

**ANIMAL DIVERSITY: THREATS AND CONSERVATION MEASURES IN THE
BUNDELKHAND REGION*****Dr. Mukesh Kumar Napit, Dr. Anjana Choudhary, Prof. Anisha Soni, Prof. Richa Silikar**

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ABSTRACT

Animal diversity is a key component of ecosystem stability and sustainable development. The Bundelkhand region of Central India spread across UP and MP supports a variety of mammals, birds, reptiles, amphibians, fishes and insects. The region supports a diverse assemblage of vertebrate and invertebrate fauna despite recurrent droughts, rocky terrain, and increasing anthropogenic pressures. However Rapid Habitat degradation, deforestation, mining, climate change, water scarcity and human- wildlife conflict have severely affected its faunal diversity. These factors have contributed to declining wildlife populations and degradation of natural habitats. Conservation of biodiversity in this region therefore requires an integrated approach involving habitat restoration, scientific wildlife monitoring, landscape level planning, community participation, environmental education, and effective implementation of national wildlife legislation. The study highlights the ecological significance of protected forests, river system, wetlands, and community managed landscapes in maintaining biodiversity. The findings demonstrate that sustainable conservation in Bundelkhand depends upon balancing ecological protection with socio – economic development. Strengthening habitat connectivity, improving watershed management, reducing anthropogenic disturbances, and encouraging community based conservation programmes are essential for maintaining the ecological integrity of this unique semi-arid landscape. This paper reviews the major threats to animal diversity in Bundelkhand region and proposes practical conservation measures to sustainable biodiversity management. Recent studies also document the declining populations of vultures, Cliff dwelling Bird and Habitat specific bat in the region.

KEYWORD: Animal diversity, Biodiversity, Conservation, Bundelkhand, Wildlife, Habitat loss, Climate change.**INTRODUCTION**

Animal diversity includes the variety of animal species, their taxonomic, ecosystem and genetic diversity they inhabit. Bundelkhand is characterized by tropical dry deciduous forests, Scrub lands, Rocky Hills, ravines, rivers, wetlands and Agricultural landscapes. These habitats support species such as nilgai, blackbuck, jackal, Fox, sloth bear, langur, bats, vulture, peafowl, reptiles, amphibians and freshwater fishes. The ecological balance of the region is increasingly threatened by human activities and environmental degradation.

Bundelkhand occupies a distinctive ecological position within central India. Characterized by undulating plateaus, granite outcrops, seasonal rivers, dry deciduous forests, scrublands, grasslands, agricultural fields, and

wetlands, the region supports a mosaic of habitats capable of sustaining diverse animal communities. Although climatic conditions are harsh, with frequent droughts and highly variable rainfall, these ecosystems remain important refuges for numerous mammals, birds, reptiles, amphibians, fishes, and invertebrates.

Large herbivores such as nilgai and blackbuck, carnivores including jackals, wolves, and leopards (in selected forest landscapes), reptiles such as monitor lizards, cobras, pythons, and turtles, together with numerous migratory and resident bird species, contribute significantly to the ecological functioning of the region. River systems such as the Betwa, Ken, Dhasan, Paisuni, Tons, and Yamuna support freshwater biodiversity,

while seasonal wetlands provide breeding habitats for amphibians and aquatic birds.

The Bundelkhand landscape also contains several protected forest and conservation areas that function as biodiversity reservoirs. These habitats are increasingly threatened by habitat fragmentation, illegal extraction of forest resources, mining, overgrazing, invasive plant species, pollution, uncontrolled tourism, road expansion, and human wildlife conflicts. Climate change further intensifies these pressures by increasing drought frequency, reducing water availability, altering vegetation composition, and disrupting breeding cycles.

Understanding the diversity, distribution, ecological interactions, and conservation status of animal species is therefore essential for effective biodiversity management. Scientific documentation of faunal diversity provides the foundation for conservation planning, ecological restoration, protected area management, environmental impact assessment, and sustainable natural resource utilization.

The present research aims to provide a comprehensive assessment of animal diversity in Bundelkhand, identify major anthropogenic and natural threats, evaluate existing conservation initiatives, and recommend evidence-based strategies for ensuring long-term biodiversity conservation in this ecologically important region.

