BioThink E – Magazine, Vol. -2, Issue -2, July 2025
ISSN No. – 3048- 7943
www.biothink.in

Major Threats to Wildlife in Himachal Pradesh, India: A Comprehensive Review

Harinder Singh Banyal[1], Neha Bains[2], Navneet Kaur[3]

[1,2,3] Department of Biosciences, Himachal Pradesh University, Shimla (171005).

Abstract

Himachal Pradesh, situated in the North-Western Himalayas, harbours a rich mosaic of biodiversity, including endemic and endangered species across its varied altitudinal and climatic zones. However, this ecological wealth is increasingly under siege from a multitude of anthropogenic and environmental threats. Key drivers of biodiversity loss identified include habitat fragmentation due to expanding infrastructure and tourism, human-wildlife conflict, illegal poaching and trade, overgrazing by livestock, invasive species, and the far-reaching effects of climate change. The review further assesses the impact of policy gaps, enforcement challenges, and socio-economic pressures that exacerbate these threats. By contextualizing these issues within Himachal Pradesh's unique topographic and ecological framework, the study highlights urgent conservation priorities and recommends integrated, science-based strategies for sustainable wildlife management. This work aims to support future research, inform policy, and galvanize community-based conservation efforts in one of India's most fragile and vital ecoregions.

Keywords: *Wildlife, Threats, Himachal Pradesh*

Introduction:

The Himalayan region is the world's largest snow and ice-covered mountain area outside the polar zones. It plays a crucial role in regulating South Asia's climate, supports major river systems (Joshi and Tamang, 2023). This extensive region, defined by its unique biogeographical traits, encompasses many lakes, rivers, a rich tapestry of flora, and a

diverse range of fauna, making it a vital reservoir of biodiversity (Kaur et al. 2022). This region is undergoing rapid changes due to climate change and human activities like urbanization and tourism, leading to significant regional and global consequences (Dhyani and Dhyani, 2016).

Wildlife comprises undomesticated animals, plants, fungi, and other organisms that grow and live in natural environments without human introduction. It occurs in every ecosystem from forests and grasslands to deserts and even urban areas, each hosting its own distinct forms of wildlife (Soni, 2020).

Himachal Pradesh located in North-Western Himalaya hosts around 8 % of India's fauna and retains 66.5 % of its land under recorded forest cover (FSI 2023). The wildlife of Himachal Pradesh is of immense ecological, economic, cultural, and scientific importance. Ecologically, wild species are essential for maintaining the structure and function of ecosystems. Predators like the Snow Leopard (*Panthera uncia*) and omnivores such as the Himalayan Black Bear (*Ursus thibetanus laniger*) help regulate prey populations and support trophic balance, while herbivores like the Himalayan Tahr (*Hemitragus jemlahicus*) and Barking Deer (*Muntiacus muntjak*) contribute to vegetation dynamics and seed dispersal (Sharma et al. 2015). Pollinators, decomposers, and keystone species in forest ecosystems perform critical ecosystem services such as nutrient cycling, soil formation, and carbon sequestration, services that ultimately benefit both nature and people. Wildlife also holds great socio-economic significance for local communities in Himachal Pradesh. The state's forests and wildlife habitats are intricately linked to indigenous livelihoods, traditional medicine, and religious beliefs. Many communities depend on these ecosystems for food, fuelwood, fodder, and non-timber forest products. Additionally, charismatic wildlife species and pristine landscapes attract ecotourism, which contributes to the state's economy and creates employment opportunities, particularly in remote regions. Culturally, animals like the Himalayan Monal (*Lophophorus impejanus*), the state bird and the Asiatic Black Bear hold symbolic value in

BioThink E – Magazine, Vol. -2, Issue -2, July 2025
ISSN No. – 3048- 7943
www.biothink.in

folklore, festivals, and spiritual traditions (Chardonnet et al. 2002; Bharti et al. 2025) Scientifically, the diverse faunal assemblage of Himachal Pradesh offers vast opportunities for ecological and behavioural research. The region provides a natural laboratory for studying evolutionary adaptation, climate resilience, and species interactions in high-altitude environments. Understanding wildlife ecology in such fragile and dynamic ecosystems is also critical for forecasting the impacts of global environmental change.

