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Sohagibarwa Wildlife Sanctuary as an Emerging Tiger Habitat and Transboundary Wildlife Corridor

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Abstract—Sohagibarwa Wildlife Sanctuary (SWLS) in Maharajganj district, Uttar Pradesh, occupies a strategically important position within the eastern Terai. Official Uttar Pradesh Eco-Tourism information describes a nearly flat protected landscape adjoining the international Indo-Nepal boundary and the Uttar Pradesh–Bihar border, with Sal forest, grasslands, wetlands, rivers and diverse fauna including tiger, leopard, deer, blue bull and wild boar. The case for treating Sohagibarwa as an emerging tiger habitat is strengthened by landscape-genetic evidence from the Wildlife Institute of India (WII), which detected first-generation tiger migrants between western Sohagibarwa and Valmiki Tiger Reserve and identified source-sink and gene-flow relationships involving Valmiki, eastern Sohagibarwa and western Sohagibarwa. The 2022 national tiger assessment further placed the Valmiki–Sohagibarwa continuum within a larger Indian–Nepalese population block, reporting 939 km² of tiger occupancy on the Indian side with an estimated 54–55 tigers; together with Chitwan and Parsa in Nepal, the block was estimated at 213 tigers. These figures refer to the wider continuum, not to Sohagibarwa alone. This paper therefore avoids treating every part of the sanctuary as a confirmed tiger corridor. Instead, it conceptualises Sohagibarwa as a landscape of habitat, dispersal and potential corridor function that requires current camera-trap, genetic and GIS verification. The study integrates the seven ranges, habitat mosaic, prey-base restoration, wetlands and grasslands, human–wildlife conflict, infrastructure pressure, community participation and low-impact tourism. It proposes a conservation-first framework in which functional movement areas are protected, degraded grasslands and wetlands restored, prey availability monitored, bottlenecks mapped, conflict reduced and conservation information coordinated with Valmiki Tiger Reserve, Bihar and relevant Nepal landscapes.

Keywords: Sohagibarwa Wildlife Sanctuary; tiger habitat; wildlife corridor; Valmiki Tiger Reserve; Nepal; Terai Arc Landscape; tiger connectivity; genetic flow; prey base; habitat restoration; transboundary conservation.

I. INTRODUCTION

Contemporary wildlife conservation increasingly operates at the landscape scale. Protected areas remain fundamental, but the persistence of wide-ranging species depends on the quality of ecological space between protected areas. Tigers require secure cover, adequate prey, water and low disturbance for occupancy, while dispersing individuals may use agricultural mosaics, riverine vegetation, forest edges and other less suitable but permeable habitats. For this reason, conservation planning should distinguish breeding or core habitat from dispersal habitat and from a functionally demonstrated corridor.

Sohagibarwa is particularly suitable for this approach because its geographical position combines an international border landscape, the Bihar–Uttar Pradesh interface and a heterogeneous Terai habitat. The official district profile places the sanctuary between approximately 26°58′–27°25′ N and 83°23′–84°10′ E. It describes the sanctuary as geographically distributed across Maharajganj and Kushinagar districts and records its historical management within the Gorakhpur Forest system. [1]

The uploaded manuscript further reports that the sanctuary was carved out of the old Gorakhpur Forest Division in 1987 and describes nearly flat terrain at around 100 m above mean sea level, gently sloping from north-west to south-east. Approximately 75% Sal forest is reported in the official tourism profile, while humid sites include Jamun, Gutal, Semal and Khair. Lower and waterlogged areas support grassland and cane-forest patches. [2]

The scientific significance of the sanctuary extends beyond wildlife occurrence. WII genetic analysis found two first-generation migrants from western Sohagibarwa to Valmiki Tiger Reserve and interpreted higher gene flow from Valmiki and eastern Sohagibarwa toward western Sohagibarwa. This provides stronger evidence than isolated sightings because it indicates biological exchange across the wider habitat block. [3]

The 2022 national tiger assessment also identifies Sohagibarwa as a tiger-detected landscape requiring prey and habitat restoration and major investment in protection for transboundary tiger conservation. [4] The implication is not that every hectare of the sanctuary is currently a functional tiger corridor. Rather, the research problem is to identify which habitat patches are most permeable, where movement is constrained, which grasslands and wetlands should be restored, and how local development can be aligned with conservation.

The central proposition of this study is therefore an integrated one: tiger conservation, habitat restoration, ecological connectivity, conflict mitigation, community livelihood development and responsible tourism should be planned as components of one landscape system.

