International Journal of Educational Innovations and Research
Volume 2 | Issue 3 | July-September 2026 | ISSN 3049-4052
Peer Reviewed (Referred Journal)
DOI: https://doi.org/10.63671/ijeir.v2i3.87

Human–Wildlife Conflict in and around Sohagibarwa Wildlife Sanctuary: Spatial Patterns, Socio-Economic Impacts, GIS-Based Hotspot Assessment and Strategies for Sustainable Coexistence

Ashutosh Yadav[1]; Netra Pal[2]

[1]Research Scholar (SRF), Department of Geography, J.S. University, Shikohabad, Firozabad (U.P.), India

[2]Professor, Department of Geography, J.S. University, Shikohabad, Firozabad (U.P.), India

Email: ashutoshydav2001@gmail.com

Abstract

Sohagibarwa Wildlife Sanctuary (SWS) is a 428.2 km² Terai protected landscape in Maharajganj district, Uttar Pradesh, near the India–Nepal border and the Uttar Pradesh–Bihar interface. Its Sal-dominated forests, grasslands, wetlands, rivers and agricultural fringes support carnivores, ungulates, birds and reptiles, while the same mosaic creates repeated opportunities for human–wildlife encounters. This study develops a GIS-oriented framework for understanding spatial patterns, socio-economic impacts and management priorities. Documented leads include leopard entry into villages and agricultural fields, livestock depredation, nilgai and wild-boar crop damage, gaur/wild-buffalo attacks, crocodile movement toward human-use areas and wildlife mortality associated with snares or crowd responses. North Chowk, South Chowk, Madhwalia and Nichlaul recur as important conflict interfaces in the available evidence. A 2025 report also documented a tigress with two cubs near Sohagibarwa village and a goat kill; this is treated as tiger–livestock interaction rather than evidence of human attack. The paper proposes a verified incident geodatabase, range/beat mapping, severity-weighted hotspot analysis, seasonal modelling, household surveys, compensation assessment, early-warning systems, livestock protection, crop-loss mitigation and community participation. Because exact GPS incident data and official spatial layers were not supplied with the base manuscript, the GIS figures are explicitly schematic planning maps and are not presented as statistically calculated hotspot surfaces. The study therefore separates documented evidence from hypotheses and provides a publication-ready framework for a future empirical Human–Wildlife Conflict Atlas integrating socio-economic development with biodiversity conservation.

Keywords

Human–wildlife conflict; Sohagibarwa Wildlife Sanctuary; leopard; tiger; gaur; nilgai; wild boar; crocodile; GIS; hotspot mapping; crop depredation; livestock loss; community conservation; coexistence

1. Introduction

Sohagibarwa Wildlife Sanctuary occupies a strategically important position in the Terai of northern Uttar Pradesh. The official Uttar Pradesh Eco-Tourism Development Board describes the sanctuary as approximately 428 km^2, close to the Indo–Nepal border in the north and the Uttar Pradesh–Bihar interstate boundary in the east. The landscape includes extensive Sal forest, humid forest vegetation, open grasslands, ponds, lakes, swamps and riverine systems. The official profile also records tiger, leopard, jungle cat, deer, nilgai, wild boar and a diverse avifauna. These characteristics make Sohagibarwa both a conservation asset and a complex human-use landscape.

The sanctuary is divided into seven ranges—Pakadi, Laxmipur, North Chowk, South Chowk, Madhwalia, Nichlaul and Sheopur. The range-wise source used in the base research material reports 39,220.10 ha across the seven forest ranges, with additional agricultural land bringing the total sanctuary area to about 42,820.10 ha. The same source identifies seven forest rest houses and describes the sanctuary as a connected ecological system rather than seven isolated units.

Human–wildlife conflict in such a setting cannot be reduced to spectacular attacks. It includes crop depredation, livestock loss, wildlife entry into settlements, fear and restricted movement, damage to property, economic and psychological costs, rescue operations, unsafe crowd responses, trapping, poisoning or other retaliatory behaviour, and wildlife mortality. The supplied base manuscript correctly frames conflict as a landscape process connecting forest edges, farms, roads, water bodies and settlements.