Despite this importance, the wildlife of Himachal Pradesh is increasingly under threat from a combination of anthropogenic and natural pressures. Habitat degradation, fragmentation, and conversion for agriculture, infrastructure, and tourism have intensified, reducing the availability of undisturbed wild spaces. Overgrazing by livestock, poaching for meat and trade, road development, forest fires, and climate-induced shifts in vegetation are accelerating biodiversity loss (Thakur et al. 2024). Human-wildlife conflict has also grown in frequency and severity, leading to economic losses and retaliatory killings (Bharti et al. 2025).

This review aims to provide a comprehensive synthesis of the major threats confronting wildlife in Himachal Pradesh. Furthermore, it highlights research gaps, conservation challenges, and policy priorities, with the goal of informing sustainable wildlife management and fostering collaborative conservation strategies in the region.

Study area

Situated in the North-Western Himalaya, Himachal Pradesh spans 55,673 km² between 30°22′ – 33°12′ N and 75°45′ – 79°04′ E (Fig. 1) (Samant et al. 2007). Altitudes within the state span from 248 m to 6,735 m above mean sea level. (Upgupta et al. 2015). Mean annual precipitation declines steeply from 3,000 mm on the Outer slopes to 150 mm within the trans-Himalayan rain-shadow. Temperatures in the state vary widely, from subtropical summers reaching less than 40°C in the low valleys, to areas of permanent frost at higher elevations

The area represents typical Himalayan conditions with diverse four geological

BioThink E – Magazine, Vol. -2, Issue -2, July 2025
ISSN No. – 3048- 7943
www.biothink.in

and ecological zones; Shivalik Himalaya, Lesser Himalaya, Higher Himalaya and Trans-Himalaya (Maikhuri et al., 2001). The striking elevational gradient in these four zones fosters exceptional biodiversity. The forests of Himachal Pradesh are categorized into eight distinct types: Tropical Moist Deciduous, Tropical Dry Deciduous, Sub-tropical Pine, Himalayan Moist Temperate, Himalayan Dry Temperate, Sub-Alpine, Moist Alpine Scrub, and Dry Alpine Scrub (FSI, 2013). To safeguard the natural heritage, the state maintains a protected-area network of 5 National Parks, 26 Wildlife Sanctuaries and 3 Conservation Reserves encompassing 8,391 km² (15 % of the state). These legally notified protected areas shelter flagship taxa such as the snow leopard (*Panthera uncia*), western tragopan (*Tragopan melanocephalus*), Himalayan musk deer (*Moschus cupreus*) and Asiatic black bear (*Ursus thibetanus*) (MoEFCC 2024).

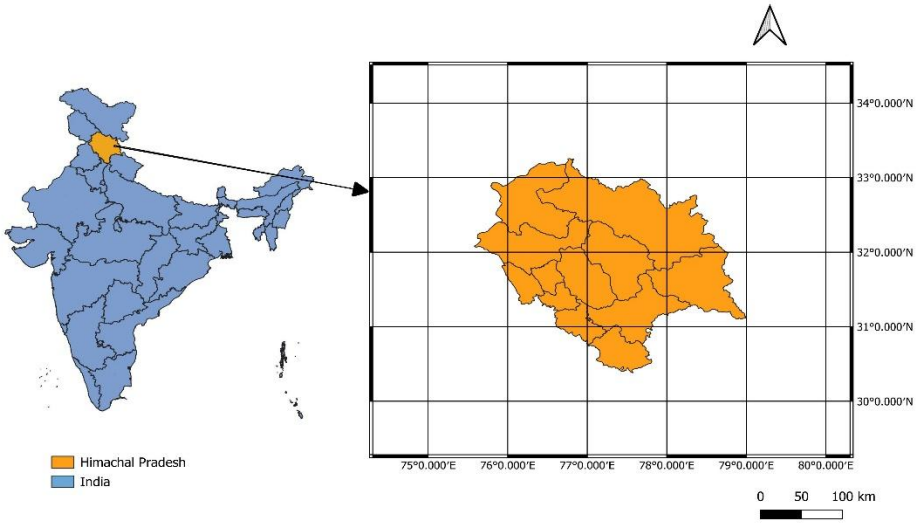

Fig. 1. Map of India and Himachal Pradesh.

Methodology:

This study based on compiling findings from field studies, government reports, and scientific literature, the review article seeks to identify key causes of biodiversity decline and evaluate their ecological consequences.