II. STUDY OBJECTIVES

- Assess the ecological basis for describing Sohagibarwa as an emerging tiger habitat and connectivity landscape.
- Examine the relationship among Sohagibarwa, Valmiki Tiger Reserve, Nepal and the wider Terai Arc Landscape.
- Characterise forest, grassland, wetland and riverine components relevant to habitat quality and prey recovery.
- Develop a seven-range research framework without assuming that every range is a verified corridor.
- Map threats to connectivity, including settlement expansion, roads, infrastructure, prey decline, habitat degradation and human–wildlife conflict.
- Develop a GIS-based methodology for mapping habitat suitability, functional connectivity and bottlenecks.
- Integrate ecological findings with community livelihoods, sustainable tourism and conservation-linked local employment.
- Provide policy and management priorities that can be updated as new camera-trap, genetic and land-use data become available.

III. STUDY AREA AND GEOGRAPHIC SETTING

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Sohagibarwa Wildlife Sanctuary is located in the eastern Terai of Uttar Pradesh. The official district tourism page gives a broad geographic extent of 26°58′–27°25′ N and 83°23′–84°10′ E and notes its position in Maharajganj and Kushinagar districts. The district administration also describes the sanctuary's historical evolution from the Gorakhpur Forest Division and its eventual treatment as a wildlife sanctuary because of its ecological, floral, faunal, natural and geological importance. [1]

The terrain is predominantly flat to gently undulating. Such topography, combined with seasonal waterlogging and riverine drainage, produces a fine-scale mosaic of forest, open grassland, wetlands and cane patches. The uploaded manuscript identifies four important river systems—the Gandak, Little Gandak, Pyas and Rohin—and notes ponds, lakes and swamps. The tourism profile specifically highlights grasslands in Madhaulia/Madhwalia and Lachmipur/Laxmipur, while lakes and ponds are reported in Nagwa and Sonari blocks. [2]

This habitat mosaic is important for both biodiversity and development planning. Forest provides cover and refuge; grassland can support ungulate prey and ecotonal species; wetlands provide water and aquatic food webs; and river corridors can act as seasonal ecological pathways. At the same time, settlements, roads, agriculture, livestock and tourism create interfaces where conservation objectives and local livelihood needs meet.