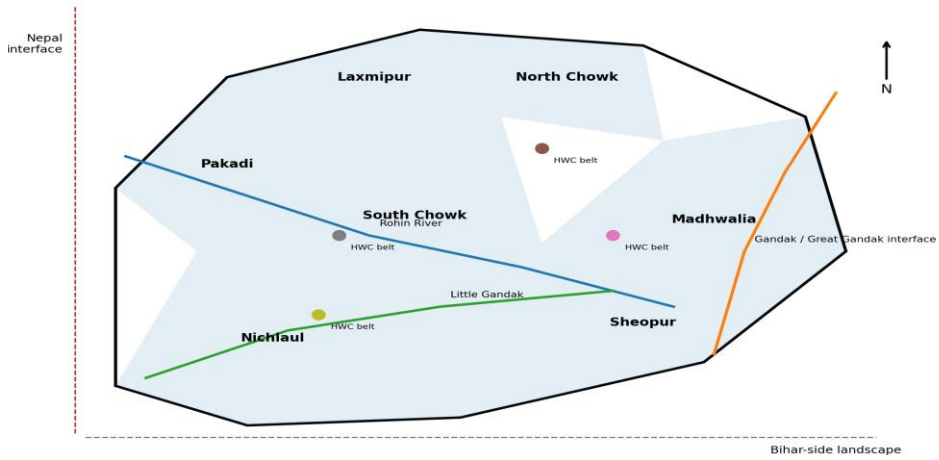
The problem is especially relevant to the user's PhD theme of integrated socio-economic development and biodiversity conservation. Conservation that ignores household losses may weaken local support, while development that ignores habitat connectivity may increase encounters. The research challenge is therefore to identify where, when and why encounters occur; determine their actual socio-economic cost; and design interventions that reduce risk without fragmenting wildlife habitat.

2. Study Area and Landscape Context

International Journal of Educational Innovations and Research
Volume 2 | Issue 3 | July-September 2026 | ISSN 3049-4052
Peer Reviewed (Referred Journal)
DOI: https://doi.org/10.63671/ijeir.v2i3.87

Sohagibarwa represents a forest–grassland–wetland–agriculture mosaic. Official tourism information states that about 75% of the area is Sal forest, while wetter areas contain Jamun, Gutal, Semal and Khair. Lower portions can become waterlogged during the rainy season, creating grasslands and patches of cane forest. Such seasonal habitat

Figure 1. GIS-style schematic of Sohagibarwa study landscape and major interfaces



variation is important for both wildlife movement and human exposure because water, forage and cover change through the year.

The sanctuary is hydrologically connected by the Great Gandak, Little Gandak, Pyas and Rohin systems. A Wildlife Institute of India Management Effectiveness Evaluation report also notes connectivity with Valmiki Tiger Reserve in Bihar and the Terai forests of Nepal through the wider Chitwan landscape, while identifying heavy biotic pressure and roughly 300 villages in and around the protected area. These characteristics demonstrate that conflict management cannot stop at the notified boundary.

The wider Terai context is important for carnivore movement. Genetic and landscape-connectivity research has detected two first-generation tiger migrants from western Sohagibarwa Wildlife Sanctuary to Valmiki Tiger Reserve and inferred gene flow involving Valmiki, eastern Sohagibarwa and western Sohagibarwa. This evidence does not mean that every forest edge is a tiger corridor; it does show that landscape connectivity is biologically meaningful and that management of movement routes should be considered alongside conflict reduction.

The seven ranges differ in habitat structure and exposure. The range-wise PhD framework identifies Pakadi as a gateway/forest-edge unit, Laxmipur as a wetland-rich range, North Chowk as a bird-rich wetland zone, South Chowk as a wetland–riparian unit, Madhwalia as a grassland–forest mosaic, Nichlaul as a wetland–riverine and raptor-rich unit, and Sheopur as a smaller range with open-habitat and disturbance concerns. These distinctions are useful for conflict research because species-specific risk is likely to vary with habitat, water, crop availability, livestock density and settlement proximity.

Figure 1. GIS-style schematic of the Sohagibarwa study landscape, seven ranges, major river interfaces and recurring conflict-belt contexts. This is a planning map, not a legal boundary or quantitative hotspot map; official Forest Department GIS layers should

International Journal of Educational Innovations and Research
Volume 2 | Issue 3 | July-September 2026 | ISSN 3049-4052
Peer Reviewed (Referred Journal)
DOI: https://doi.org/10.63671/ijeir.v2i3.87

replace/refine it for publication.

3. Objectives

The objectives are to: (1) compile documented human–wildlife conflict incidents associated with Sohagibarwa and its surrounding fringe; (2) identify range, beat, village and landscape situations repeatedly associated with conflict; (3) classify incidents by species and conflict type; (4) assess household-level economic and social impacts; (5) develop a GIS-based hotspot framework using verified coordinates; (6) distinguish confirmed evidence from media-derived leads and research hypotheses; (7) identify range-specific mitigation priorities; and (8) propose a sustainable coexistence model linking biodiversity conservation, local livelihoods and responsible ecological tourism.

4. Methodology

The study follows a mixed-method landscape approach. The first evidence layer is the supplied base research paper, which compiles official sanctuary information and local news reports from 2023–2026. The manuscript explicitly cautions that news reports can contain incomplete species identification, approximate locations and unverified statements. Therefore, the present expanded paper does not convert media reports into a complete official incident census. Each case is treated as a documented lead until verified through Forest Department records, compensation files, GPS coordinates, photographs, camera-trap evidence or systematic interviews.