BioThink E – Magazine, Vol. -2, Issue -2, July 2025
ISSN No. – 3048- 7943
www.biothink.in

Results and Discussion

Himachal Pradesh, a biologically rich state in the Western Himalayas, is facing escalating threats to its wildlife due to a range of anthropogenic and environmental factors. Key challenges include habitat fragmentation from infrastructure development, increasing human-wildlife conflict, illegal poaching, and the spread of invasive species such as *Lantana camara* (Negi & Bhardwaj, 2020; Dogra et al., 2009). Additionally, climate change is altering habitat conditions, affecting species distributions and ecosystem stability (Shrestha et al., 2012). These threats collectively endanger iconic species like the Snow Leopard (*Panthera uncia*) and Himalayan Monal (*Lophophorus impejanus*), underscoring the urgent need for integrated conservation strategies (Sathyakumar et al., 2013; Raza et al., 2021).

1. Habitat Loss and Fragmentation

Habitat loss and fragmentation represent the most significant and pervasive threats to wildlife in Himachal Pradesh (HP). The Himalayan landscape, characterized by its unique topography and biodiversity, is increasingly being altered by developmental pressures such as road construction, hydroelectric projects, tourism infrastructure, and urban expansion. According to the India State of Forest Report (FSI, 2021), HP experienced a measurable decline in its dense forest cover, attributed to infrastructural expansion and shifting cultivation practices. The construction of linear infrastructure, such as roads and power lines, has led to the segmentation of once-continuous forests, creating ecological islands and obstructing wildlife movement (Saberwal & Rangarajan, 2003).

Species such as the Himalayan tahr (*Hemitragus jemlahicus*), snow leopard (*Panthera uncia*), and musk deer (*Moschus leucogaster*) are particularly affected, as their ranges require large, undisturbed tracts of land. Fragmented habitats also reduce genetic diversity, leading to inbreeding depression and population declines (Lovari et al., 2013). Apple orchards, expanding into higher altitudes, are gradually replacing subalpine meadows and forested zones, thereby displacing endemic and specialist species (Singh et al., 2021).

2. Human-Wildlife Conflict (HWC)

As human settlements and agricultural zones expand into wildlife habitats, the frequency and severity of human-wildlife conflict (HWC) have increased. In HP, leopards (*Panthera pardus fusca*), Himalayan black bears (*Ursus thibetanus*), and wild boars (*Sus scrofa*) are often involved in conflict scenarios. These animals venture into villages and agricultural lands in search of food, resulting in livestock predation, crop damage, and, occasionally, attacks on humans (Thakur et al., 2016).

Districts such as Shimla, Kullu, and Sirmaur have reported high incidences of leopard sightings and livestock depredation (HPFD, 2019). Despite compensation schemes provided by the government, delays in disbursement and bureaucratic red tape often discourage reporting and foster resentment among affected communities (Athreya et al., 2013). In response, some farmers resort to illegal retaliatory killings, including the use of poison bait and trapping, further endangering non-target wildlife.

3. Poaching and Illegal Wildlife Trade

Illegal wildlife trade is a persistent and lucrative enterprise that significantly threatens biodiversity in HP. The musk deer, targeted for its musk gland, is one of the most heavily poached species in the state. Other commonly poached animals include the leopard (for its skin and bones), Himalayan black bear (for bile), and pheasants such as the Western tragopan (*Tragopan melanocephalus*), prized for their plumage (Kaul et al., 2004).

Himachal Pradesh's geographic location—bordering Tibet and close to Nepal—makes it a hotspot for transboundary wildlife trafficking (WWF India, 2020). Weak enforcement, understaffed forest departments, and challenging terrain hinder anti-poaching efforts. Moreover, traditional hunting practices among some indigenous communities, though culturally rooted, have also contributed to wildlife decline (Sekhsaria, 2007).

4. Climate Change Impacts

The Himalayan region is experiencing rapid climate change, with rising temperatures, erratic precipitation, and

glacial retreat posing severe threats to biodiversity. Himachal Pradesh, in particular, has recorded warming trends that have altered vegetation zones, affecting the habitat preferences of alpine and subalpine species (Sharma et al., 2019).

Species like the snow leopard and Himalayan monal (*Lophophorus impejanus*) are being forced to shift their ranges upward, where space and resources are limited. This shift not only causes competition with other species but also increases exposure to human contact and conflict. Additionally, changes in snowfall and precipitation patterns are affecting the availability of water and food resources, influencing the distribution and survival rates of both prey and predator species (Aryal et al., 2016).