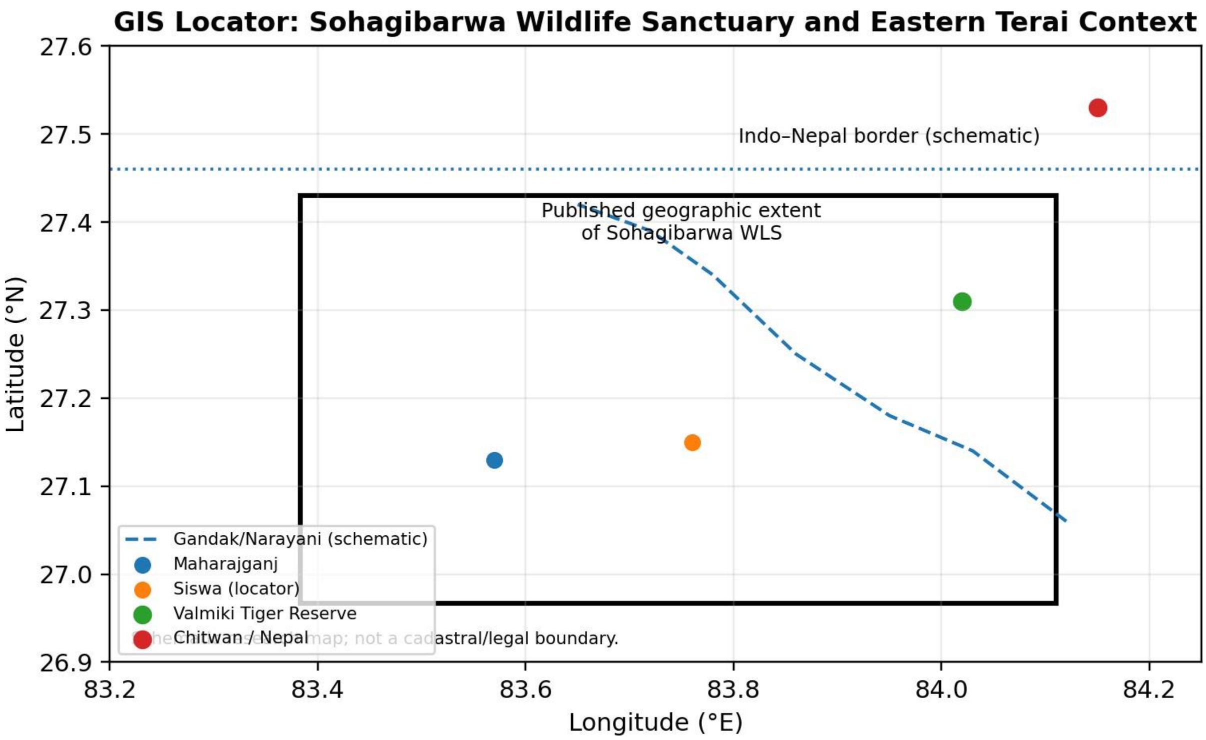

Figure 1. GIS locator and geographic context. The sanctuary extent is shown as a published-coordinate envelope, not as a legal cadastral boundary. Surrounding river and landscape features are schematic.

IV. SEVEN-RANGE RESEARCH FRAMEWORK

The uploaded manuscript identifies seven management-research units: Pakadi, Laxmipur/Lachmipur, North Chowk, South Chowk, Madhwalia/Madhaulia, Nichlaul and Sheopur. Spelling varies between local usage and official tourism material. These are research units for this paper; exact legal range polygons should be inserted from the current Forest Department GIS before publication.

Range	Core research focus	Priority GIS layers / field indicators
Pakadi	Forest–grassland interface; prey habitat; wildlife movement; human–wildlife interface; tourism pressure	Forest edge, grassland, roads, villages, conflict points, camera traps, visitor pressure
Laxmipur / Lachmipur	Grassland ecology; prey habitat; wetland–grassland linkage; restoration	Grassland extent/condition, seasonal water, invasive cover, ungulate signs, grazing pressure
North Chowk	Forest–wetland landscape; biodiversity; water systems; settlement interface; controlled eco-cultural tourism	Wetland seasonality, land use, water quality, settlements, tourism footprint, bird diversity
South Chowk	Forest, water bodies and grassland edges; prey distribution; disturbance and conflict	Water bodies, crop interface, livestock, roads, conflict incidents, prey signs
Madhwalia / Madhaulia	Grassland ecology; prey base; habitat quality; connectivity resistance	Grassland condition, prey distribution, disturbance, resistance surface, restoration sites
Nichlaul	Eastern connectivity assessment; border landscape; water systems; potential bottlenecks	Gandak/Narayani interface, roads, settlements, forest continuity, movement evidence
Sheopur	Forest–grassland mosaic; prey habitat; restoration; movement-route assessment	Land-cover change, prey habitat, disturbance, camera traps, restoration suitability

V. CONCEPTUAL DISTINCTION: HABITAT, DISPERSAL AND CORRIDOR

Three concepts should remain analytically separate. Habitat is an area providing sufficient cover, prey, water and security for occupancy. Dispersal habitat is an area through which an individual can move between suitable patches even if it does not establish a territory. A functional corridor is stronger: movement and/or gene flow must be demonstrated or strongly supported by evidence. Consequently, a line on a GIS map is a hypothesis until validated.

This distinction is particularly important for Sohagibarwa. WII genetic evidence demonstrates that the wider landscape has participated in tiger movement and gene flow, but present-day route strength may have changed due to land-use change, roads, settlement expansion, prey distribution, water availability, fire and disturbance. The research objective should therefore be to identify gradients of habitat permeability and bottlenecks, not to draw a permanent corridor through every forest patch.

VI. EVIDENCE FOR EMERGING TIGER HABITAT

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The expression emerging tiger habitat is used cautiously. It does not mean that Sohagibarwa is already equivalent to an established tiger reserve or that a stable resident tiger population is present throughout the sanctuary. It refers to a protected landscape whose tiger occurrence, habitat quality and connectivity significance justify stronger research and management.

Three evidence streams are particularly relevant. First, official Uttar Pradesh information lists tiger among the sanctuary fauna and identifies a habitat mosaic of Sal forest, grasslands, wetlands and rivers. Second, WII genetic research detected two first-generation migrants from western Sohagibarwa to Valmiki Tiger Reserve and identified higher gene-flow relationships involving Valmiki, eastern Sohagibarwa and western Sohagibarwa. Third, the 2022 national assessment included Sohagibarwa among tiger-detected grids and specifically recommended prey and habitat restoration and stronger protection because of its transboundary importance. [3–4]

The wider landscape numbers must be handled carefully. The uploaded manuscript reports a 2022 landscape-level figure of 939 km² of tiger occupancy on the Indian side with an estimated 54–55 tigers, and a wider India–Nepal block involving Chitwan and Parsa estimated at 213 tigers. These figures refer to the wider Valmiki–Sohagibarwa–Nepal population block, not to Sohagibarwa Wildlife Sanctuary alone. They should never be quoted as a sanctuary-only population estimate.

