OPEN ACCESS

International Journal of Health and Biological Sciences
Abbreviated Key Title: Int. J. Health Biol. Sci.
E-ISSN 2590-3357 | P-ISSN 2590-3365
IJHBS Publication, 701 Jun, Tooropstraat, Amsterdam, Netherlands
Journal homepage: https://ijhbs.com/index.php/ijhbs

Original Research Article

Ecological Diversity and Habitat Conservation in Sohagibarwa Wildlife Sanctuary: An Integrated Assessment of Forests, Wetlands, Grasslands and Wildlife

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Article History | **Received:** 11.06.2026 | **Revised:** 17.06.2026 | **Accepted:** 18.08.2026 |

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Abstract

Sohagibarwa Wildlife Sanctuary in Uttar Pradesh represents an important Terai landscape in which forests, grasslands, wetlands, rivers and riparian habitats occur together and support diverse wildlife. The present paper provides an integrated assessment of the major ecological resources and habitat characteristics of the sanctuary, with particular attention to the relationship between habitat diversity and biodiversity conservation. The assessment is based on available sanctuary-level ecological and avifaunal information and examines the seven forest ranges, wetland systems, grassland habitats and important wildlife groups. The sanctuary comprises seven ranges—Pakadi, Laxmipur, North Chowk, South Chowk, Madhwalia, Nichlaul and Sheopur—and supports approximately 21 identified wetlands and 21 recorded grassland locations. The grasslands cover approximately 3,942.5 ha, while wetlands include important bird habitats such as Singraina Taal, Pidari Taal and other seasonal water bodies. Singraina Taal is particularly significant for migratory and resident waterbirds, with more than 150 migratory and resident water and woodland bird species reported around the wetland in the available study material. Other important ecological features include Sal forests, riparian vegetation, grasslands, the Choti Gandak riverine system and habitats supporting raptors, Sarus Crane, Lesser Adjutant, Mugger and other wildlife. The findings indicate that conservation planning should consider the sanctuary as a connected habitat mosaic rather than treating individual forests, wetlands and grasslands separately. Habitat monitoring, wetland protection, grassland management, regulation of human disturbance and community participation are important for maintaining ecological integrity.

Keywords: Sohagibarwa Wildlife Sanctuary. Biodiversity, Habitat Diversity, Wetlands, Grasslands, Sal Forests, Wildlife Conservation, Migratory Birds, Terai Ecosystem, Habitat Management.

1. INTRODUCTION

Protected areas are important for conserving biodiversity, but their ecological value depends on the condition and connectivity of the habitats within them. Forests, wetlands, grasslands, rivers and riparian areas perform different ecological functions and together provide food, shelter, breeding grounds and movement corridors for wildlife [1]. Therefore, biodiversity assessment is more meaningful when these habitats are examined as parts of a connected ecological system. Sohagibarwa Wildlife Sanctuary is an important Terai landscape of Uttar Pradesh containing Sal-dominated forests, grasslands, wetlands, rivers, streams and riparian forests. The available sanctuary material identifies seven ranges: Pakadi, Laxmipur, North Chowk, South Chowk, Madhwalia, Nichlaul and Sheopur. Together, these ranges cover approximately 39,220.10 ha, while the reported total area including agricultural land within the sanctuary boundary is approximately 42,820.10 ha. The sanctuary is also ecologically connected with the wider Terai landscape, including Valmiki Tiger Reserve and the Chitwan landscape of Nepal [2].

The ecological importance of Sohagibarwa is strongly associated with its habitat diversity. The sanctuary contains a network of wetlands, including rivers, streams, ponds, marshes and seasonally waterlogged grasslands. Available information identifies approximately 21 taals and water bodies, ranging from small water bodies to larger wetlands. Singraina Taal is particularly important because of its role as a wintering area for large numbers of migratory and resident birds. Grasslands are another important component of the sanctuary. They represent approximately 13% of the sanctuary according to the available material, with both dry savannah-type grasslands and low-lying wet and tall grasslands occurring in the landscape. An inventory identifies 21 grassland locations covering approximately 3,942.5 ha. Important grassland areas include Madhwalia Nagwa-14, Sonari-31, Dudhi-13, Arjunahi-4, Sheopur-3, Nagwa-15B, Sonasri-32, Nagwa-16, Nagwa-19B and Nichlaul-8 [3].