An incident database should contain at least: incident ID, date, time, range, beat, village, GPS latitude and longitude, species, conflict type, human injury/death, livestock species and number, crop type and affected area, estimated monetary loss, response taken, compensation status, weather, habitat type, distance from forest edge, distance from water body, road proximity, livestock density and whether the incident was verified. Repeated incidents at the same location should be linked rather than counted as independent events when they represent the same episode.

For GIS analysis, the sanctuary boundary should be obtained from the latest Forest Department GIS layer. Range and beat boundaries should be digitised from official maps. Incident points should then be overlaid on land cover, forest compartments, agricultural fields, villages, roads, rivers, ponds and wetlands. Buffer zones of 1 km, 3 km and 5 km around the sanctuary boundary and selected forest edges can be used for exploratory analysis, but the buffer distances should be tested rather than treated as universal thresholds. The base manuscript proposes severity weighting—human death 5, serious injury 4, livestock loss 3, repeated crop damage 2 and non-damaging sighting 1—and recommends Kernel Density or Getis-Ord Gi* for hotspot detection.

Household surveys should use stratified sampling across high-, medium- and low-conflict villages. Questions should cover crop losses, livestock losses, medical expenses, workdays lost, fear, night-time mobility, women's and children's mobility, school disruption, compensation experience, attitudes toward wildlife and willingness to participate in conservation. Qualitative interviews with forest staff, village leaders, livestock owners, farmers and community volunteers can explain why particular places repeatedly become conflict interfaces.

Seasonality is central. A monsoon period may increase waterlogging and alter animal movement; crop maturation can attract herbivores; winter may change waterbird and livestock-use patterns; and dry-season water scarcity can concentrate wildlife around permanent water sources. Therefore, monthly or fortnightly incident mapping should be combined with crop calendars, rainfall, water availability and vegetation condition.

Because exact GPS data were not available in the supplied manuscript, Figures 1 and 2 in this paper are explicitly schematic GIS planning maps rather than legal or statistically derived maps. They are intended to show how the final GIS atlas should be organised. They must be replaced or refined with verified Forest Department spatial data before publication as a quantitative GIS result.

5. Documented Conflict Events and Locations

The supplied base paper identifies a set of reported incidents that provide a useful starting point for field verification. In 2023, a gaur/wild-buffalo attack was reported at Nayanser, Farenda, and a leopard attack was reported at Semrahwa, Nautanwa. In 2024, another fatal gaur/wild-buffalo case was reported at Karamha, Sadar. A leopard was reported near Ramnagar in the North Chowk context, while Sohat in the Kothibhar/Nichlaul link area was associated with leopard entry and a subsequent snare incident. Bahuar Kala in Nichlaul was reported as a settlement-entry site, and Basouli in Madhwalia was reported as a leopard-interface location. Pipra Khadar, about 30 km from the sanctuary according to the cited report, illustrates that dispersing animals can move well beyond the protected-area edge.

Recent public reporting supports the continuing relevance of these interfaces. A December 2024 report described a leopard near the Basouli forest outpost in Madhwalia, while another December 2024 report described a leopard approximately 30 km from the sanctuary in Pipra Khadar. These cases are important not because media accounts alone establish population-level trends, but because they identify locations for systematic verification.

A 2025 report documented a tigress with two cubs near Sohagibarwa village in the Shivpur range and reported the killing of a goat. The report described forest staff warning villagers and the animals moving back toward the forest. This should be classified as tiger–livestock interaction rather than human attack. The distinction is important: risk communication must not convert livestock depredation into an unsupported claim of human danger, while still recognising the need for preventive livestock protection.

Another 2025 report described crop and livestock impacts around villages near the South Chowk, North Chowk and Madhwalia ranges, involving leopard, nilgai, wild boar, deer and crocodile. Again, such reports are useful leads, but species-specific loss estimates and exact incident coordinates require field verification.

The base manuscript also separates a 2026 leopard-cub mortality case near Bajahi, Nichlaul,

International Journal of Educational Innovations and Research
Volume 2 | Issue 3 | July-September 2026 | ISSN 3049-4052
Peer Reviewed (Referred Journal)
DOI: https://doi.org/10.63671/ijeir.v2i3.87

because it appears to concern probable intra-specific conflict rather than human–wildlife conflict. This is an important methodological practice: a wildlife death should not automatically be counted as HWC simply because it occurs near a village or protected-area boundary.