VII. TRANSBOUNDARY ECOLOGICAL CONNECTIVITY

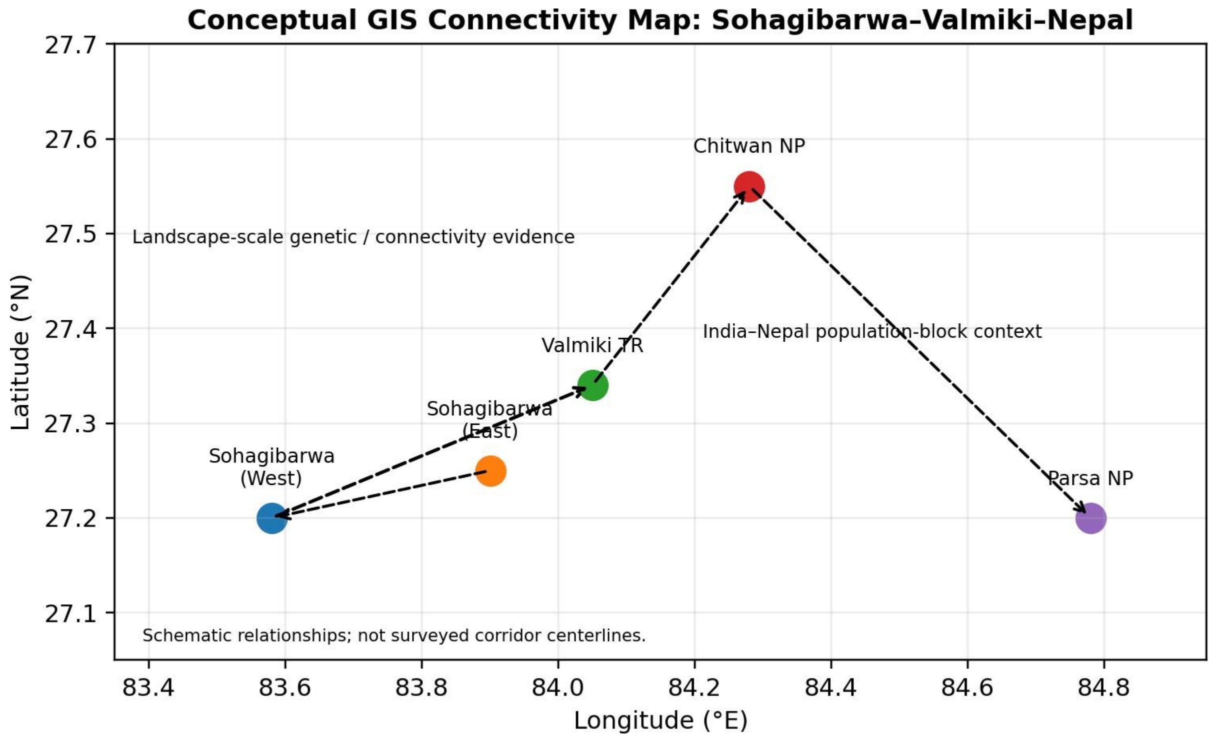

Figure 2. Conceptual connectivity map based on the evidence and relationships discussed in the source manuscript and WII literature. Arrows indicate research hypotheses/known relationships at landscape scale, not surveyed corridor centerlines.

Valmiki Tiger Reserve in West Champaran, Bihar is an important eastern Terai tiger population and is described by WII as connected with Chitwan National Park of Nepal and ecologically connected with

Sohagibarwa. The Valmiki landscape is itself a mosaic of Bhabar–Dun and Terai habitats, and its northern relationship with Nepal adds a major transboundary dimension. [5]

The older WII Terai Arc assessment also described the eastern ranges of Sohagibarwa and Valmiki as one habitat block, while noting that the Gandak river bisects the Nichlaul and Shivpur/Sohagibarwa areas and that movement possibilities require ecological interpretation. The report recorded substantial disturbance and low prey conditions in parts of the older survey area. These historical observations are useful as a baseline, but they should not be treated as current conditions without new field surveys. [6]

The appropriate policy language is therefore a connected landscape rather than an uninterrupted forest corridor. Administrative borders do not determine tiger movement. Habitat permeability, prey, water, cover and disturbance do. Cooperation among Uttar Pradesh, Bihar and Nepal should focus on compatible monitoring, data exchange, infrastructure screening, conflict response and habitat restoration.