The wetland and grassland systems are particularly significant for avifaunal diversity. Singraina Taal has recorded species such as Sarus Crane, Lesser Adjutant, Black-necked Stork, Grey-headed Fish-eagle and Painted Stork. During winter, more than 2,000–3,000 ducks and more than 500 waders were reported from the Singraina area in the available avifaunal study. More than 150 migratory and resident water and woodland bird species were recorded around the wetland. Other parts of the sanctuary also contain distinctive habitat and species associations. Pidari Taal in South Chowk is important for Sarus Crane and Lesser Adjutant, while riparian habitats support kingfishers and other forest birds. Nichlaul contains wetlands, raptor habitats and the Choti Gandak riverine system, while the Sheopur range contains a substantial grassland area and faces comparatively greater human pressure [4]. These characteristics show that the biodiversity of Sohagibarwa cannot be understood through species lists alone. Habitat condition, water availability, grassland management, human disturbance and connectivity between different habitat types are equally important. The present paper therefore provides an integrated assessment of the ecological diversity and conservation significance of forests, wetlands, grasslands and wildlife habitats in Sohagibarwa Wildlife Sanctuary [5].

2. METHODOLOGY

2.1 Research Design

The study followed a descriptive and analytical ecological assessment approach based on available secondary information concerning Sohagibarwa Wildlife Sanctuary. The assessment brought together information on forest habitats, wetlands, grasslands, wildlife and avifaunal diversity to develop a broad habitat-based understanding of the sanctuary. The sanctuary was examined through its seven forest ranges, namely Pakadi, Laxmipur, North Chowk, South Chowk, Madhwalia, Nichlaul and Sheopur. Each range was considered in terms of its area, major habitat characteristics, wetlands, grasslands, wildlife significance and conservation concerns [6].

2.2 Habitat Assessment

Four major habitat categories were considered:

- Forest habitats
- Wetland and aquatic habitats
- Grassland habitats
- Riparian and riverine habitats

The assessment considered the presence of important wetlands, grassland blocks, birding areas and wildlife habitats. Particular attention was given to habitat features that support migratory birds and species of conservation importance [7].

2.3 Biodiversity Assessment

Available avifaunal infor-mation was used to examine species associated with different habitats. Birds were considered particularly useful indicators because wetlands, grasslands and forests support different bird communities. Species such as Sarus Crane, Lesser Adjutant, Black-necked Stork, Painted Stork and several raptors were considered in relation to their documented habitats.

2.4 Conservation Assessment

Conservation requirements were identified by considering habitat disturbance, water availability, livestock pressure, visitor activity, human pressure and the need for habitat monitoring. The assessment does not claim new field measurements or original species inventories where such data were not available. Range-level information that requires current GIS or Forest Department verification is treated accordingly [8].

3. RESULTS

3.1 Seven-Range Ecological Structure

The ecological characteristics of Sohagibarwa Wildlife Sanctuary vary considerably across its seven forest ranges, reflecting differences in forest cover, wetlands, grasslands, riparian habitats and wildlife resources. Each range has distinct ecological features that contribute to the overall biodiversity of the sanctuary and presents specific conservation requirements. The range-wise assessment therefore provides an important basis for understanding the spatial distribution of ecological resources and identifying priority areas for habitat protection and biodiversity management. The major ecological characteristics and conservation significance of the seven ranges are presented in Table 1.

The sanctuary is divided into seven ranges with different ecological characteristics [9].

Table 1: Range-wise Ecological Profile of Sohagibarwa Wildlife Sanctuary

Range	Area(ha)	Major Ecological Features	Conservation Significance
Pakadi	6,459.50	Forest habitat, Tedwa Taal, forest birds	Gateway range; nature interpretation
Laxmipur	5,159.80	Six wetlands, forest birds, waterbirds	Wetland and bird habitat
North Chowk	5,599.70	Singraina Taal, forest-grassland-wetland mosaic	Major birding and wintering zone
South Chowk	5,089.40	Pidari Taal, riparian forests	Sarus Crane and Lesser Adjutant habitat
Madhwalia	8,091.70	Grasslands, Thuthari Taal, Mugger habitat	Grassland and wetland conservation
Nichlaul	6,823.10	Wetlands, raptors, Choti Gandak	Riverine and raptor habitat
Sheopur	1,996.90	Sheopur grassland, forest habitat	Human-pressure and grassland management

The available ecological framework identifies different conservation priorities across the seven ranges rather than a uniform ecological condition throughout the sanctuary.