5. Invasive Species and Wildlife Diseases

Invasive species, such as *Lantana camara*, *Ageratina adenophora*, and *Parthenium hysterophorus*, have become widespread in the forests of HP, disrupting native ecosystems by outcompeting local flora. This has led to reduced forage availability for native herbivores, altering food chains and reducing habitat quality (Dogra et al., 2009).

Wildlife diseases are another emerging threat, especially zoonotic infections transmitted from domestic animals to wild populations. Diseases like canine distemper, sarcoptic mange, and foot-and-mouth disease have been observed in wild carnivores and ungulates, often originating from unvaccinated livestock and feral dogs that encroach into protected areas (Sehgal et al., 2021). The lack of systematic disease surveillance and veterinary care for wildlife further exacerbates the problem.

6. Tourism and Anthropogenic Pressure

Tourism, although an important economic activity in HP, has often contributed to ecological degradation. Destinations like Manali, Spiti Valley, and the Great Himalayan National Park attract large numbers of tourists, leading to habitat trampling, noise pollution, and garbage accumulation. Unregulated adventure activities such as trekking, camping, and off-road vehicle use disturb sensitive habitats and wildlife behavior (Negi & Nautiyal, 2003).

Wildlife species, particularly ground-nesting birds and elusive mammals, suffer from increased stress levels and breeding disruptions due to human presence. Additionally, tourism infrastructure such as hotels and roads further fragments natural habitats, while the influx of people increases the risk of forest fires and littering (Badola et al., 2010).

7. Policy Gaps and Enforcement Challenges

Despite the presence of comprehensive legal frameworks, including the Wildlife Protection Act (1972), Forest Conservation Act (1980), and Environment Protection Act (1986), enforcement remains inconsistent in HP. Forest departments are often understaffed and lack advanced equipment and training to deal with wildlife crimes or emergencies (Sekhsaria, 2007).

Community-based conservation programs exist but suffer from weak institutional support. Ecodevelopment committees, for instance, are frequently inactive due to lack of funding and local participation. Moreover, overlapping jurisdictions between forest, revenue, and tourism departments lead to conflicting land-use decisions and implementation challenges.

8. Summary Table of Major Threats to Wildlife in Himachal Pradesh

Threat Category	Drivers	Affected Species	Consequences	References
Habitat Fragmentation	Roads, hydropower, agriculture	Snow leopard, ibex, musk deer	Isolation, loss of gene flow	FSI (2021); Lovari et al. (2013)
Human-Wildlife Conflict	Crops, livestock, human encroachment	Leopard, bear, wild boar	Economic losses, retaliatory killings	Thakur et al. (2016)
Poaching and	Demand for animal	Musk deer,	Population decline,	Kaul et al.

Trade	parts, weak enforcement	leopard, bear, pheasants	extinction risk	(2004); WWF (2020)
Climate Change	Warming, altered rainfall	Snow leopard, monal, red panda	Range shift, competition, stress	Sharma et al. (2019)
Invasive Species & Disease	Alien plants, zoonotic diseases	Herbivores, carnivores	Food scarcity, mortality	Dogra et al. (2009)
Tourism Impact	Unregulated trekking, garbage, disturbance	Monal, tragopan, fox	Behavioral changes, habitat degradation	Badola et al. (2010)
Governance Gaps	Poor staffing, weak coordination	All species	Weak protection, poor community engagement	Sekhsaria (2007)

To counteract these escalating threats to wildlife in Himachal Pradesh, an integrated suite of conservation strategies is imperative. The following approaches, informed by scientific research and field experience, form the backbone of wildlife conservation in the region:

Strengthening Protected Areas and Ecological Corridors

Himachal Pradesh houses several protected areas, including the Great Himalayan National Park (GHNP), a UNESCO World Heritage Site. However, many species roam beyond these zones. Expanding and connecting existing protected areas through ecological corridors is crucial to ensure species migration and genetic exchange, particularly for wide-ranging animals like leopards and black bears (Sathyakumar et al., 2013; Negi & Bhardwaj, 2020).

Community-Based Conservation and Livelihood Support

Engaging local communities in conservation through eco-development and sustainable livelihood programs fosters

stewardship and reduces dependency on forest resources. Initiatives such as community-managed forests and participatory monitoring have shown success in mitigating human-wildlife conflict and poaching (Bajracharya et al., 2006; Rawat & Sharma, 2020).