VIII. HABITAT MOSAIC: FOREST, GRASSLAND AND WETLAND

Approximately three quarters of the sanctuary is described as Sal forest in the official tourism profile, with Jamun, Gutal, Semal and Khair occurring in humid locations. Seasonal waterlogging creates grassland and cane patches. The ecological value of this mosaic is greater than the sum of individual land-cover classes because edge zones, seasonal wetlands and open habitats can influence prey distribution and animal movement.

Grasslands in Laxmipur/Lachmipur and Madhwalia/Madhaulia deserve special attention. A grassland is not automatically a low-quality habitat; its value depends on structure, seasonal water, grazing intensity, invasive vegetation, fire regime and prey response. GIS should therefore map not only grassland area but also grassland condition and change through time.

Wetlands should be mapped seasonally. Pre-monsoon, monsoon and post-monsoon imagery can reveal water persistence, inundation, vegetation succession and encroachment. The Nagwa and Sonari water bodies identified in the source material can be treated as priority research sites, but their present ecological condition should be established through field verification.

A practical GIS classification is: (1) core habitat, (2) movement habitat, (3) restoration habitat, (4) ecological interface zones and (5) human-use zones. The same patch can shift category over time as vegetation, prey, water and disturbance change.

IX. GIS AND REMOTE-SENSING METHODOLOGY

A publication-grade GIS study should begin with an official sanctuary boundary and current range polygons obtained from the Forest Department. These should be combined with satellite imagery, digital elevation data, hydrography, road networks, settlement layers and field observations. The present paper deliberately does not fabricate range boundaries where the source material does not provide a verified GIS layer.

Data component	Recommended source / technique	Primary output
Sanctuary and range boundaries	Current Forest Department GIS / official administrative layers	Legal study units; range-wise statistics

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Land cover	Sentinel-2 / Landsat time series; supervised or machine-learning classification	Forest, grassland, wetland, agriculture, settlement
Vegetation condition	NDVI/EVI and seasonal composites	Vegetation vigour and degradation hotspots
Water	Seasonal water indices + field GPS	Permanent/seasonal water bodies and inundation
Terrain	DEM; slope, elevation, drainage	Topographic resistance and hydrological context
Infrastructure	Road/rail/transmission layers + field GPS	Linear barriers and road-crossing risk
Prey	Camera traps, distance sampling, pellet/sign surveys	Relative abundance and prey distribution
Carnivores	Camera traps, sign surveys, occupancy modelling	Tiger/leopard occurrence and movement evidence
Conflict	Forest records + household survey + GPS	Incident density, severity and economic loss
Connectivity	Resistance surface + least-cost path + Circuitscape	Potential movement pathways and bottlenecks
Ground truth	GPS tracks, field plots, local ecological knowledge	Accuracy assessment and model validation

X. HABITAT SUITABILITY AND RESISTANCE MAPPING

Habitat suitability can be estimated from cover, prey proxies, water proximity and disturbance. Connectivity modelling then converts these variables into a resistance surface. High-quality forest with prey and water may receive low movement resistance, whereas dense settlement, high-traffic roads, intensive agriculture or highly disturbed sites may receive higher resistance. The exact weights should be estimated transparently and tested through sensitivity analysis.

Least-cost path models can identify relatively low-resistance routes between habitat patches. Circuit-theory models can additionally identify areas where movement is concentrated and where multiple pathways converge. Linkage Mapper or equivalent GIS workflows can help compare habitat patches. These outputs are decision-support hypotheses; camera traps, genetic evidence and field observations are required for validation.

A useful final map series should include: (a) current land cover, (b) land-cover change, (c) prey distribution,

(d) conflict hotspots, (e) infrastructure barriers, (f) resistance surface, (g) least-cost pathways, (h) pinch points and (i) restoration priorities. Producing these as separate map plates will keep the research paper visually clear and prevent map overlap.

XI. PREY BASE AND HABITAT RESTORATION

Tiger conservation cannot be sustained by predator monitoring alone. Deer, blue bull/nilgai and wild boar are among the fauna recorded in the official sanctuary profile and should form the core of a systematic prey assessment. Camera traps, distance sampling and pellet/sign surveys can estimate relative abundance and distribution. Livestock density should be measured separately because livestock availability at forest edges can affect carnivore movement and conflict risk.