3.2 Forest Habitats

Sal-dominated forests form an important component of the sanctuary landscape. Forest habitats are associated with resident birds, mammals and other wildlife. Pakadi, for example, supports characteristic forest birds such as Greater Racket-tailed Drongo, Hair-crested Drongo and Crested Serpent-eagle. The broader sanctuary also supports mammals including leopard, tiger, deer, nilgai and wild pig, although range-specific occurrence should be confirmed through field surveys [10].

The forest ecosystem is not isolated from other habitats. Forest edges, grasslands, wetlands and riparian areas together create a habitat mosaic that increases the ecological value of the landscape.

3.3 Wetland Diversity

Wetlands constitute one of the most important ecological resources of Sohagibarwa. The available material identifies approximately 21 water bodies, including wetlands, ponds, streams and seasonal waterlogged areas. These habitats provide feeding, breeding and wintering areas for numerous bird species [11].

Table 2: Important Wetland Habitats and Their Ecological Significance

Wetland/Water Body	Range	Ecological Significance
Tedwa Taal	Pakadi	Small wetland and local bird habitat
Sri Nagar Taal	Laxmipur	Seasonal wetland and waterbird habitat
Singraina Taal	North Chowk	Major migratory and resident bird habitat
Pidari Taal	South Chowk	Sarus Crane and Lesser Adjutant habitat
Thuthari Taal	Madhwalia	Wetland and Mugger-associated habitat
Chandamani Taal	Nichlaul	Wetland and Mugger/raptor habitat
Darginia Taal	Nichlaul	Wetland and wildlife habitat
Choti Gandak	Nichlaul	Riverine ecosystem

The ecological significance of wetlands is not limited to bird diversity. They also contribute to aquatic habitat availability, seasonal water retention and the maintenance of the wider forest-grassland ecosystem.

3.4 Singraina Taal as a Major Avifaunal Habitat

Singraina Taal represents one of the most significant wetland habitats identified in the available material. Its reported seasonal area ranges from approximately 100 to 500 ha. The wetland has recorded Sarus Crane, Lesser Adjutant, Black-necked Stork, Grey-headed Fish-eagle and Painted Stork.

The winter bird assemblage includes several ducks and waders. More than 2,000–3,000 ducks and over 500 waders were reported during the winter study period. The area also supported more than 150 migratory and resident water and woodland bird species [12].

Table 3: Selected Birds Associated with Singraina Taal

Bird Group/Species	Habitat Significance
Sarus Crane	Wetland and open habitat
Lesser Adjutant	Wetland and open habitat

Bird Group/Species	Habitat Significance
Black-necked Stork	Wetland habitat
Painted Stork	Wetland habitat
Grey-headed Fish-eagle	Wetland-associated raptor
Bar-headed Goose	Winter waterbird
Greylag Goose	Winter waterbird
Common Teal	Winter waterbird
Northern Pintail	Winter waterbird
Mallard	Winter waterbird
Common Pochard	Winter waterbird

The concentration of waterbirds makes Singraina Taal a priority site for wetland monitoring and migratory bird conservation.

3.5 Grassland Diversity

Grasslands represent an important component of the Terai ecosystem within Sohagibarwa. The available inventory identifies 21 grassland locations covering approximately 3,942.5 ha. Both dry savannah-type grasslands and low-lying wet and tall grasslands occur.

Table 4: Important Grassland Locations

Grassland	Area (ha)
Madhwalia Nagwa-14	377.7
Sonari-31	483.3
Dudhi-13	435.1
Arjunahi-4	199.0
Sheopur-3	295.0
Nagwa-15B	222.0
Sonasri-32	205.0
Nagwa-16	262.0
Nagwa-19B	384.0
Nichlaul-8	31.8

The grassland inventory provides a useful ecological baseline, although the available material specifically recommends verification of the range-wise assignment of individual grassland blocks through current Forest Department compartment maps or GIS. Grasslands provide open habitat for birds and other wildlife and therefore require management that maintains their ecological characteristics while controlling excessive disturbance.

3.6 Riparian and Riverine Habitats

Riverine habitats add another important dimension to the sanctuary's ecological diversity. The Choti Gandak River is particularly important in the Nichlaul range, while riparian forests in South Chowk provide habitat for kingfishers and other forest birds. Riparian vegetation also provides connectivity between aquatic and terrestrial ecosystems. Maintaining these areas is therefore important for both biodiversity and ecological continuity [13].