Human-Wildlife Conflict Mitigation

With increasing instances of crop-raiding and livestock predation, conflict mitigation is vital. Strategies include use of predator-proof livestock enclosures, compensation schemes for wildlife damage, and early warning systems to alert communities about wildlife movement (Verma et al., 2022). Effective conflict resolution can reduce retaliatory killings and promote coexistence.

Climate Change Adaptation and Ecosystem Monitoring

Given the vulnerability of Himalayan ecosystems to climate change, conservation planning must incorporate long-term ecological monitoring and climate-resilient management. Predictive modelling and species distribution studies can inform adaptation measures for key species such as the Himalayan Tahr and Snow Leopard (Shrestha et al., 2012; Aryal et al., 2016).

Invasive Species Management

Controlling invasive alien species like *Lantana camara* and *Parthenium hysterophorus*, which degrade habitats and displace native flora, is critical. Mechanical removal, controlled burning, and ecological restoration using native species are recommended methods (Dogra et al., 2009).

Capacity Building and Awareness Campaigns

Training forest staff, equipping frontline workers with modern tools, and conducting biodiversity awareness programs can strengthen conservation outcomes. Public education and involvement, particularly of youth and women, enhances conservation ownership and local support (Bawa et al., 2010).

Wildlife Crime Control and Law Enforcement

Illegal wildlife trade remains a persistent threat. Strengthening enforcement of the

Wildlife (Protection) Act, 1972, improving surveillance, and promoting intelligence sharing between forest departments and police are necessary to curb poaching and trafficking (Raza et al., 2021).

Scientific Research and Biodiversity Documentation

Continued research on species population trends, habitat use, and threats is essential. Citizen science programs and digital tools such as camera traps and GIS mapping can aid in more efficient and participatory conservation planning (Kumar et al., 2021).

These conservation strategies must be implemented holistically, with strong institutional support, adequate funding, and inclusive governance to ensure the long-term protection of Himachal Pradesh's unique and fragile wildlife heritage.

Conclusion

The wildlife of Himachal Pradesh, though richly diverse and ecologically significant, is increasingly imperiled by a range of interconnected threats. Habitat loss due to infrastructural expansion, deforestation, and agricultural encroachment continues to fragment ecosystems, while climate change further exacerbates stress on vulnerable species by altering temperature and precipitation patterns. Human-wildlife conflicts, illegal poaching and invasive species, compound these issues, placing immense pressure on both flora and fauna. If left unaddressed, these threats could lead to irreversible biodiversity loss and the collapse of critical ecological functions. Therefore, immediate and integrated conservation actions such as strengthening protected areas, promoting community-based wildlife management, enhancing ecological connectivity, and enforcing environmental legislation are essential to safeguard Himachal Pradesh's wildlife heritage for future generations. This comprehensive review highlights the urgent need for a multi-disciplinary, participatory approach to conservation that combines scientific research, policy implementation, and local stakeholder engagement.

References

Aryal, A., Brunton, D., & Raubenheimer, D. (2016). Climate change in the Himalayas: Current state of

knowledge. *Climatic Change*, **135**, 1–15. https://doi.org/10.1007/s10584-015-1580-z

Aryal, A., et al. (2016). Predicting the impacts of climate change on the endangered red panda. *Ecological Indicators*, 60, 1017–1024.

Athreya, V., Odden, M., Linnell, J. D. C., Krishnaswamy, J., & Karanth, K. U. (2013). Big cats in our backyards: Persistence of large carnivores in a human-dominated landscape in India. *PLoS ONE*, 8(3), e57872.

Badola, R., et al. (2010). An assessment of ecosystem services of Corbett Tiger Reserve. *Forest Ecology and Management*, 259(11), 2178–2187.

Bajracharya, S. B., Furley, P. A., & Newton, A. C. (2006). Impacts of community-based conservation on local communities in the Annapurna Conservation Area, Nepal. *Biodiversity and Conservation*, **15**(8), 2765–2786.