6. Evidence Table for Field Verification

Year	Location / range	Species / issue	Interpretation
2023	Nayanser, Farenda	Gaur / wild buffalo	Reported human fatality; verify official record and species identification.
2023	Semrahwa, Nautanwa	Leopard	Reported human fatality; verify incident details.
2024	Karamha, Sadar	Gaur / wild buffalo	Reported human fatality; supports dedicated gaur movement study.
2024	Ramnagar, North Chowk	Leopard	Village-edge entry and reported injury/fear.
2024	Sohat / Nichlaul link	Leopard + human response	Agricultural-fringe entry; snare-related wildlife risk reported.
2024	Bahuar Kala, Nichlaul	Leopard	Settlement entry; two cubs reported.
2024	Basouli, Madhwalia	Leopard	Forest-outpost/village-edge sighting.
2024	Pipra Khadar fringe	Leopard	Reported movement beyond sanctuary edge.
2025	South/North Chowk, Madhwalia	Leopard, nilgai, wild boar, deer, crocodile	Reported crop, livestock and water-body safety issues; requires verification.
2025	Sohagibarwa village	Tiger/tigress	Tigress with two cubs reportedly killed goat; no human attack established.

Source note: These entries are documented leads from the supplied manuscript, not a complete official incident census. Each case requires verification before statistical analysis.

7. Spatial Pattern by Range and Landscape Interface

North Chowk emerges as a priority interface because Ramnagar is a documented leopard-entry location and broader reporting places North Chowk in a wider crop and livestock conflict belt. The range also contains important wetland and forest-edge habitats. The appropriate research question is whether conflict points cluster around particular wetland margins, crop types, roads, livestock holdings or forest-edge vegetation rather than assuming that the entire range has equal risk.

South Chowk is repeatedly identified in local reporting as part of a conflict belt involving leopard, nilgai, wild boar, deer and crocodile. The ecological explanation may be a combination of wetlands, riparian habitats and agricultural interfaces. A dedicated GIS layer for ponds and water bodies is particularly important because crocodile-related safety risk should not be analysed with the same kernel as leopard or herbivore incidents.

Madhwalia is a major grassland–forest mosaic and a documented leopard-interface area around Basouli. Its grasslands can be valuable wildlife habitat, while nearby agricultural fields can create an attractive interface for herbivores and livestock owners. Conflict mapping should therefore include grassland condition, livestock grazing, crop type and road access.

Nichlaul contains a strong wetland and riverine component. The base manuscript identifies Sohat and Bahuar Kala as leopard-interface locations, while a 2025 report documented a wild-boar hunting case in the Chargaha beat of Nichlaul Range. Illegal hunting is not identical to HWC, but it can increase risk by reducing prey, encouraging snares and creating non-target wildlife mortality.

Pakadi and Laxmipur should not be labelled low-conflict simply because fewer incidents appear in the available media record. Absence of reports may reflect lower incidence, lower reporting, different accessibility, or incomplete documentation. Laxmipur also recorded a dead leopard in the Tedhighat Beat in June 2024, demonstrating the need to monitor wildlife mortality and human–wildlife interactions even where human injury is not reported.

Sheopur is a smaller range and should be incorporated into the monitoring design rather than excluded because fewer documented incidents are available. The objective is to establish a comparable baseline across all seven ranges and then determine whether observed differences reflect ecology, human pressure, reporting intensity or actual conflict frequency.

8. Species-wise Conflict Profile

Leopard is the strongest documented HWC signal in the supplied evidence. Settlement entry, agricultural-field movement, livestock predation, human injury and fear appear repeatedly. Leopards are particularly capable of using fragmented agricultural mosaics and vegetation near settlements, so the relevant management unit is often the forest–farm–village interface rather than the forest interior alone.

Tiger conflict should be treated separately from leopard conflict. Tiger movement has ecological significance because Sohagibarwa is connected to the wider Valmiki–Terai landscape, and genetic studies have identified first-generation migrants between Sohagibarwa and Valmiki. Yet the available local incident evidence does not establish a pattern of human attack. The 2025 goat-kill case is better interpreted as livestock depredation and an early-warning opportunity.

Gaur or wild buffalo presents a different risk profile. The documented fatal cases at Nayanser and Karamha justify targeted monitoring of movement routes, seasonal congregation, visibility near roads and agricultural edges, and community awareness. Gaur conflict should not be analysed through carnivore-style livestock predation models; it is more closely related to movement, surprise encounters, crop use and human response.

Nilgai, wild boar and deer are primarily important for crop depredation. Their economic effect may be large even when no human injury occurs. The appropriate indicators are crop type, affected area, frequency of visits, yield loss, fencing expenditure, guarding labour and household income dependence on the damaged crop. The 2025 local reporting from the South Chowk–North Chowk–Madhwalia belt reinforces the need for household-level quantification rather than anecdotal statements.

Crocodile incidents should be mapped as a water-body safety problem. Reports of crocodile movement from ponds toward inhabited areas suggest that the risk is spatially concentrated around particular water bodies and access points. GIS should therefore map water-body boundaries, bathing/washing points, livestock access, fishing locations and settlement proximity.