Grassland restoration should be site-specific. Some sites may need invasive vegetation control; others may require protection from excessive grazing, water management or evidence-based fire regimes. Restoration should be evaluated by ecological response—vegetation structure, prey use, water persistence and wildlife occupancy—not merely by area treated.

Wetland management should prioritise protection from drainage, encroachment and excessive disturbance. A seasonal wetland inventory should record area, hydroperiod, vegetation condition, human use, livestock access and wildlife observations. The aim is to create a functioning habitat network rather than isolated ornamental water bodies.

XII. HUMAN–WILDLIFE CONFLICT AND CORRIDOR SECURITY

The source manuscript identifies leopard entry into villages, livestock losses, crop depredation by nilgai and wild boar, gaur-related fatalities and crocodile movement near inhabited areas as examples of the conflict spectrum. These observations demonstrate that connectivity and conflict are not separate topics. As animal movement increases through fragmented landscapes, the probability of encounters at settlement and agricultural interfaces can also increase.

A village-level GIS database should record forest edge, crops, livestock, roads, water sources, schools or other sensitive locations, incident coordinates, season, species, damage type, response time and compensation status. Hotspot analysis can then identify recurring conflict interfaces. Camera traps around high-risk edges can provide early-warning information and improve understanding of animal movement.

Management should combine rapid-response protocols, livestock protection, safer night-time practices, verified compensation procedures, community awareness, trained response teams and data-sharing between field staff and researchers. Conflict information should feed directly into the resistance model: repeated incidents can indicate either a movement pathway, a prey-depleted forest edge, or a high-attractant human-use zone.

XIII. THREATS TO CONNECTIVITY

1. Settlement and agricultural expansion causing habitat fragmentation.
2. Roads and other linear infrastructure creating movement barriers and mortality risk.
3. Loss or degradation of grasslands and wetlands.
4. Declining prey availability and excessive livestock pressure.
5. Forest degradation, invasive vegetation and poorly managed fire.
6. Human disturbance around tourism and cultural-use sites.

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7. Unplanned construction inside or adjacent to sensitive habitat.
8. Conflict when dispersing carnivores enter agricultural and residential areas.
9. Climate-related changes in water availability and seasonal habitat conditions.
10. Administrative fragmentation among Uttar Pradesh, Bihar and Nepal.

XIV. SUSTAINABLE ECOTOURISM AND SOCIO-ECONOMIC DEVELOPMENT

Sohagibarwa has strong potential for nature-based tourism because its official tourism profile highlights diverse fauna, grasslands, wetlands and scenic landscapes. The key principle is that tourism potential should not be equated with opening sensitive movement habitat to visitors. Ecologically sensitive areas should receive limited access, low noise and minimal infrastructure, while visitor facilities should be concentrated in suitable and already disturbed locations.

A carrying-capacity assessment should precede expansion of roads, parking, lighting, buildings or visitor facilities. Suitable low-impact products include guided nature trails, birdwatching, wetland interpretation, grassland walks, photography from designated points and community-led interpretation. Tourism revenue can support habitat restoration, monitoring and local employment, but tourism should never be used to justify incompatible construction in sensitive habitat.

Community participation should be spatially targeted. Households around priority tourism nodes can be supported through eco-guiding, birdwatching, nature interpretation, local food services, handicrafts, waste management, nursery work, grassland restoration and authorised conservation monitoring. Local youth can be trained in GPS use, bird identification, first aid, visitor interpretation and wildlife-safety protocols.

This model directly supports the broader PhD theme of integrated socio-economic development and biodiversity conservation: ecological connectivity becomes an economic asset only when local people receive legitimate and sustained benefits without conversion of sensitive habitat into intensive infrastructure.

XV. RANGE-WISE PRIORITY RESEARCH QUESTIONS

Range	Priority question	Suggested evidence
Pakadi	Where are forest–grassland interfaces with high prey activity? Which tourism or settlement interfaces create disturbance?	Camera traps; prey signs; conflict GPS; visitor pressure mapping
Laxmipur/Lachmipur	Which grasslands are persistent, seasonal, degraded or restorable? How does wetland proximity affect prey use?	Seasonal remote sensing; vegetation plots; prey surveys
North Chowk	How do wetlands, settlements and cultural/ecotourism use interact with biodiversity?	Water mapping; bird surveys; participatory GIS; disturbance mapping