Bawa, K. S., Koh, L. P., Lee, T. M., Liu, J., Ramakrishnan, P. S., Yu, D. W., Zhang, Y., & Raven, P. H. (2010). China, India, and the Environment. *Science*, **327**(5972), 1457–1459. https://doi.org/10.1126/science.1185164

Bharti, S., Kumar, G. & Kapoor, G. (2025). "Navigating Human-Wildlife Conflict: Key Species, Impacts, Mitigation and Challenges in Himachal Pradesh, India". *Asian Journal of Research in Zoology*, **8**(1), 33-49. https://doi.org/10.9734/ajriz/2025/v8i1180.

Chardonnet, P., Clers, B. D., Fischer, J., Gerhold, R., Jori, F. & Lamarque, F. (2002). The value of Wildlife. *Rev. sci. tech. Off. int. Epiz.*, **21**(1), 15-51.

Dhyani, S. & Dhyani, D. (2016). Significance of provisioning eco-system services from moist temperate forest ecosystems: lessons from upper Kedarnath valley, Garhwal, India. *Energy Ecology and Environment*, **1**, 109–121.

Dogra, K. S., et al. (2009). Impact of invasive plants on native biodiversity. *Journal of Ecology and the Natural Environment*, 1(3), 109–121.

Dogra, K. S., Kohli, R. K., & Sood, S. K. (2009). An assessment and impact of three invasive species in the Shivalik Hills of Himachal Pradesh, India. *International Journal of Biodiversity and Conservation*, **1**(1), 4–10.

Dogra, K. S., Kohli, R. K., & Sood, S. K. (2009). An assessment and impact of three invasive species in the Shivalik Hills of Himachal Pradesh, India. *International Journal of Biodiversity and Conservation*, **1**(1), 4–10.

Ecosystem in Western Himalaya- possible impacts on alpine vegetation. ENVIS Bulletin Himalayan Ecology, **31**.

Forest survey of India (FSI), 2013. State of Forest Report. Forest Survey of India, Ministry of Environment and Forests, Dehradun.

Forest Survey of India (FSI). (2021). *India State of Forest Report 2021*. Ministry of Environment and Forests.

Forest Survey of India. (2023). *India State of Forest Report 2023*. Dehradun: FSI. https://fsi.nic.in/isfr

HPFD. (2019). *Annual Report*. Himachal Pradesh Forest Department.

Joshi, R., & Tamang, N. D. (2023). Indications of elevation dependent warming along treeline

Kaul, R., Menon, V., & Choudhury, B. C. (2004). *Conservation of the Himalayan musk deer*. Wildlife Trust of India.

Kaur, D., Tiwana, A. S., Kaur, S. & Gupta, S. (2022). Climate Change: Concerns and Influences on Biodiversity of the Indian Himalayas. In: Rani, S., Kumar, R. (eds) Climate Change. Springer Climate. Springer, Cham, 265-281. https://doi.org/10.1007/978-3-030-92782-0_13

Kumar, R., Sharma, L. K., & Hussain, S. A. (2021). Camera trap-based monitoring reveals new records of mammals in the western Himalayas. *Journal of Threatened*

Taxa, **13**(2), 17514–17523. https://doi.org/10.11609/jott.6743.13.2.17514-17523

Lovari, S., Ventimiglia, M., & Minder, I. (2013). Food habits of the Himalayan snow leopard in Ladakh. *Journal of Mammalogy*, 94(3), 577–583.

Maikhuri, R. K., Ramakrishnan, P. S. (1990). Ecological analysis of a cluster of villages emphasising land use of different tribes in Meghalaya in North-east India. *Agriculture, ecosystems & environment*, **31**(1), 17-37.

Ministry of Environment, Forest & Climate Change. (2024). *National Parks & Wildlife Sanctuaries Database, Version 2.0.* New Delhi: MoEFCC. https://moef.gov.in/wp-content/uploads/2024/03/national-parks-database-v2.0.pdf

Negi, C. S., & Nautiyal, S. (2003). Eco-tourism in the Indian Himalayan region: A case study of Kullu–Manali. *Eco-tourism and Conservation in the Himalayas*, 1, 107–126.

Negi, C., & Bhardwaj, R. (2020). Habitat fragmentation and its implications on biodiversity in the Western Himalayas: A review. *Journal of Mountain Science*, **17**(5), 1125–1140. https://doi.org/10.1007/s11629-019-5615-8

Negi, C., & Bhardwaj, R. (2020). Habitat fragmentation and its implications on biodiversity in the Western Himalayas: A review. *Journal of Mountain Science*, **17**(5), 1125–1140. https://doi.org/10.1007/s11629-019-5615-8

Rawat, A. P., & Sharma, R. (2020). Anthropogenic pressures on biodiversity in Himachal Pradesh: A case study. *Indian Journal of Ecology*, **47**(Special Issue), 135–142.

