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Aaranyak's Role in Reducing Human–Elephant Conflict through Community Participation in Assam

Shrutilekha Barman[1]

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Abstract

Human–elephant conflict (HEC) has become one of the most pressing conservation and livelihood concerns in Assam, primarily driven by habitat loss, fragmentation of traditional corridors and increasing overlap between human settlements and elephant ranges. This study examines the interventions undertaken by Aaranyak's Elephant Research and Conservation Division (ERCD) to mitigate HEC through ecological assessments, corridor mapping, infrastructure risk reduction, habitat restoration and community-based approaches. Using a qualitative, document-based method, the study synthesizes evidence from technical assessments, field reports and community outcomes across multiple districts of Assam. The findings show that ERCD's integrated strategies—such as solar-powered fencing, early-warning networks, elephant-deterrent crops and livelihood support—have contributed to measurable reductions in conflict incidents, electrocution deaths and crop damage. Ecological research and corridor evaluations have strengthened conservation planning, while community participation has enhanced local preparedness and resilience. Despite persistent challenges, including rapid land-use change and limited resources, the results demonstrate that long-term coexistence depends on multi-layered interventions that combine scientific research with locally grounded mitigation.

Keywords: Human–Elephant Conflict, Assam, Community Participation, Corridor Connectivity, Habitat Restoration.

Introduction

Human-elephant conflict has emerged as a major conservation issue in Assam, driven by the steady expansion of agricultural land, settlements and infrastructure into forest areas. As elephants enter croplands in search of food, communities experience crop loss, property damage and, in severe cases, human injuries or fatalities. Elephants too face retaliatory killings, displacement and electrocution due to illegal electric fences. These impacts have ecological consequences, especially for India's endangered Asian elephant population, which already faces pressure from habitat fragmentation and shrinking movement corridors.

In Assam, the increase in human-elephant interactions is strongly associated with the degradation of traditional migratory routes and the rapid transformation of forested landscapes. The state supports a significant portion of India's elephant population, making conflict mitigation essential both for conservation and for the well-being of local communities. Aaranyak, an environmental conservation non-governmental organization based in Guwahati, has been involved in addressing these issues through its Elephant Research and Conservation Division (ERCD). Established in 2002, ERCD works across several districts of Assam and northern West Bengal with a focus on ecological research, conflict mitigation, corridor restoration and community engagement.

[1] Assistant Professor, Department of Political Science Department, Dhakuakana College (Autonomous)

Objectives

1. To examine and document Aaranyak's key interventions such as ecological research, corridor assessments, electrocution prevention, habitat restoration and community-based mitigation in addressing human-elephant conflict in Assam.
2. To assess the effectiveness of Aaranyak's multi-pronged, community-centered strategies including solar fencing, early-warning networks, livelihood support and elephant-deterrent crops in reducing conflict intensity and strengthening human-elephant coexistence.

Review of Literature

Studies indicate that human-elephant conflict has increased sharply in Assam due to the loss and fragmentation of habitat, expansion of agriculture and rapid infrastructure development. The state and its adjoining North Bengal region host a substantial portion of India's Asian elephants, making the protection of movement corridors essential. Ecological assessments across several landscapes-such as Manas, Dehing-Patkai, Digboi, Golaghat and Udalguri have identified elephant movement patterns, high-risk conflict zones and degraded corridors requiring urgent attention.

The literature consistently highlights the growing threat of electrocution from illegal electric fences and sagging power lines, a major cause of elephant deaths in Assam. Habitat restoration, especially grassland improvement, removal of invasive species and maintenance of water bodies, is recognised as a long-term solution to reduce elephant incursions into croplands. Several studies emphasise the importance of community involvement through solar fencing, bio-fences, early-warning teams and livelihood diversification. These interventions have shown promise in reducing conflict, promoting safer coexistence and providing alternative income opportunities for conflict-prone communities.

Methodology

A qualitative, document-based methodology has been adopted for this study. Primary data have consisted of Aaranyak's technical reports, project documents and ecological assessments relating to human–elephant conflict in Assam. Secondary data have been collected from newspaper articles and credible online sources to understand recent conflict events, community experiences and infrastructure-related challenges. All material has been classified into thematic categories such as ecological research, corridor connectivity, electrocution prevention, habitat restoration, community mitigation and livelihood support. Effectiveness has been evaluated by comparing outcomes reported across different districts and by analyzing evidence of behavioural, ecological and community-level changes.

Results

The findings from Aaranyak's ecological assessments, corridor evaluations, infrastructure risk surveys and community-based interventions reveal measurable improvements in human–elephant conflict mitigation across several districts of Assam. Results are presented under key thematic areas.

- **Ecological Research and Monitoring**

Extensive surveys across Manas, Dehing-Patkai, Digboi, Golaghat, Udalguri, Nagaon and Sibsagar generated baseline information on elephant distribution and habitat use. Dung-based population assessments and occupancy mapping identified multiple high-risk conflict zones and crucial movement routes. Landscape genetic sampling initiated in 2022 offered deeper insights into source populations and corridor connectivity.

Table1: Summary of Ecological and Corridor Findings

Assessment Type	Key Findings
Occupancy and dung-count surveys	Identified conflict hotspots and seasonal movement zones
Corridor reassessment	Bogapani, Golai and Kotha found degraded; one new corridor identified in North Bengal
Gene-flow sampling (2022–)	Mapped source populations and functional connectivity
Conflict heat maps	Revealed clusters of high human-elephant interactions

- **Corridor Assessment and Connectivity**

Corridor evaluations confirmed severe degradation in several traditional routes, including Kotha (nearly non-functional). A new corridor in North Bengal and cross-border routes in the Indo–Bhutan landscape were mapped, guiding placement of monitoring posts and forest department patrolling routes.