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South Chowk	Where do forest, water and agricultural edges create prey or conflict hotspots?	Conflict GIS; livestock survey; camera traps
Madhwalia/Madh auli a	Which grasslands have the greatest restoration and prey-recovery potential?	Habitat condition index; prey distribution; resistance modelling
Nichlaul	Which landscape features strengthen or weaken eastern connectivity toward Valmiki?	Forest continuity; Gandak interface; roads; settlements; camera traps
Sheopur	Which forest–grassland mosaics should be prioritised for restoration and movement monitoring?	Land-cover change; prey surveys; camera traps; least-cost modelling

XVI. PROPOSED ANALYTICAL INDICATORS

Component	Indicators	Method / evidence
Tiger	Occupancy, detection rate, movement, age/sex evidence	Camera trapping; individual identification; occupancy models
Prey	Relative abundance and spatial distribution	Distance sampling; camera traps; pellet/sign surveys
Habitat	Forest, grassland, wetland, disturbance	Remote sensing + ground truthing
Connectivity	Resistance, conductance, bottlenecks	Least-cost path; Circuitscape; Linkage Mapper
Genetics	Migrant assignment; gene flow	Non-invasive samples + population genetics
Conflict	Frequency, severity, economic loss	Forest records + household survey + GIS
Community	Attitudes, livelihood dependence, benefit sharing	Structured interviews + participatory mapping
Tourism	Visitor pressure, carrying capacity, local benefit	Visitor survey + spatial assessment

XVII. RESEARCH DESIGN AND FIELD PROTOCOL

The study can be implemented in four linked phases. Phase I should establish the geodatabase: official boundaries, range polygons, settlements, roads, hydrography, land cover and historical land-use layers. Phase II should generate ecological observations through camera trapping, prey surveys, wetland and grassland monitoring and conflict mapping. Phase III should integrate ecological and socio-economic data into resistance and suitability models. Phase IV should ground-truth predicted pathways and translate results into range-specific management recommendations.

Camera trapping should be spatially stratified across all seven ranges rather than concentrated only where tiger signs are already expected. Sampling intensity can be increased around predicted bottlenecks and interfaces after an initial GIS screening. Non-invasive genetic sampling from scat or hair can be incorporated subject to statutory permissions, laboratory protocols and ethical requirements.

Remote sensing should compare multiple seasons and multiple years. A single satellite image can misclassify seasonal wetlands or grasslands. Multi-temporal composites can identify persistent forest, seasonal grassland, temporary water, crop cycles and disturbance. Accuracy assessment should report a confusion matrix or equivalent validation statistics rather than relying on visual interpretation alone.

Household surveys should record livelihood dependence, livestock holdings, crop exposure, conflict experience, attitudes toward wildlife, tourism participation, willingness to engage in conservation-linked livelihoods and perceived benefits/costs. Participatory mapping can identify locally known animal routes and conflict sites. Local knowledge should complement, not replace, ecological verification.

XVIII. EXPECTED GIS OUTPUTS AND MAP PLATES

Map Plate	Content	Use in management
1	Study-area locator: SWLS, Maharajganj, Nepal, Valmiki landscape	Regional context
2	Official sanctuary and seven range boundaries	Administrative baseline
3	Land-cover classification and change	Habitat monitoring
4	Forest–grassland–wetland mosaic	Habitat restoration
5	Water bodies and seasonal inundation	Water security and wetland management
6	Prey distribution and habitat suitability	Tiger-supporting habitat
7	Human–wildlife conflict hotspots	Rapid response and prevention
8	Infrastructure and fragmentation	Development screening
9	Resistance surface and least-cost pathways	Connectivity planning
10	Circuitscape pinch points / priority linkages	Bottleneck protection
11	Tourism suitability and carrying-capacity zones	Low-impact tourism
12	Integrated conservation priority map	Final management decision

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XIX. POLICY AND MANAGEMENT RECOMMENDATIONS

1. Recognise the Valmiki–Sohagibarwa landscape as a priority tiger-connectivity research and conservation landscape where supported by current evidence.
2. Obtain and standardise the current Forest Department GIS boundary and range layers before assigning legal or operational corridor boundaries.
3. Establish long-term camera-trap and genetic monitoring across all seven ranges.
4. Develop a prey-monitoring programme linked to grassland and wetland management.
5. Restore degraded grasslands, wetlands and forest edges using site-specific ecological evidence.
6. Protect verified movement areas from avoidable fragmentation and incompatible land-use change.
7. Create village-level conflict early-warning and rapid-response systems.
8. Screen proposed linear infrastructure for ecological connectivity impacts before approval using applicable legal and scientific procedures.
9. Coordinate tiger monitoring and information exchange with Valmiki Tiger Reserve and relevant Nepal agencies.
10. Develop conservation-linked livelihoods and community benefit-sharing mechanisms.
11. Maintain a central database linking tiger, prey, habitat, movement, conflict and tourism observations.
12. Review connectivity maps periodically because corridor functionality can change with land use, water conditions, fire, prey and disturbance.