Raza, H., Nijman, V., & Shepherd, C. R. (2021). Illegal trade of Himalayan wildlife in India: Enforcement challenges and conservation priorities. *Oryx*, **55**(2), 181–188. https://doi.org/10.1017/S0030605319000693

Raza, H., Nijman, V., & Shepherd, C. R. (2021). Illegal trade of Himalayan wildlife in India: Enforcement challenges and conservation priorities. *Oryx*, **55**(2), 181–188. https://doi.org/10.1017/S0030605319000693

Saberwal, V. K., & Rangarajan, M. (2003). *Battles over nature: Science and the politics of conservation*. Permanent Black.

Samant, Pant, S., Singh, M., Lal, M., Singh, A., Sharma, A. & Bhandari, S. (2007) Medicinal plants in Himachal Pradesh, north western Himalaya, India. *The International Journal of Biodiversity Science and Management*, **3**(4), 234-251. DOI: 10.1080/17451590709618177.

Sathyakumar, S., Bashir, T., Bhattacharya, T., & Poudyal, K. (2013). Diversity, distribution and abundance of mammals in Great Himalayan National Park, Himachal Pradesh, India. *International Journal of Conservation Science*, **4**(2), 189–202.

Sathyakumar, S., Bashir, T., Bhattacharya, T., & Poudyal, K. (2013). Diversity, distribution and abundance of mammals in Great Himalayan National Park, Himachal Pradesh, India. *International Journal of Conservation Science*, **4**(2), 189–202.

Sehgal, R. N. M., et al. (2021). Wildlife disease risk in the Himalayas. *Frontiers in Ecology and Evolution*, 9, 673837.

Sekhsaria, P. (2007). The state and the wild. *Economic and Political Weekly*, 42(39), 4063–4067.

Sharma, E., Chettri, N., & Tse-ring, K. (2019). Climate change impacts in the Eastern Himalayas. *ICIMOD Report*.

Sharma, G., Kamalakannan, M. and Venkataraman, K. (2015). A Checklist of Mammals of India with their distribution and conservation status. Zool. Surv. India, Kolkata. 107.

Shrestha, U. B., Gautam, S., & Bawa, K. S. (2012). Widespread climate change in the Himalayas and

associated changes in local ecosystems. *PLoS ONE*, **7**(5), e36741. https://doi.org/10.1371/journal.pone.0036741

Shrestha, U. B., Gautam, S., & Bawa, K. S. (2012). Widespread climate change in the Himalayas and associated changes in local ecosystems. *PLoS ONE*, **7**(5), e36741. https://doi.org/10.1371/journal.pone.0036741

Singh, R., Kumari, R., & Bhandari, A. (2021). Human-leopard conflict in Himachal Pradesh. *Human Dimensions of Wildlife*, 26(2), 129–144.

Soni, V. K. (2020). Wildlife Conservation in India: Issues and Challenges. *Journal of Interdisciplinary Cycle Research*, **12**(10), 796-802.

Thakur, M., Thakur, A. & Thakur, J. (2024). Habitat degradation and increasing Human-Wildlife Conflicts in Himachal Pradesh: a Review. *Voyager*, **15**, 51-67. https://doi.org/10.31995/voyager.2024.v15.SI.006.

Thakur, S., et al. (2016). Patterns of human-carnivore conflict in Himachal Pradesh. *Human Dimensions of Wildlife*, 21(1), 54–65.

Upgupta, S., Sharma, J., Jayaraman, M., Kumar, V., Ravindranath, N. H. (2015). Climate change impact and vulnerability assessment of forests in the Indian Western Himalayan region: A case study of Himachal Pradesh, India. *Climate Risk Management*, **10**, 63–76. http://dx.doi.org/10.1016/j.crm.2015.08.002.

Verma, A., Mehta, P., & Rana, R. (2022). Human-Wildlife Conflict in Himachal Pradesh: Drivers and Mitigation. *Journal of Environmental Management and Sustainable Development*, **11**(2), 45–59.

WWF India. (2020). *Illegal Wildlife Trade in India*. Retrieved from https://www.wwfindia.org