

Negotiating Coexistence and Territories in Tension: A Case Study of Elephant Incursions and Social Vulnerability from Eastern India

Aseema Biswal¹, Punyatoya Patra²

¹Department of Geography, Delhi School of Economics, University of Delhi

²Aditi Mahavidyalaya, University of Delhi

ABSTRACT: Human-animal conflict in general and Human-elephant conflict in particular has become an acute problem in Odisha state, that accounts for the largest toll of elephant attack induced human casualty among all states of India. Recently, news reports recorded 153 human casualties and 94 elephant deaths due to such conflict in Odisha 2024-25 alone. Taking note of this ever-increasing concern, this paper aims to bridge the gap between policy implementation and ground reality by qualitatively analysing the real-world scenario in a micro- setting in Kanheipur Village Panchayat, a targeted location in the given context in the state as a case study. It employs rigorous field survey of N=100 local stakeholders across the villages of the Panchayat as methodology to assess elephant incursions, resultant crop damage and fatalities. The results indicate towards a pronounced seasonal pattern of around 70% of elephant visits during the post-monsoon and winter window. The study span recorded one recent fatality and several injuries. Major factors behind this include proximity to Dalijoda and Haripur Forest Ranges, local crop profiles as paddy farms etc. Recommended interventions include solar fencing, trenches construction, community-based patrols etc.

1. INTRODUCTION

Human-elephant conflict has proved to be the most recurring type among all human-animal conflicts in recent past and has done significant loss to rural livelihood in India. Due to habitat decay, and poaching, Asian and African elephants are vested with the highest degree of protection under the Schedule-1 of Wildlife protection Act in India and often raid crop fields and occasionally attack people and property ([Tripathy et al., 2021](#); [Menon et al., 2017](#)). Such issues concerning biodiversity is a serious concern, as it is an impediment to the achievement of sustainable development ([Adeniyi, 2024](#)). Between the years 2015 and 2018, India alone has recorded around 2,381 human casualties and 490 elephant fatalities from conflict and about 0.5 million households suffered crop losses and Odisha suffering disproportionately by claiming the highest elephant-related human death toll ([MOEF and CC, 2018](#)), despite having fewer elephants than states like Karnataka, Assam etc., indicating the severity of the issue in the state. Elephants are neither spared from humans, with electric shocks, poaching, wiring taking their lives like nowhere else. Odisha recorded an all-time high annual record of 94 elephant deaths in 2024-25 (only till 18.3.2025) and has acquired the notorious distinction of being the elephant graveyard of India ([Statesman, 2025](#)).

Multiple previous studies have already shown the conflict story in Odisha. [Singh et al. \(2021\)](#) mapped hotspots in Keonjhar district where 5,145 hectares of cropland and 345 lives were lost to elephants between the years 2001 and 2018. Odisha Wildlife 2025 report has revealed 153 such casualties and crop damage in more than 2905 acres farm land, affecting 12,337 farmers. With over 100 elephant deaths and 171 human casualties in 2024-25, human-animal conflict has only worsened over time in the state ([Maharana, 2025](#)). The rural forest-fringe areas face urgent challenges with regard to such large- scale life and property loss. The 2024 Odisha Elephant Census recorded 2103 elephants over 2017 count of 1976 ([Maharana, 2024](#)), mostly drawn from Jharkhand and West Bengal due to rampant mining and deforestation, to Odisha due to its rich forests, crops ([Senapati, 2024](#); [Niyogi, 2025](#)). [Fig. 1](#) shows an increasing trend of annual human casualties in the recent past due to elephant attacks. However, the focus of this paper lies in the heavy human side loss in a case study rural area to show the human concern side of the story, yet keeping conservative attitude towards the vulnerable wildlife unlike studies with restrictive measures that limit the right to wildlife's natural existence ([Mohanty and Mishra, 2017](#)).