4. DISCUSSION

The findings demonstrate that the ecological significance of Sohagibarwa Wildlife Sanctuary arises from the interaction of multiple habitat types. Forests provide terrestrial habitat, wetlands support aquatic and water-dependent species, grasslands provide open habitats, and rivers and riparian vegetation connect these systems. The presence of important migratory and resident birds highlights the role of wetlands as ecological assets. Singraina Taal, in particular, demonstrates how a single wetland can support a large and diverse bird community. Its ecological importance also means that increased tourism or visitor activity should be managed carefully. The available framework recommends monitoring water levels, aquatic vegetation, water quality and livestock and visitor disturbance at such sites.

Grasslands require similar attention. They are sometimes considered secondary to forests, but the sanctuary's grassland inventory shows that they constitute a substantial part of the landscape. Their ecological value is connected with open-habitat species and with the wider forest-grassland mosaic. Maintaining these habitats requires monitoring their extent, vegetation condition and levels of human and livestock pressure.

The results also suggest that conservation should be habitat-based rather than species-based alone. Protecting a species such as Sarus Crane requires protection of the wetland and surrounding open habitat on which it depends. Similarly, protecting raptors

requires maintaining wetlands, forests and prey resources. This makes habitat connectivity an important component of future conservation planning. Tourism represents both an opportunity and a potential pressure. The sanctuary has seven documented Forest Rest Houses—Pakadi, Tedhighat, Deibhar, Kushmahwa, Madhwalia, Nichlaul and Doma—which can support controlled nature interpretation and tourism subject to prior approval. However, tourism development should remain low-impact and should be linked with habitat protection rather than large-scale infrastructure.

5. Integrated Conservation Framework

Based on the assessment, an integrated conservation framework can be developed around five major components.

Table 5: Proposed Integrated Habitat Conservation Framework

Component	Major Action	Expected Conservation Outcome
Forest conservation	Monitor forest condition and habitat connectivity	Improved terrestrial habitat
Wetland conservation	Monitor water level, water quality and disturbance	Protection of aquatic and waterbird habitats
Grassland management	Map and monitor grassland condition	Maintenance of open habitats
Wildlife monitoring	Seasonal bird and wildlife surveys	Better understanding of biodiversity trends
Community participation	Local conservation awareness and controlled tourism	Greater community support for conservation

A long-term monitoring programme should combine bird diversity, wetland condition, grassland condition, human disturbance, livestock pressure and visitor activity. This would allow changes in habitat quality to be assessed alongside changes in biodiversity.

6. CONCLUSION

Sohagibarwa Wildlife Sanctuary represents a diverse Terai ecological landscape in which forests, wetlands, grasslands, rivers and riparian habitats function together to support biodiversity. The seven-range structure provides a useful basis for understanding the spatial variation in ecological resources and conservation requirements. The assessment identifies wetlands such as Singraina Taal and Pidari Taal, extensive grassland areas, Sal forests and the Choti Gandak riverine system as important components of the sanctuary's ecological diversity. Singraina Taal is particularly significant for migratory and resident birds, while Pidari Taal supports important species such as Sarus Crane and Lesser Adjutant. The grassland inventory further demonstrates that open habitats form a substantial part of the sanctuary and require specific conservation attention. The major implication of the study is that biodiversity conservation in Sohagibarwa should move towards an integrated habitat approach. Forests, wetlands, grasslands and riparian systems should be managed as interconnected ecological units rather than as separate components. Regular biodiversity monitoring, wetland protection, grassland management, control of human disturbance and regulated nature tourism can strengthen conservation outcomes. The sanctuary's ecological diversity also creates opportunities for carefully managed community-based conservation and nature tourism. However, tourism and other human activities should remain compatible with habitat requirements and wildlife behaviour. A balanced approach that combines habitat protection, biodiversity monitoring, ecological connectivity and local participation can contribute to the long-term conservation of Sohagibarwa Wildlife Sanctuary.