9. Socio-economic Impacts

The principal socio-economic effect of HWC is cumulative livelihood insecurity. A crop loss can reduce seasonal income; livestock loss removes an important household asset; human injury produces medical costs and lost workdays; and repeated sightings can alter mobility. The base manuscript notes reports that fear has affected children's and women's movement and that crop losses may push some farmers toward debt, but these claims require systematic household surveys before being expressed as population-level estimates.

A robust household-loss framework should distinguish direct and indirect costs. Direct costs include destroyed crops, killed livestock, veterinary expenses, medical bills and property damage. Indirect costs include labour spent guarding fields, reduced school attendance, reduced market visits, sleep disruption, psychological stress, transport costs during rescue or medical treatment and changes in cropping decisions.

Compensation is a critical governance variable. A 2024 Government of India PIB release cited in the base manuscript states that ex-gratia relief under relevant central wildlife schemes had been enhanced to Rs 10 lakh for death or permanent incapacitation caused by wild animals. Actual eligibility and compensation for a particular Sohagibarwa incident must be assessed under the applicable Uttar Pradesh rules and case documentation. Research should compare claimed loss, eligible loss, amount received, processing time and household perception of fairness.

Community participation can reduce both conflict and conservation costs. A useful contemporary example comes from Sarus conservation in Maharajganj: Wildlife Trust of India reported that 35 Sarus Mitras helped protect 104 eggs across 52 nests during 2025–26, with activities linked to rice paddies, wetland-agriculture margins and wetlands in the Sohagibarwa Wildlife Division. Although this is not an HWC programme, it demonstrates that local stewardship can work at the same forest–farm–wetland interface where conflict management must operate.

International Journal of Educational Innovations and Research
Volume 2 | Issue 3 | July-September 2026 | ISSN 3049-4052
Peer Reviewed (Referred Journal)
DOI: https://doi.org/10.63671/ijeir.v2i3.87

10. GIS-based Hotspot Assessment

GIS provides the strongest route for moving from a list of incidents to a spatial explanation of conflict. The first requirement is a verified point layer. Each incident should have a confidence class—A for GPS/Forest Department verified, B for reliable locality but approximate coordinates, and C for media-only locality requiring verification. Statistical hotspot analysis should be performed primarily on A-class incidents and sensitivity-tested with A+B incidents.

The second layer is severity. A simple starting index can assign 5 points to human death, 4 to serious human injury, 3 to livestock loss, 2 to repeated crop damage and 1 to non-damaging wildlife sighting. However, severity weights should be tested with local stakeholders because monetary loss and human safety may not be perceived identically across communities. Separate hotspot surfaces should be produced for carnivores, herbivores and crocodile-related events to avoid masking species-specific patterns.

The third layer is exposure. Forest edge distance, agricultural land, crop type, village density, road density, water-body distance, livestock density, grassland cover and settlement expansion should be included. A multivariate model can then test whether conflict probability rises with particular combinations of these variables. For example, leopard encounters may be associated with forest-edge vegetation and livestock availability, while nilgai and wild-boar crop damage may be associated with specific crop types and open agricultural mosaics.

Kernel Density Estimation can visualise concentrations, while Getis-Ord Gi* can identify statistically significant hot and cold spots when sufficient point density exists. For predictive modelling, logistic regression, Random Forest or other interpretable machine-learning approaches can test whether distance to forest, water, road and settlement predicts incident probability. Model performance should be evaluated through spatial cross-validation rather than random splitting alone because nearby points are not statistically independent.

Figure 1 presents a GIS-style schematic of the sanctuary's range and landscape interfaces. Figure 2 presents a conceptual conflict-hotspot map using the documented localities from the base paper. These are deliberately not presented as measured hotspot maps because exact coordinates and official range/beat polygons were not available in the source material. Figure 3 gives the recommended GIS workflow for producing the final Human–Wildlife Conflict Atlas.

International Journal of Educational Innovations and Research
Volume 2 | Issue 3 | July-September 2026 | ISSN 3049-4052
Peer Reviewed (Referred Journal)
DOI: https://doi.org/10.63671/ijeir.v2i3.87

Figure 2. Conceptual GIS conflict-hotspot framework. The figure illustrates analytical structure using documented localities; it is not a statistically calculated hotspot surface.