LITERATURE REVIEW

Studies by Mishra, Rana, and Pal(2018), reported high avian diversity in Bundelkhand, recording numerous bird species, including several globally threatened species. Their work highlighted the ecological significance of forest patches, wetlands, and agriculture landscapes in maintaining bird diversity while emphasizing the adverse impacts of habitat degradation and human disturbance.

Kushwaha and Kumar(2018), investigated the decline of vulture population in the Bundelkhand region and identified habitat destruction, disturbance at nesting sites, poisoning, and veterinary drug use as major threats. Their study demonstrated that, despite the ban on veterinary diclofenac, human activities continue to affect vulture conservation.

Further research by Kushwaha, Kumar and Singh(2022), Focused on the conservation of cliff dwelling birds in Bundelkhand. The authors emphasized that rock cliffs serve as critical breeding habitats for several raptor species but are increasingly threatened by stone quarrying, mining, and infrastructure development. They recommended community participation, habitat protection, and sustainable management as essential conservation strategies.

Overall, the available literature suggests that conserving the animal diversity of Bundelkhand requires integrated

habitat management, restoration of protected ecosystems, strengthening of degraded areas, scientific monitoring, strict enforcement of wildlife protection laws, and active participation of local communities. Although important information is available for selected groups such as birds and vultures, comprehensive studies covering the entire faunal diversity of Bundelkhand region remain limited, indicating the need for further systematic research.

STUDY AREAS

The Bundelkhand region is a historically and ecologically important plateau situated in central India. It extends across approximately 70,000 – 71,000km, covering parts of southern Uttar Pradesh and northern Madhya Pradesh. Administratively, the region comprises thirteen districts.

The region lies approximately between 23°10'-26°30' N latitude and 78°00'-81°30' E longitude. The climate is tropical semi arid with three distinct seasons.

Summer - (March - June): Maximum temperature often exceeds 45°C.

Monsoon - (July - September): Around 75-90% of annual rainfall occurs during this period.

Winter - (November - February): Temperature may fall to 5-8°C in some districts. Average annual rainfall varies from 700 to 1,100mm, but rainfall is highly erratic. Frequent droughts strongly influence vegetation, water availability, and wildlife distribution.

It is bounded by the Yamuna River in the north, the Vindhyan highlands in the south, the Chambal basin in the west, and the Bundelkhand region in the east. The landscape is characterized by granite outcrops, rocky plateaus, isolated hills, shallow valleys, and seasonal drainage channels. Bundelkhand is drained by several important rivers belonging mainly to the Yamuna and Ganga basins, including: Betwa, Ken, Dhasan, Paisuni, Mandakni, Baghan, Sonar.

Major Soil types include: Red soil, Black cotton soil, Mixed red black soil, Alluvial soil and gravelly soil on rocky uplands. Soil depth and fertility vary considerably, influencing vegetation patterns and habitat quality for wildlife. The natural vegetation is dominated by tropical dry deciduous forest interspersed with scrub forest, thorny bushes, grasslands, and agricultural landscapes.

Common tree species include: Teak (*Tectona grandis*), Dhak (*Butea monosperma*), Tendu (*Diospyros melanoxylon*), Mahua (*Madhuca longifolia*), Neem (*Azadirachta indica*), Babul (*Vachellia nilotica*), Ber (*Ziziphus mauritiana*) and Salai (*Boswellia serrata*), these plant communities provide food, nesting sites, shelter, and breeding habitats for numerous faunal species.

The present study incorporates a survey of the study areas in respect to its history, geology and climatic condition, seasonal, spatial, zonation variation of

physico-chemical factors, biological study of animal population are represented in tabular form.

This is for the first time that a systematic animals fauna diversity study has been done in these areas.

Table 1: Showing the mean values of Climatic factors of Damoh district from July 2024 to June 2025.