XX. DISCUSSION

The available evidence supports a cautious but scientifically meaningful interpretation of Sohagibarwa as an emerging tiger habitat and connectivity landscape. The official profile establishes the Terai setting, tiger occurrence, forest–grassland–wetland mosaic and border position. National assessment provides a contemporary landscape-level context, while WII genetic evidence demonstrates that Sohagibarwa participates in tiger gene flow with Valmiki. The combination is substantially stronger than a simple list of wildlife sightings.

The most important conceptual shift is from sanctuary as an isolated protected area to sanctuary as a component of a connected Terai system. This does not mean every range is equally suitable for tiger occupancy or movement. Instead, each range should be evaluated according to habitat quality, prey density, disturbance, water availability, conflict intensity and landscape resistance.

The range-wise framework also makes the research operational. Laxmipur and Madhwalia can become focal areas for grassland ecology and prey recovery; Nichlaul can receive particular attention in the eastern connectivity assessment; Pakadi can be used to study forest–grassland and human-use interfaces; North and South Chowk can support wetland, settlement and biodiversity research; and Sheopur can focus on forest–grassland restoration and movement assessment. These are research priorities, not claims that any one range is already a confirmed corridor.

The transboundary dimension requires equal caution. Uttar Pradesh, Bihar and Nepal are administrative units, while ecological connectivity is a biological process. Compatible monitoring standards, data exchange and joint planning can improve conservation outcomes. At the same time, exact pathway strength must be demonstrated using current evidence.

Finally, conservation and development should not be presented as competing objectives. Properly designed tourism, local guiding, habitat restoration employment, birdwatching, waste management and community monitoring can create income while strengthening conservation. The key is spatial zoning: sensitive movement habitat should be protected, while visitor and livelihood infrastructure should be concentrated where ecological costs are low.

XXI. CONCLUSION

Sohagibarwa Wildlife Sanctuary occupies a strategically important position in the eastern Terai. Its Sal-forest matrix, grasslands, wetlands, river systems, prey base, border location and relationship with the Valmiki landscape create the conditions for a landscape-scale conservation programme. WII genetic evidence of first-generation tiger migrants between western Sohagibarwa and Valmiki is especially important because it moves the discussion from wildlife presence toward functional biological exchange.

A GIS-integrated research programme can now provide the missing spatial resolution: where habitat is strongest, where grassland and wetlands are degrading, where prey is concentrated, where conflict occurs, which roads or settlements create resistance, and which potential linkages require field verification. The proposed methodology deliberately separates mapped hypotheses from verified corridors and therefore provides a more defensible foundation for publication and management.

The long-term vision should be a connected conservation landscape involving Sohagibarwa, Valmiki Tiger Reserve, relevant Nepal landscapes and the wider Terai Arc system. The objective should not simply be to increase tiger sightings. It should be to secure breeding habitat, prey populations, dispersal routes, genetic exchange and community support. If habitat restoration, prey recovery, corridor mapping, conflict mitigation, sustainable tourism and transboundary cooperation are strengthened together, Sohagibarwa can make a substantial contribution to biodiversity conservation while supporting sustainable socio-economic development.

XXII. LIMITATIONS AND PUBLICATION INTEGRITY

This manuscript is a research synthesis and GIS-oriented research design, not a substitute for primary field data. The uploaded source document itself states that current camera-trap data, prey-density estimates, GIS outputs, village-level surveys, photographs/maps where permitted and current Forest Department records should be added before journal submission. [2]

Accordingly, this revised version does not present a fabricated sanctuary-only tiger population, does not assign exact corridor boundaries to individual ranges, and does not treat proposed indicators as observed results. The two GIS figures showing the sanctuary context and connectivity are explicitly schematic research maps; the final empirical paper should replace them with official boundary shapefiles and field-validated GIS outputs.

Historical WII observations are also treated as historical evidence rather than current abundance estimates. Before publication, all historical observations should be compared with current Forest Department records, contemporary camera-trap results and the latest national assessment. This distinction improves scientific reliability and protects the paper from overstatement.

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