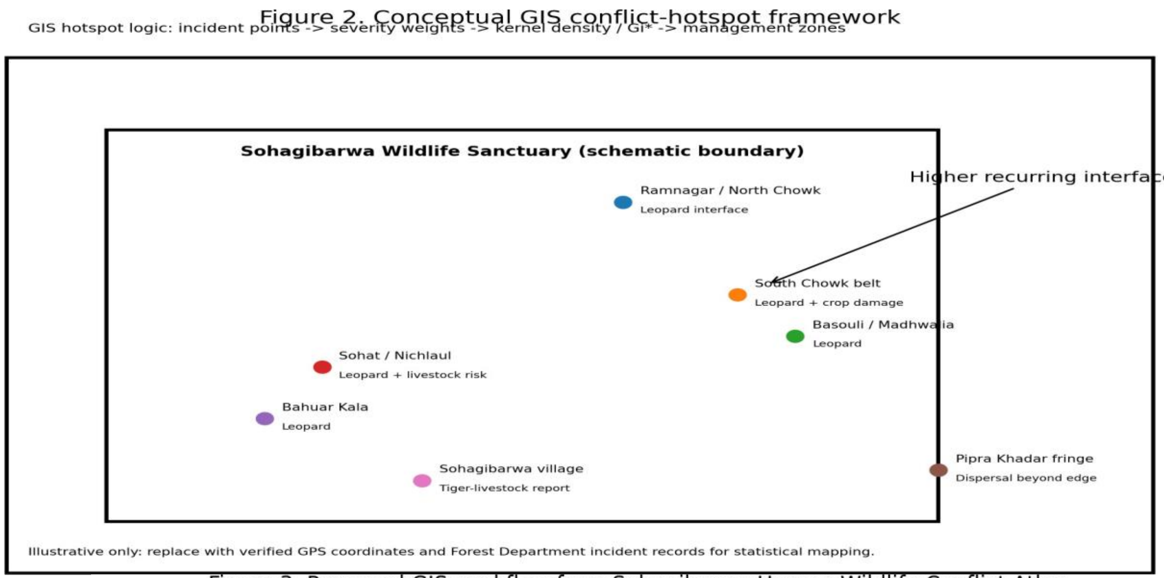


Figure 3. Proposed GIS workflow for a Sohagibarwa Human-Wildlife Conflict Atlas

Figure 3. Proposed GIS workflow for the Sohagibarwa Human–Wildlife Conflict Atlas: verified incidents → GPS/range attribution → land cover, water and roads → hotspot analysis → priority zones and early warning.

11. GIS Research Layers and Data Architecture

A publication-quality GIS database should contain at least eight groups of layers. First are administrative and protected-area boundaries: sanctuary boundary, range, beat, compartment, district and village boundaries. Second are habitat layers: dense forest, open forest, grassland, wetland, riverine vegetation, agriculture and built-up land. Third are hydrological layers: rivers, ponds, lakes, drainage lines, seasonal water bodies and livestock-use points.

Fourth are human-access layers: roads, tracks, settlements, schools, markets, health centres, grazing areas and field paths. Fifth are wildlife observations: camera-trap locations, pugmarks, scat, livestock-kill sites, direct sightings and movement routes. Sixth are HWC incidents. Seventh are socio-economic layers such as crop type, livestock density, household dependence and compensation cases. Eighth are temporal layers such as rainfall, crop calendar, fire occurrence, water level and seasonal vegetation indices.

The final atlas should provide separate maps for leopard hotspots, herbivore crop-depredation hotspots, crocodile water-safety zones, gaur movement-risk zones and potential tiger movement interfaces. A composite map can then show where several pressures overlap. This is more useful for management than a single generic HWC map.

12. Range-wise Management Priorities

Pakadi: establish a baseline incident register, survey forest-edge settlements and monitor livestock-related incidents. Because Pakadi functions as an accessible gateway range, visitor movement and roadside wildlife sightings should also be recorded.

Laxmipur: integrate wildlife-mortality records with conflict mapping, particularly around wetland and forest-edge habitats. Crop-damage surveys should be conducted even if media reports are fewer. The June 2024 leopard mortality case near Tedhighat demonstrates why mortality monitoring matters.

North Chowk: prioritise village-edge leopard monitoring, crop-damage assessment and night-time early warning. Ramnagar and surrounding interface villages can serve as pilot sites for a community alert network.

South Chowk: prioritise crop depredation, livestock protection and crocodile safety around water bodies. Water-body access points should be mapped and community safety signage should be evidence-based.

Madhwalia: combine grassland management with conflict mitigation. Basouli and nearby agricultural edges can be used for detailed leopard movement and livestock-availability studies. Grassland restoration should avoid creating artificial concentration points near settlements.

Nichlaul: prioritise leopard-interface mapping, wild-boar and nilgai crop damage, wetland safety and illegal-hunting risk. The range's river and wetland systems require separate crocodile and water-use layers.

Sheopur: establish a complete baseline because the present evidence is comparatively sparse. A low reported frequency should be treated as an information gap until systematic monitoring confirms it.

13. Community-based Mitigation Strategy

A sustainable coexistence strategy should begin with verified early warning. Village-level alert groups can be linked to the Forest Department through a designated communication chain. The objective is not to encourage villagers to chase animals but to provide rapid, verified information about where an animal has been seen and what safe behaviour is required.