Months	Temperature ($^{\circ}\text{C}$)			Rain Fall (mm)	Humidity (%)			Wind Velocity
	Max.	Min.	Average		Max.	Min.	Average	
July	31.28	23.12	231.0	231.0	84.07	69.79	77.02	7.90
August	29.46	22.36	25.91	353.8	93.00	82.07	87.54	6.00
September	32.19	21.73	26.96	47.7	80.50	60.00	70.25	5.13
October	33.98	19.50	26.74	-	47.19	33.03	40.11	4.03
November	28.81	15.24	22.03	-	46.50	31.43	38.97	3.53
December	25.93	11.92	18.93	-	51.42	34.97	43.17	3.52
January	24.19	9.27	16.73	2.6	49.71	31.10	40.41	4.55
February	28.25	12.99	20.62	-	35.07	20.75	27.91	5.32
March	31.77	17.11	24.44	28.3	46.19	26.13	36.16	5.90
April	38.01	22.06	30.04	-	24.67	12.80	18.74	5.77
May	42.07	26.56	34.32	1.4	28.07	13.77	20.92	6.48
June	36.79	24.04	30.42	110.5	67.20	48.80	58.00	8.33

Courtesy: Meteorological department department Damoh (M.P.)

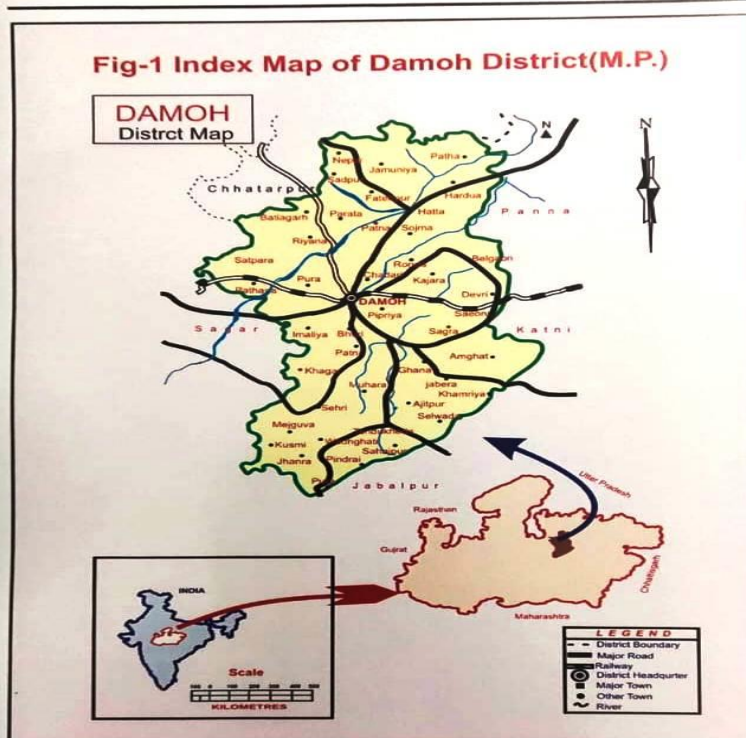
Protected Areas of the Bundelkhand Region

The Bundelkhand region spans Southern Uttar Pradesh and northern Madhya Pradesh. It includes several protected forests, wildlife Sanctuaries, and one tiger reserve that are important for conserving the regions, Biodiversity.

