring that affected communities remain central to decision-making processes. Regarding the latest methods of wild animal capture represent a decisive shift from force-driven, reactive interventions to strategically planned, science-based, and welfare-oriented operations.

Contemporary techniques ranging from boma systems and precision chemical immobilization to drone-assisted monitoring and AI-based predictive planningprioritise minimizing physiological stress, preventing injury, and ensuring post-capture survival.



Various modern wildlife capture techniques demonstrating humane, science-based, and technology-assisted approaches including boma capture systems, helicopter-assisted chemical immobilization, ground-based remote darting, drop nets, corral traps, and drone-supported monitoring designed to ensure minimal stress, enhanced safety, and improved animal welfare during conservation and management operation.

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