- **Electrocution Prevention and Infrastructure Risk Mitigation**

A statewide survey detected widespread illegal electric fences and sagging power lines. Subsequent collaboration with APDCL led to removal or insulation of high-risk lines. Approximately 16 km of lethal fencing in Baksa was converted into community-managed solar-powered fencing.

- **Habitat Restoration**

Restoration initiatives included invasive species removal, grassland regeneration in Manas, and improvement of water bodies and woodland–grassland mosaics in Udalguri and Nagaon. More than 100 hectares of potential restoration areas were identified to reduce elephant movement into agricultural fields.

- **Community-Based Mitigation and Livelihood Support**

Aaranyak introduced mindful solar fencing, solar streetlights, bio-fences, and early-warning groups such as Elephant Conservation Networks (ECNs), Village Champions and Rapid Response Units. Elephant-deterrent crops-citronella, lemongrass, turmeric, *Curcuma aromatica*, *Homalomena aromatica* and chilli-were successfully trialled and adopted.

Table2: Community Mitigation Outcomes

Intervention	Reported Outcome
Solar fencing	Protected across 10,000 people; safeguarded across 200 elephants
Early-warning networks	Protected across 10,000 people; safeguarded across 200 elephants
Elephant-deterrent crops	Reduced crop-raiding; 10+ hectares revived
Livelihood support	Beekeeping, weaving, poultry and fish-rearing strengthened resilience

- **Overall Impact**

Across multiple districts, incidents of conflict declined following the introduction of community-led mitigation. Reports indicate the prevention of more than 30 electrocutions in one proactive year, revival of abandoned cropland and improved community safety and preparedness.

Discussion

The results highlight that Aaranyak's interventions have produced meaningful ecological and social outcomes, demonstrating the value of integrating scientific research with community-led approaches.

Interpretation of Findings

The ecological research provided the foundation for targeted mitigation. Occupancy surveys and heat maps enabled precise identification of high-risk zones, which strengthened the placement of solar fences, early-warning groups and surveillance. The corridor assessments reaffirmed that connectivity loss is a primary driver of conflict; thus, their restoration remains essential for long-term viability of elephant movement.
Electrocution prevention proved to be one of the most impactful interventions. The shift from illegal lethal wiring to solar-powered community fencing directly reduced elephant deaths and improved human safety. This confirms that infrastructure-related risk, often overlooked, is a critical element in conflict mitigation.
Community involvement emerged as the strongest determinant of success. Elephant-deterrent crops and livelihood support helped farmers regain economic stability while reducing dependency on high-risk paddy cultivation. ECNs and Village Champions improved preparedness, allowing faster responses during elephant movement. These findings indicate that coexistence is achievable when communities become active participants rather than passive recipients of conservation efforts.

Implications

Taken together, the observations provide a foundation for understanding how Aranyak's initiatives can shape long-term conservation outcomes, the implications of which are discussed below.

- **Conservation Planning:**
  The ecological data generated can guide long-term habitat and corridor restoration across Assam.
- **Policy Making:**
  Electrocution-related findings highlight the urgency of safe power infrastructure and collaborative planning between wildlife agencies and power utilities.
- **Community Resilience:**
  Adoption of deterrent crops and alternative livelihoods diversifies income sources, reducing vulnerability to repeated losses.
- **Landscape-Level Management:**
  Mapping of Indo–Bhutan routes underscores the need for transboundary conservation strategies.

Limitations

However, the study is not without constraints, and recognising these limitations is crucial for a balanced understanding of the evidence presented.

- **Resource Constraints:**
  Many interventions rely on external funding, which may limit long-term maintenance of fences, restoration sites and community programmes.
- **Continuous Land-Use Change:**
  Rapid conversion of forest edges into farmland creates new conflict fronts, making mitigation an ongoing process rather than a one-time solution.

- **Incomplete Monitoring:**
  Some areas lack continuous monitoring, which limits the ability to measure long-term behavioural changes in elephants.

- **Community Fatigue:**
  Repeated conflict can erode motivation, making it difficult to maintain voluntary participation without sustained support.

Conclusion

Human–elephant conflict in Assam is shaped by ecological pressures, landscape changes and community vulnerabilities. The evidence presented in this study shows that Aaranyak's Elephant Research and Conservation Division has played a vital role in addressing these challenges through a combination of ecological monitoring, corridor assessment and inclusive community engagement. Interventions undertaken by Aaranyak, such as solar fencing, early-warning systems, bio-fences, elephant-deterrent crops and livelihood diversification, have contributed to reducing conflict intensity and improving the safety of both people and elephants. Long-term impacts of Aaranyak's initiatives also include enhanced local resilience, restored habitats and evidence-based conservation planning.

However, challenges remain. Rapid land-use change, illegal power tapping and limited funding continue to create new conflict fronts. Strengthening institutional partnerships, expanding habitat restoration, improving power infrastructure safety and ensuring long-term ecological monitoring-areas in which Aaranyak continues to play a significant role-will be critical in sustaining progress. Overall, the findings highlight that durable human–elephant coexistence in Assam requires integrated, science-based and community-led strategies that balance conservation goals with the needs and safety of local people, with Aaranyak's sustained engagement remaining central to this process.

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