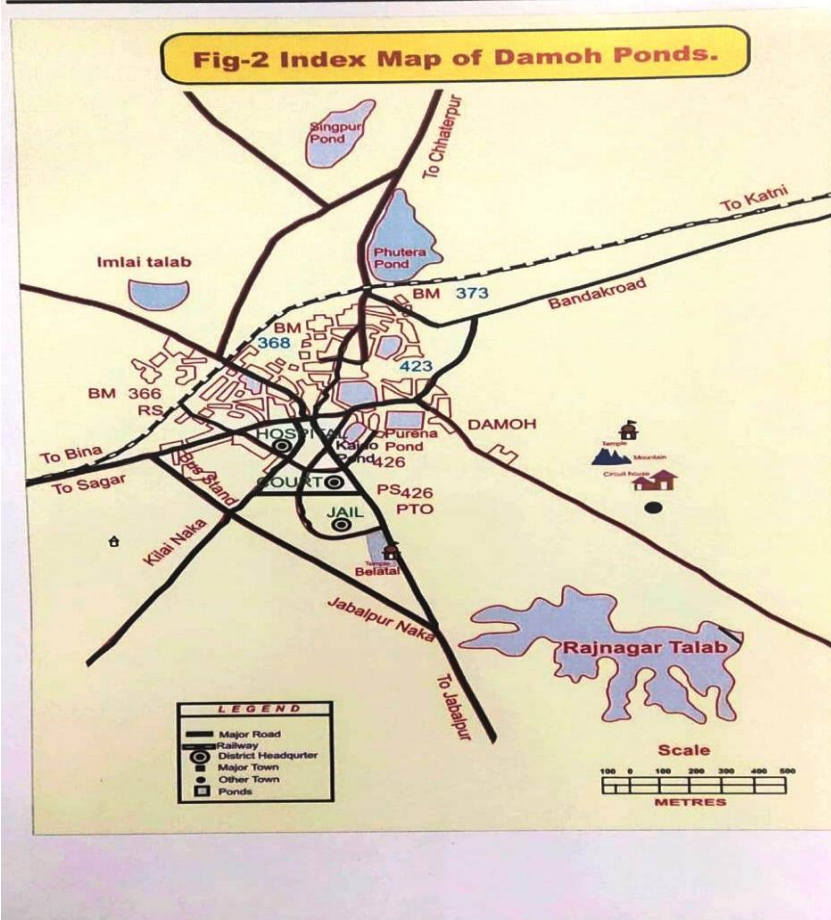
Conserve dry deciduous forest and Scrub ecosystem. Protect trending mammals, reptiles, birds and aquatic fauna provide habitat for tigers, Leopard, Sloth bears, vultures, gharial and many endemic species maintain ecological connectivity to riverine and forest landscape support Eco-tourism Research and biodiversity conservation.

	Protected Area	State	District	Category	Major Wildlife
•	Panna Tiger Reserve	Madhya Pradesh	Panna, Chhatarpur	Tiger Reserve	Tiger, Leopard, Sloth Bear, Chinkara, Gharial, Vultures
•	Ranipur Wildlife Sanctuary	Uttar Pradesh	Chitrakoot	Wildlife Sanctuary	Leopard, Sloth Bear, Nilgai, Chinkara, Jackal, Hyena
•	National Chambal Sanctuary	UP, MP, Rajasthan	Chambal River	Wildlife Sanctuary	Gharial, Gangetic Dolphin, Mugger Crocodile, Indian Skimmer
•	Ken Gharial Sanctuary	Madhya Pradesh	Panna	Wildlife Sanctuary	Gharial, Mugger Crocodile, Freshwater Turtles, Water Birds
•	Rani Durgavati Wildlife Sanctuary	Madhya Pradesh	Damoh	Wildlife Sanctuary	Leopard, Chital, Sambar, Wild Boar
•	Nauradehi Wildlife Sanctuary	Madhya Pradesh	Sagar	Wildlife Sanctuary	Gharial, Mugger Crocodile, Freshwater Turtles, Water Birds