Livestock protection is one of the most practical interventions. Goats and calves should be housed in predator-resistant night enclosures, especially in villages adjacent to forest edges. Community-level demonstration units can show low-cost roofing, secure doors and reduced attractants. Compensation should be linked to verified cases but prevention should not depend entirely on compensation.

Crop-loss mitigation should be species-specific. Nilgai and wild boar require crop-protection approaches different from leopard management. Potential measures include community guarding, crop diversification where ecologically and economically appropriate, physical barriers, early-warning devices and coordinated field protection. Any deterrent should be tested for ecological safety and effectiveness before large-scale deployment.

Human behaviour is a major determinant of risk. Crowding around a leopard, chasing an animal, using snares, poisoning carcasses or attempting untrained capture can convert a manageable encounter into a dangerous one. School programmes, women's groups, farmer meetings and youth volunteers can improve knowledge of safe responses.

Community monitoring can also generate conservation benefits. A standard sighting form or mobile application can record date, time, location, species, direction of movement and photographs. Such citizen observations should not automatically enter the official incident database; they should enter a verification queue and be validated by trained staff.

14. Human–Wildlife Conflict and Wildlife Connectivity

Sohagibarwa's conflict problem must be understood alongside its connectivity value. The sanctuary is not an isolated ecological island. WII assessments describe connectivity with Valmiki Tiger Reserve and Nepal's Terai landscape, while genetic research has detected tiger gene flow between Sohagibarwa and Valmiki. This means that some animals entering agricultural landscapes may be dispersers moving through a broader ecological network rather than residents of a single range.

Connectivity conservation does not mean allowing unrestricted wildlife movement through villages. Instead, it means identifying where movement is likely, protecting high-value habitat links, reducing dangerous crossing points and managing land use at bottlenecks. Roads, expanding settlements, intensive agriculture and fencing can all change permeability. A corridor-sensitive infrastructure screening process should therefore be incorporated into district-level planning.

The relationship between HWC and connectivity can be analysed through a combined GIS model. First map wildlife observations; second map habitat suitability; third identify least-cost movement routes; fourth overlay villages, roads and crop fields; fifth identify conflict-prone bottlenecks. The result is a practical map showing where habitat restoration and community mitigation should occur together.

15. Sustainable Ecotourism and Conflict Reduction

Tourism can either support coexistence or increase pressure. Sohagibarwa's forests, wetlands, grasslands and birds provide opportunities for low-impact nature tourism, but tourism should not be developed by opening every sensitive habitat to vehicles or visitors. The sanctuary's official tourism profile already identifies substantial ecological and avifaunal diversity.

A conflict-sensitive tourism model can include guided birdwatching, wetland interpretation, grassland walks, nature trails, community guides and conservation

International Journal of Educational Innovations and Research
Volume 2 | Issue 3 | July-September 2026 | ISSN 3049-4052
Peer Reviewed (Referred Journal)
DOI: https://doi.org/10.63671/ijeir.v2i3.87

education. Visitor movement should be restricted near active wildlife-use areas and breeding sites. Night tourism should be carefully controlled, especially in potential tiger and leopard movement zones.

Tourism revenue should create visible local benefits: guide employment, homestay opportunities where appropriate, handicraft and local-product markets, conservation-linked visitor fees, and support for village conservation groups. If households see economic value in maintaining habitat and safe wildlife coexistence, tourism can become a conservation incentive rather than an additional disturbance.

Component	Indicators	Suggested method
Tiger	Occupancy, detection, 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 sampling + population genetics
Conflict	Frequency, severity, economic loss	Forest records + household survey + GIS
Community	Attitudes, livelihood dependence, benefit sharing	Structured interviews + participatory mapping

16. Discussion

The available evidence supports a cautious but meaningful interpretation. Human–wildlife conflict in Sohagibarwa is spatially uneven and appears strongest in several recurring forest–agriculture interfaces, especially around North Chowk, South Chowk, Madhwalia and Nichlaul in the currently available reports. However, media frequency cannot be equated with true incidence. Reporting bias, accessibility, social attention and administrative response can all affect the apparent pattern.

The most consistent signal is leopard interface activity, followed by herbivore crop damage and a smaller number of serious gaur and tiger–livestock interactions. Crocodile risk is spatially tied to water bodies. Each species therefore requires a different management response. A single composite conflict score may be useful for district planning, but operational decisions should rely on species-specific maps.

The socio-economic dimension is equally important. Farmers may experience repeated small losses that never become news reports but cumulatively exceed the economic effect of a single dramatic incident. The proposed household survey is therefore essential. It should measure annual loss at household level and compare it with compensation, prevention expenditure and conservation attitudes.

Recent community conservation experience in Maharajganj, including Sarus Mitra participation around wetlands and rice fields, suggests that local stewardship can be institutionalised. The same social infrastructure could support wildlife sighting verification, safe-response messaging, crop-protection trials and habitat monitoring.

