

Threatened Wildlife Species of Jammu and Kashmir with Conservation Challenges and Future Management Strategies

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Abstract

Jammu and Kashmir is one of the most biologically significant regions of the Indian Himalayan ecosystem, supporting diverse terrestrial, aquatic, and alpine habitats. Its rich biodiversity includes numerous threatened mammals, birds, reptiles, amphibians, and freshwater fishes that are of national and global conservation importance. Species such as the Hangul (*Cervus hanglu hanglu*), snow leopard (*Panthera uncia*), Himalayan musk deer (*Moschus leucogaster*), Kashmir markhor (*Capra falconeri cashmiriensis*), Himalayan brown bear (*Ursus arctos isabellinus*), and several migratory birds face increasing threats from habitat degradation, climate change, poaching, illegal wildlife trade, human-wildlife conflict, and unplanned developmental activities. According to recent assessments, Jammu and Kashmir supports more than 70 threatened and near-threatened faunal species, emphasizing the urgent need for integrated conservation strategies. This review summarizes the diversity of threatened wildlife species, their conservation status, major threats, existing conservation initiatives, protected-area networks, recent advances in wildlife management, and future strategies for sustainable biodiversity conservation.

Keywords: Threatened wildlife, Jammu and Kashmir, Biodiversity conservation, Hangul, Snow leopard, Protected areas.

1. Introduction

The Himalayan region is recognized globally as one of the world's biodiversity hotspots because of its exceptional species richness, habitat diversity, and high level of endemism. Jammu and Kashmir occupies a strategic position within this landscape, encompassing subtropical forests, temperate forests, alpine meadows, wetlands, river systems, and high-altitude ecosystems. These habitats support a remarkable diversity of wildlife, including several species that are classified as Critically Endangered, Endangered, Vulnerable, or Near Threatened under the International Union for Conservation of Nature (IUCN) Red List. Wildlife plays a fundamental role in maintaining ecological stability by regulating food webs, pollination, seed dispersal, nutrient cycling, and ecosystem productivity. However, increasing anthropogenic pressures, rapid urbanization, habitat fragmentation, illegal hunting, climate change, invasive species, infrastructure development, and unsustainable resource utilization have accelerated biodiversity loss across the region. Protected areas including Dachigam National Park, Kishtwar National Park, Kazinag National Park, Overa-Aru Wildlife Sanctuary, Hirpora Wildlife Sanctuary, Jasrota Wildlife Sanctuary, and several conservation reserves provide essential habitats for threatened fauna. Nevertheless, many species continue to experience declining populations because of habitat degradation and increasing human disturbances.

Recent assessments have documented approximately 71 threatened and near-threatened faunal species from Jammu and Kashmir, including mammals, birds, reptiles, amphibians, and freshwater fishes.

2. Threatened Wildlife Diversity of Jammu and Kashmir

Jammu and Kashmir supports an exceptionally rich assemblage of vertebrate fauna. Mammals constitute one of the most important groups, represented by the Hangul (Kashmir stag), snow leopard, Himalayan musk deer, Kashmir markhor, Himalayan brown bear, Himalayan black bear, Asiatic ibex, blue sheep, and leopard. Several of these species have experienced substantial population declines because of habitat loss, poaching, and climate change. The region is equally important for avian diversity, supporting numerous resident and migratory birds. Species such as the western tragopan, black-necked crane, Egyptian vulture, steppe eagle, and white-rumped vulture are of considerable conservation concern. Wetlands including Hokersar, Wular Lake, Mansar Lake, Surinsar Lake, and Gharana Wetland provide essential wintering habitats for thousands of migratory birds along the Central Asian Flyway. Reptiles, amphibians, and freshwater fishes also contribute significantly to regional biodiversity. Native snow trout, Himalayan amphibians, and several reptilian species face increasing pressures from habitat degradation, pollution, river modification, and climate-induced environmental changes.

Table 1: Major Threatened Wildlife Species of Jammu and Kashmir

Species	Conservation Category*	Major Threats
Hangul (Kashmir stag)	Critically Endangered (regional concern)	Habitat fragmentation, inbreeding
Snow leopard	Vulnerable	Climate change, prey decline
Kashmir markhor	Near Threatened	Habitat degradation, poaching
Himalayan musk deer	Endangered	Illegal hunting for musk
Himalayan brown bear	Endangered (regional concern)	Human conflict
Western tragopan	Vulnerable	Forest degradation
Egyptian vulture	Endangered	Poisoning and habitat loss

*Based on widely recognized conservation assessments and regional conservation priorities.

3. Major Threats to Wildlife Conservation

Wildlife populations in Jammu and Kashmir are threatened by multiple interacting factors. Habitat fragmentation caused by road construction, urban expansion, hydroelectric projects, mining, and deforestation has reduced habitat connectivity and isolated wildlife populations. Illegal hunting and wildlife trafficking continue to affect mammals, birds, and reptiles despite legal protection. Climate change has altered snowfall patterns, vegetation distribution, and water availability, thereby affecting breeding, migration, and food resources for numerous species. Human–wildlife conflict has increased due to expanding settlements near forest boundaries, resulting in livestock predation, crop damage, and retaliatory killing of wildlife. Wetland degradation, invasive species, uncontrolled tourism, forest fires, and pollution further accelerate biodiversity loss.