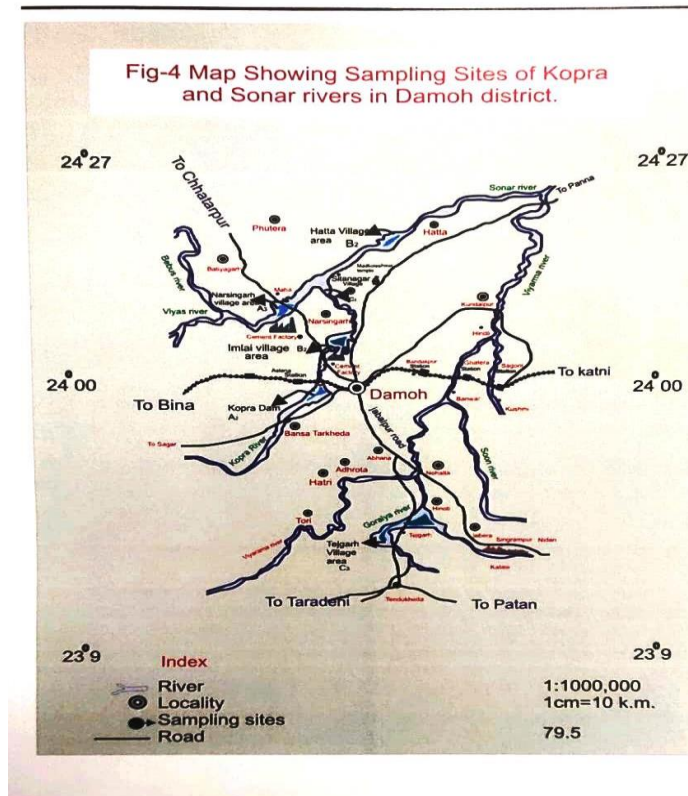
Study Areas



Study Areas



Study Areas



MATERIALS AND METHODS

The present study on “**Animal Diversity Threats and Conservation Measures in the Bundelkhand Region**” was conducted using both **primary and secondary sources of information**. The materials used in this study included published books, research articles, government reports, biodiversity databases, forest department records, wildlife census reports, satellite maps, and field observation sheets. Standard field equipment such as binoculars, a GPS device, digital camera, field notebooks, and identification guides for mammals, birds, reptiles, amphibians and insects were utilized during field observations. Topographical maps and GIS based land use maps were also used to understanding habitat distribution and fragmentation.

The study adopted a descriptive and analytical approach. Secondary data were collected through an extensive review of scientific literature, reports of the Ministry of Environment, Forest and Climate change, the wildlife institute of India, the Zoological Survey of India, and the Madhya Pradesh and Uttar Pradesh Forest Departments. Primary information was obtained through field surveys, direct observations, and informal discussions with local communities and forest officials.

The collected data were compiled, classified, and analysed to assess the current status of animal diversity, identify major threats, and recommend suitable conservation strategies for the sustainable management of biodiversity in the Bundelkhand region.

OBSERVATION

Field observations and the review of available literature indicate that the Bundelkhand region possesses a considerable diversity of wild animals despite its semi arid climate and increasing anthropogenic pressures. The region supports a variety of mammals, birds, reptiles, amphibians, fishes, and invertebrates inhabiting dry deciduous forests, scrublands, grasslands, wetlands, rivers, agricultural fields, and rocky hill ecosystems. Frequently observed mammalian species include nilgai, blackbuck, chital, wild boar, jackal, Indian fox, rhesus macaque, langur, and small carnivores. The avifauna is particularly diverse, comprising peafowl, partridges, owls, kingfishers, eagles, vultures, herons, and numerous migratory water birds. Reptiles such as monitor lizards, snakes, turtles, and geckos are also commonly found in suitable habitats.

The observations revealed that habitat degradation is the most significant threat to animal diversity in the Bundelkhand region. Expansion of agriculture, deforestation, mining activities, quarrying of rocky hills, urbanization, road construction, and uncontrolled grazing have fragmented natural habitats, reducing food availability and breeding sites for wildlife. Seasonal droughts and declining water resources further limit the survival of many terrestrial and aquatic species. Illegal hunting, fuel wood extension, pollution of water bodies, invasive plant species, and increasing human wildlife conflicts were also observed as important factors affecting biodiversity.

Overall, the observations suggest that while the Bundelkhand region still retains significant faunal diversity, the increasing pressure from human activities and climatic variability poses serious challenges to its long term conservation. Sustainable managements of natural resources, protection of critical habitats, scientific biodiversity monitoring, and community based conservation are essential to ensure the ecological balance in the region.

Animal diversity of Bundelkhand region

Major faunal groups include.

- Mammals: Nilgai, Blackbuck, Jackal, Indian Fox, Sloth Bear, Langur, Bats.
- Birds: Indian Pea Fowl, Vultures, Parakeets, Owls, Eagles, Kingfishers and Numerous Migratory Birds.
- Reptile: Monitor Lizard, Cobra, Red Snake, Garden lizard.
- Amphibian: Frogs and toads associated with seasonal wetlands.
- Freshwater fishes: Native fishes, Turtle and aquatic invertebrate.

Survey have recorded rich bird diversity including globally.

threatened species and documented several bat species across.

Bundelkhand districts.