Finally, GIS should be treated as a decision-support system rather than a decorative map. The final product should allow a Forest Department manager to ask: Which villages experienced repeated incidents? Which species are involved? Which roads or water bodies are nearby? Which households face the highest economic loss? Where should an alert group, livestock enclosure or habitat-restoration project be placed? A GIS atlas that answers these questions would have direct management value.

17. Proposed Human–Wildlife Conflict Atlas for Sohagibarwa

The proposed atlas should contain a sanctuary overview map; seven range maps; village and beat maps; species-wise incident maps; seasonal maps; crop-loss maps; livestock-loss maps; wildlife-mortality maps; water-body safety maps; tiger/leopard movement maps; socio-economic vulnerability maps; compensation maps; and conservation-priority maps. Each map should have scale, north arrow, coordinate system, legend, source, date and data-quality statement.

18. Limitations

The major limitation is the absence of a complete, verified incident database with GPS coordinates. The supplied base paper itself states that public news reports are not a complete official census and that several reports lack exact coordinates or verified compensation data. Consequently, this expanded paper does not calculate annual conflict rates or statistically claim that one range is definitively more dangerous than another.

A second limitation is that some species identifications and localities in media reports require Forest Department verification. A third is that socio-economic impacts are described conceptually rather than estimated from a representative household survey. A fourth is that the GIS maps included here are schematic planning maps because official spatial layers and incident GPS points were not supplied with the base manuscript. These limitations define the next empirical stage of the research.

19. Conclusion

Human–wildlife conflict around Sohagibarwa Wildlife Sanctuary is a socio-ecological and geographical problem created by the interaction of wildlife habitat, agricultural production, water systems, livestock, roads and settlements. The documented evidence shows leopard settlement entry, livestock interaction, crop depredation by herbivores, serious gaur/wild-buffalo incidents, crocodile movement near human-use areas and wildlife mortality associated with unsafe human responses. Some animals also move beyond the sanctuary boundary, demonstrating that conflict

International Journal of Educational Innovations and Research
Volume 2 | Issue 3 | July-September 2026 | ISSN 3049-4052
Peer Reviewed (Referred Journal)
DOI: https://doi.org/10.63671/ijeir.v2i3.87

management must operate at the landscape scale.

The strongest research priority is therefore to build a verified Human–Wildlife Conflict Atlas using Forest Department records, GPS, camera traps, compensation files and household surveys. GIS can identify hotspots, but field verification must explain the mechanisms behind those hotspots. Species-specific mitigation, community participation, livestock protection, crop-loss reduction, compensation monitoring and habitat connectivity should be planned together.

For Sohagibarwa, sustainable coexistence should not mean choosing between people and wildlife. It should mean designing a landscape in which critical habitat remains functional, households receive practical protection and fair institutional support, and wildlife movement is managed through evidence rather than fear. Such an integrated approach directly supports the broader goal of socio-economic development and biodiversity conservation and can form a strong empirical component of doctoral research.

2. Data and Evidence Classification for Future Fieldwork

Evidence class	Definition	Use in analysis
A – Verified	GPS/Forest Department record, camera trap or independently verified field evidence.	Primary statistical hotspot and modelling dataset.
B – Locality verified	Reliable village/beat information but approximate coordinates.	Sensitivity analysis and field-prioritisation layer.
C – Reported lead	Media or community report requiring verification.	Do not use alone for quantitative rates; use for field verification.

References

1. Forest and Wildlife Department / Uttar Pradesh Eco-Tourism Development Board. Sohagibarwa Wildlife Sanctuary profile. Government of Uttar Pradesh.
2. Wildlife Institute of India. Management Effectiveness Evaluation report: Sohagi Barwa Wildlife Sanctuary, Uttar Pradesh.
3. Wildlife Institute of India. Connecting Tiger Populations for Long-term Conservation. 2026.
4. Wildlife Institute of India / Terai Arc Landscape studies on tiger genetic connectivity, metapopulation dynamics and corridor functionality.

International Journal of Educational Innovations and Research
Volume 2 | Issue 3 | July-September 2026 | ISSN 3049-4052
Peer Reviewed (Referred Journal)
DOI: **https://doi.org/10.63671/ijeir.v2i3.87**

5. National Tiger Conservation Authority & Wildlife Institute of India. Status of Tigers, Co-predators & Prey in India – 2022.
6. Uttar Pradesh Forest Department / protected-area records used in the supplied manuscript for sanctuary establishment, area and range-level context.
7. Published local news reports cited in the supplied manuscript for individual human–wildlife conflict incident leads. These are treated as leads requiring verification rather than as a complete official incident database.
8. Wildlife Trust of India. Community-based conservation work in the Maharajganj/Sohagibarwa landscape, including Sarus Mitra initiatives.
9. Author's research framework: proposed GIS geodatabase, range/beat mapping, hotspot analysis, household survey, compensation assessment and participatory mapping.