REFERENCES

1. Botha AJ, Andevski J, Bowden CGR, Gudka M, Safford RJ, Tavares J, et al. Multi-species action plan to conserve African-Eurasian vultures. CMS Raptors MOU Technical Publication. 2017;5:1-164.
2. Cuthbert R, Taggart MA, Prakash V, Saini M, Swarup D, Upreti S, et al. Effectiveness of action in India to reduce exposure of Gyps vultures to the toxic veterinary drug diclofenac. PLoS One. 2011;6:e19069. doi:10.1371/journal.pone.0019069.
3. Cuthbert RJ, Taggart MA, Saini M, Sharma A, Das A, Kulkarni MD, et al. Continuing mortality of vultures in India associated with illegal veterinary use of diclofenac and a potential threat from nimesulide. Oryx. 2016;50:104-112. doi:10.1017/S003060531500037X.
4. Das SK, Dashahare A, Marathe S, Kundu N, Kesharwani R. Status of raptors with special reference to vultures in and around Rajaji National Park, India. 2011.
5. Galligan TH, Taggart MA, Cuthbert RJ, Svobodova D, Chipangura J, Alderson D, et al. Metabolism of aceclofenac in cattle to vulture-killing diclofenac. Conserv Biol. 2016;30:1122-1127. doi:10.1111/cobi.12711.
6. Gilbert M, Watson RT, Ahmed S, Asim M, Johnson JA. Vulture restaurants and their role in reducing diclofenac exposure in Asian vultures. Bird Conserv Int. 2007;17:63-77. doi:10.1017/S0959270906000621.
7. Grimmett R, Inskipp C, Inskipp T. Field guide to birds of the Indian subcontinent: India, Pakistan,

Sri Lanka, Nepal, Bhutan, Bangladesh and the Maldives. Bloomsbury Publishing; 2016.
8. Gupta N, Prasad R. Climate patterns and rainfall variability in the Terai region. J Environ Stud. 2019;15:101-110.
9. Iqbal S, Khan U, Murn C. Vulture population and status survey, Pakistan. World Wide Fund for Nature Pakistan; 2011.
10. Jha KK. Distribution of vultures in Uttar Pradesh, India. J Threat Taxa. 2015;7:6750-6763. doi:10.11609/JoTT.o3319.6750-63.
11. Kambale AA. A study on breeding behaviour of Oriental White-backed Vulture (Gyps bengalensis) in Anjarle and Deobag, Maharashtra. Wildlife Institute of India; 2011.
12. Khatri PC. Home range use of winter migratory vultures in and around Jorbeer, Bikaner (Rajasthan), India. 2013.
13. Margalida A, Donázar JA. Fake news and vultures. Nat Sustain. 2020;3:492-493. doi:10.1038/s41893-020-0534-5.
14. Ministry of Environment and Forests, Government of India. Action plan for vulture conservation in India. New Delhi: MoEF; 2006.
15. Ministry of Environment, Forest and Climate Change, Government of India. Action plan for vulture conservation in India (2020-2025). New Delhi: MoEFCC; 2020.
16. Mundy P, Butchart D, Ledger J, Piper S. The vultures of Africa. London: Academic Press; 1992.
17. Oaks JL, Gilbert M, Virani MZ, Watson RT, Meteyer CU, Rideout BA, et al. Diclofenac residues as the cause of vulture population decline in Pakistan. Nature. 2004;427:630-633. doi:10.1038/nature02317.
18. Ogada D, Shaw P, Beyers RL, Buij R, Murn C, Thiollay JM, et al. Another continental vulture crisis: Africa's vultures collapsing toward extinction. Conserv Lett. 2016;9:89-97. doi:10.1111/conl.12182.
19. Prakash V, Bishwakarma MC, Chaudhary A, Cuthbert R, Dave R, Kulkarni M, et al. The population decline of Gyps vultures in India and Nepal has slowed since veterinary use of diclofenac was banned. PLoS One. 2012;7:e49118. doi:10.1371/journal.pone.0049118.
20. Prakash V, Pain DJ, Cunningham AA, Donald PF, Prakash N, Verma A, et al. Catastrophic collapse of Indian white-backed Gyps bengalensis and long-billed Gyps indicus vulture populations. Biol Conserv. 2003;109:381-390. doi:10.1016/S0006-3207(02)00164-7.
21. Singh R, Singh H. Forest ecosystem and climate variability in Uttar Pradesh. Biodivers Conserv J. 2015;8:155-168.
22. Yamac E. Roosting tree selection of Cinereous Vulture Aegypius monachus in breeding season in Turkey. Podoces. 2007;2:30-36.