- Major threats to animal diversity
- Habitat destruction due to deforestation and land use change

- Mining and stone quarrying causing destruction of Rocky Habitats and nesting sites
- Climate change leading to drought, rising temperatures and reduced water availability
- Human-wildlife conflict caused by agricultural expansion and free ranging livestock
- Illegal hunting and poaching
- Pollution from pesticides, industrial wastes and plastics
- overgrazing in forest degradation
- Invasive Plant species reducing native Habitat quality

Ravine ecosystem and dry forests are particularly vulnerabl because of over exploitation and biodiversity loss.

Conservation Measures

- Strengthen protected areas and wildlife corridor Restore degraded forest and ravine ecosystem through afforestation and Eco development
- Control illegal hunting and wildlife trade through strict enforcement encourage sustainable agriculture with reduced pesticide use developed water conservation structure such a pond and check dams conduct biodiversity monitoring using GIS, camera traps and field surveys
- Increase Environmental education and public awareness, community participation has been shown to support conservation of cliff-dwelling birds, while habitat restoration improves biodiversity in degraded landscapes.

Conservation status of commonly reported species

Faunal Group	Representative species	Scientific Name	Conservation status (IUCN)
Mammals	Nilgai (Blue bull)	<i>Boselaphus tragocamelus</i>	Least concern
	Black buck	<i>Antilope cervicapra</i>	Least concern
	Golden Jackel	<i>Canis aureus</i>	Least concern
	Indian fox	<i>Vulpes bengalensis</i>	Least concern
	Sloth Bear	<i>Melursus ursinus</i>	Vulnerable
	Rhesus Macaque	<i>Macaca mulatta</i>	Least concern
	Human Langur	<i>Semnopithecus entellus</i>	Least concern
	Indian Hare	<i>Lepus nigricollis</i>	Least concern
	Indian peafowl	<i>Pavo cristatus</i>	Least concern
Birds	Indian Vulture	<i>Gyps indicus</i>	Critically Endangered
	Egyptian Vulture	<i>Neophron percnopterus</i>	Endangered
	Red-headed vulture	<i>Sacrogyps calvus</i>	Critically Endangered
	Black Drongo	<i>Dicrurus macrocerus</i>	Vulnerable
	Indian Roller	<i>Coracias bengalensis</i>	Least concern
	Jangle owlet	<i>Glaucidium radiatum</i>	Least concern
	Indian Thick Knee	<i>Burhinus indicus</i>	Vulnerable
	Grey Franwlin	<i>Ortygornis pondicerianus</i>	Least concern
	Painted stork	<i>Mycteria leucoce</i>	Least concern
	White throated Kingfisher	<i>Halcyon smyrner</i>	Vulnerable
Reptiles	Green Bee – eater	<i>Merops orientalis</i>	Vulnerable
	Indian Cobra	<i>Naja naja</i>	Least concern
	Bengal monitor	<i>Varanus bengalensis</i>	Least concern
	Rat Snake	<i>Ptyas mucosa</i>	Least concern

	Indian Rock Python	<i>Python molurus</i>	Vulnerable
	Common Krait	<i>Bungarus caeruleus</i>	Least concern
	Russell's Viper	<i>Daboia russelii</i>	Least concern
	Indian Flapshell Turtle	<i>Lissemys punctata</i>	Vulnerable
	Mugger Crocodile	<i>Crocodylus palustris</i>	Least concern
	Crestred Serpent Eagle	<i>Spilorrhis cheela</i>	Vulnerable
Amphibia	Indian frog	<i>Rana tigrinus</i>	Least concern
	Toad frog	<i>Bufo bufo</i>	Vulnerable
	Tree frog	<i>Rana esculenta</i>	Least concern
Fishes	Labeo	<i>Labeo rohita</i>	Least concern
	Catla	<i>Catla catla</i>	Least concern
	Mrigla	<i>Cirrhina mrigla</i>	Least concern
	Coman carp	<i>Cyprinus carpio</i>	Vulnerable
	Tilapia	<i>O. mossambicus</i>	Least concern
	Murrel	<i>Cyprinus carpio</i>	Vulnerable
Butterflies	Common Mormon	<i>Papilio polytes</i>	Least concern
	Plain Tiger	<i>Danaus chrysippus</i>	Least concern