Table 2: Major Conservation Challenges

Threat	Impact
Habitat fragmentation	Population isolation
Illegal hunting	Declining wildlife populations
Climate change	Habitat alteration
Human–wildlife conflict	Increased mortality
Wetland degradation	Decline of migratory birds
Forest fires	Habitat destruction
Pollution	Aquatic biodiversity loss

4. Existing Conservation Programs and Protected Areas

The conservation of threatened wildlife species in Jammu and Kashmir is supported through an extensive network of protected areas, wildlife sanctuaries, conservation reserves, and national parks. These protected landscapes provide critical habitats for endangered mammals, birds, reptiles, and other wildlife species. Conservation initiatives are coordinated by the Department of Wildlife Protection, Government of Jammu and Kashmir, in collaboration with national and international conservation organizations. Dachigam National Park is the most important protected area for the conservation of the Hangul population. The park provides suitable habitat for several threatened mammals including the Himalayan black bear, leopard, and musk deer. Kishtwar National Park, Kazinag National Park, Hirpora Wildlife Sanctuary, Overa–Aru Wildlife Sanctuary, and Limber Wildlife Sanctuary play significant roles in protecting alpine and temperate biodiversity. Conservation programs increasingly incorporate habitat restoration, anti-poaching patrols, wildlife monitoring, ecological research, captive breeding, and community participation. Population monitoring using camera traps, satellite telemetry, geographic information systems (GIS), and remote sensing technologies has improved the effectiveness of wildlife management and conservation planning.

Table 3: Important Protected Areas Supporting Threatened Wildlife

Protected Area	Major Species Protected
Dachigam National Park	Hangul, black bear, leopard
Kishtwar National Park	Snow leopard, brown bear
Kazinag National Park	Markhor, Himalayan fauna
Hirpora Wildlife Sanctuary	Markhor, musk deer
Overa–Aru Wildlife Sanctuary	Hangul, leopard
Limber Wildlife Sanctuary	Markhor and mountain ungulates

5. Recent Trends in Wildlife Conservation

Recent wildlife conservation efforts in Jammu and Kashmir have shifted from species-focused approaches toward integrated ecosystem-based management. Advances in ecological monitoring technologies have enhanced the collection of scientific data regarding wildlife distribution, habitat quality, migration routes, and population dynamics. Camera trap surveys have improved estimation of elusive species such as snow leopards, leopards, and musk deer. Remote sensing and GIS-based habitat mapping enable identification of critical wildlife corridors and priority conservation areas. Environmental DNA (eDNA) techniques are increasingly being explored for monitoring aquatic and terrestrial biodiversity without direct observation. Community-based conservation has emerged as an important strategy for reducing human-wildlife conflict and promoting local participation in biodiversity management. Educational campaigns, eco-development programs, sustainable livelihood initiatives, and ecotourism projects encourage local communities to actively support wildlife conservation. Research institutions and universities are increasingly contributing to biodiversity assessments, species inventories, ecological studies, and conservation planning. Collaborative conservation programs involving government agencies, researchers, local communities, and non-governmental organizations have strengthened wildlife protection efforts throughout the region.

Table 4: Recent Conservation Approaches

Conservation Approach	Major Benefit
Camera trapping	Population monitoring
GIS and remote sensing	Habitat mapping
Environmental DNA (eDNA)	Species detection
Community participation	Reduced conflict
Ecotourism initiatives	Sustainable conservation funding
Wildlife corridor planning	Improved habitat connectivity

6. Future Management Strategies

Long-term conservation of threatened wildlife species in Jammu and Kashmir requires comprehensive management strategies that integrate scientific research, habitat protection, community participation, and climate adaptation. Habitat restoration and protection of ecological corridors should be prioritized to maintain connectivity among fragmented wildlife populations. Strengthening anti-poaching measures through improved surveillance, modern monitoring technologies, and stricter law enforcement is essential for controlling illegal wildlife trade. Expansion of protected areas and creation of buffer zones can further improve habitat security for threatened species.

Climate-resilient conservation planning should address changing environmental conditions by identifying climate refugia, restoring degraded ecosystems, and maintaining genetic diversity within wildlife populations. Genetic monitoring programs can assist in managing small and isolated populations, particularly for species such as the Hangul.

Public awareness campaigns, environmental education, and community-based conservation programs should be expanded to promote coexistence between humans and wildlife. Sustainable ecotourism initiatives can generate economic incentives for local communities while supporting conservation objectives. Greater investment in wildlife research, biodiversity databases, long-term ecological monitoring, and advanced technologies such as artificial intelligence, drones, satellite tracking, and environmental genomics will further strengthen conservation outcomes.

7. Conclusion

Jammu and Kashmir represents one of the most ecologically significant regions of the Indian Himalayas, supporting a remarkable diversity of threatened wildlife species across forests, wetlands, alpine meadows, grasslands, and mountainous ecosystems. Species such as the Hangul, snow leopard, Kashmir markhor, Himalayan musk deer, Himalayan brown bear, western tragopan, and numerous migratory birds constitute invaluable components of the region's natural heritage and ecological integrity. Despite ongoing conservation efforts, wildlife populations continue to face serious challenges from habitat fragmentation, climate change, illegal hunting, human-wildlife conflict, wetland degradation, pollution, and unsustainable developmental activities. These threats have contributed to population declines and increased vulnerability of several species that are already under conservation concern. Protected areas, wildlife sanctuaries, conservation reserves, habitat restoration programs, scientific monitoring, and community-based conservation initiatives have significantly improved wildlife protection in recent decades. The adoption of advanced technologies such as GIS, remote sensing, camera trapping, environmental DNA analysis, and satellite telemetry has enhanced wildlife management and conservation planning.

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