RESULTS AND DISCUSSION

The present study revealed that the Bundelkhand region supports a rich diversity of fauna despite its semi arid climate and increasing anthropogenic disturbance. Field observations and secondary data indicate the presence of mammals, birds, reptiles, amphibians, fishes, and numerous invertebrates inhabiting forests, scrublands, grasslands, wetlands, rivers, agricultural landscapes, and rocky hill ecosystems. Birds represented the most diverse vertebrate group, followed by mammals and reptiles. Species such as nilgai (*Boselaphus tragocamelus*), chital (*Axis axis*), blackbuck (*Antelope cervicapra*), jackal (*Canis aureus*), Indian fox (*Vulpes bengalensis*), Indian peafowl (*Pavo cristatus*), Vultures, monitor lizards, turtles, and several freshwater fish species were commonly recorded.

The study identified habitat loss and fragmentation as the primary threats to wildlife conservation in Bundelkhand. Rapid expansion of agriculture, urban development, mining quarrying, deforestation, and infrastructure projects have significantly reduced natural habitats. Seasonal droughts, declining groundwater levels, and shrinking wetlands further threaten both terrestrial and aquatic fauna. Illegal hunting, overgrazing, pollution, invasive plant species, and increasing human wildlife conflicts were also observed to contribute to the decline of wildlife populations. Sensitive species such as vultures and grassland dependent birds showed greater vulnerability to these environmental changes.

The findings further indicate that protected forests, wildlife sanctuaries, and community managed forest areas continue to play an important role in conserving biodiversity. Afforestation programmes, watershed development, habitat restoration, enforcement of the wildlife protection Act, 1972, and awareness campaigns have produced positive outcomes in certain locations. However, the effectiveness of these measures varies due to inadequate funding, limited scientific monitoring,

habitat fragmentation, and insufficient participation of local communities.

The results are consistent with previous ecological studies conducted in Bundelkhand and other semi arid regions of India, which emphasize that habitat degradation and climate variability are the major drivers of biodiversity loss. Strengthening habitat connectivity, restoring degraded ecosystems, conserving wetlands and river systems, promoting sustainable land use practices, controlling illegal hunting, and encouraging community based conservation are essential for protecting the region's animal diversity. Long term biodiversity monitoring, ecological research, and environmental education should also be prioritized to support evidence based conservation planning.

Overall the study concludes that although Bundelkhand still harbours significant faunal diversity, immediate and integrated conservation efforts are necessary to reduce biodiversity loss and ensure the sustainable management of wildlife resources for future generations.

Conservation of Bundelkhand wildlife requires integrated management involving government agencies, researchers, local communities and NGOs. Climate resilient, Habitat restoration, sustainable Land management and scientific monitoring are essential to maintain ecological balance and ensured the long-term survival of native fauna.

This recent study present representative species commonly reported from the Bundelkhand landscape. Species occurrence varies by district and Habitat, and some threatened birds such as vultures have experienced sustainable population declined in the region.

CONCLUSION

In recent times there is a lot of concern regarding biodiversity. The very survival existence of mankind depends on the indispensable biological wealth. Hence,

we need to conserve the biodiversity in the environment. The subject of biodiversity is also linked with academic disciplines like systematic, ecology, evolution, genetics and molecular biology. It may be considered as a cornerstone of biotechnology, the industry of the future. Agriculture, aquaculture, pharmaceutical industries and other biology-based industries are largely dependent on biodiversity.

Due to multiple uses of Animals and their by-products have become a major industry and a large number of these terrestrial and aquatic communities are under a big threat of extinction. Habitat loss and environmental degradation have seriously affected animal fauna; Knowledge of available resources and the biological characters of species serve as the base line information for further studies on resource conservation and maintenance. Further, there is a need for a survey of diversity of animals in different types of habitats.

Bundelkhand possesses valuable animal diversity despite its harsh climatic conditions increasing habitat degradation, climate stress and human activities threatens many species. Conservation strategies based on habitat restoration, community participation, sustainable resources use and effective policy implementation essential for protecting the regions biodiversity and ecological integrity.

The study will provide future strategies for development and conservation measures, requiring afforestation in catchments and awareness on illegal killing of animals.

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