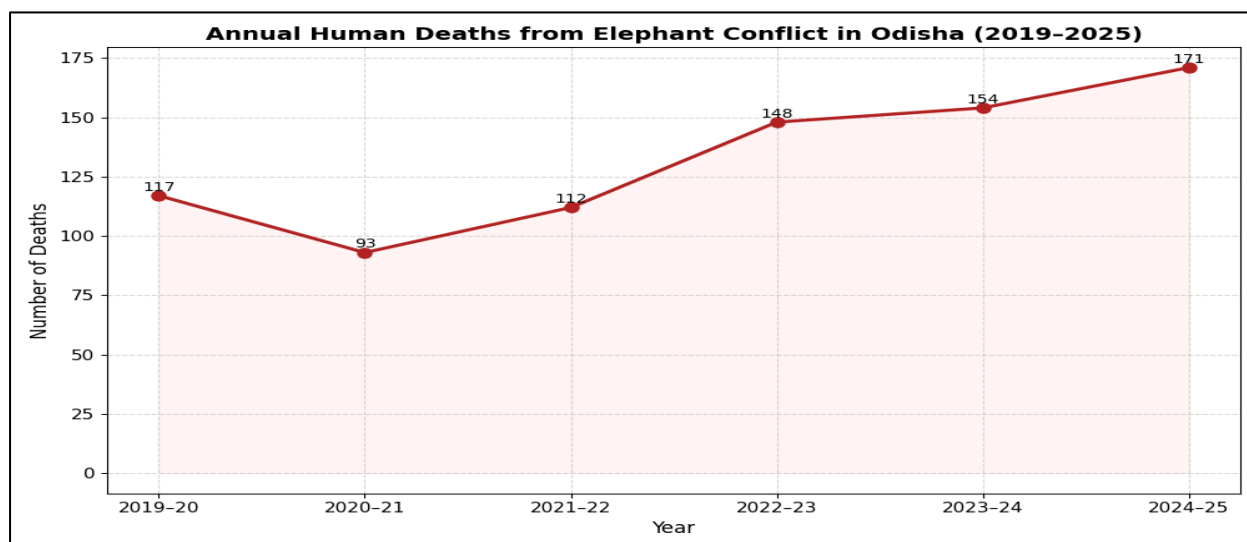


Fig.1: Annual Human Casualties Due to Elephant Attacks Between 2019- 2025 (Data Source- Odisha Wildlife Report, 2025, prepared by authors)

This study is conducted at Kanheipur Village Panchayat as a recurring hotspot case study of this conflict in Cuttack district of Odisha state. Objective of this study is to quantify the frequency and seasonality of elephant attacks, estimate losses and record local mitigation and behaviour in the area. The study carefully analyses the cause of such conflict, resultant losses, mitigation measures and future aspects. It lies at the fringe area of Dalijoda Forest Range, with multiple other small forested hills such as Purusundha, Ambua, Damani, Mania and is bestowed with extensive agricultural land-use. Recurring elephant raids on rice fields and occasional human fatalities are emerging problems in Kanheipur, especially around the harvest season. The survey findings were complemented with data from news reports and forest department figures to validate the findings.

2. STUDY AREA

Kanheipur Village Panchayat is a Rural Local Body under Tangi Choudwar block, located in the Cuttack district in Odisha state of India. It comprising of 11 villages, i.e. - Bada-pokhari, Barapada, Anjua, Jharakata, Kanamira, Teliapada, Palasa, Haduotta, Chintamanipur, Naranpur and Kanheipur. It extends between latitude 20.5°North and longitude ~86.0°East, encompasses several villages with small hills and forest patches. The average altitude is around 100–300 meters and majority of population is engaged in agricultural and allied activities. The region enjoys a humid subtropical monsoon climate with cool dry winter, therefore is bestowed with tropical deciduous forests. The area, with fertile alluvial soil, is dominated by paddy cultivation in two phases annually, i.e.- Kharif paddy sown during June–July and harvested during October–November and some Rabi paddy sown in early winter around December and harvested during February- March. Forest corridors from Dalijoda and nearby hills provide elephant habitat and pathways into these fields. These are often visited by elephants, coming from Purusundha, Ambua, Biswali, Duburi, Mania and Damani hills into adjacent farms ([The New Indian Express, 2018](#)). At a small distance, there is also Haripur and Kapilash forest range that houses numerous forested greenery. [Fig.2](#) represents the study area map along with forest ranges, considered by localites as elephants source region.

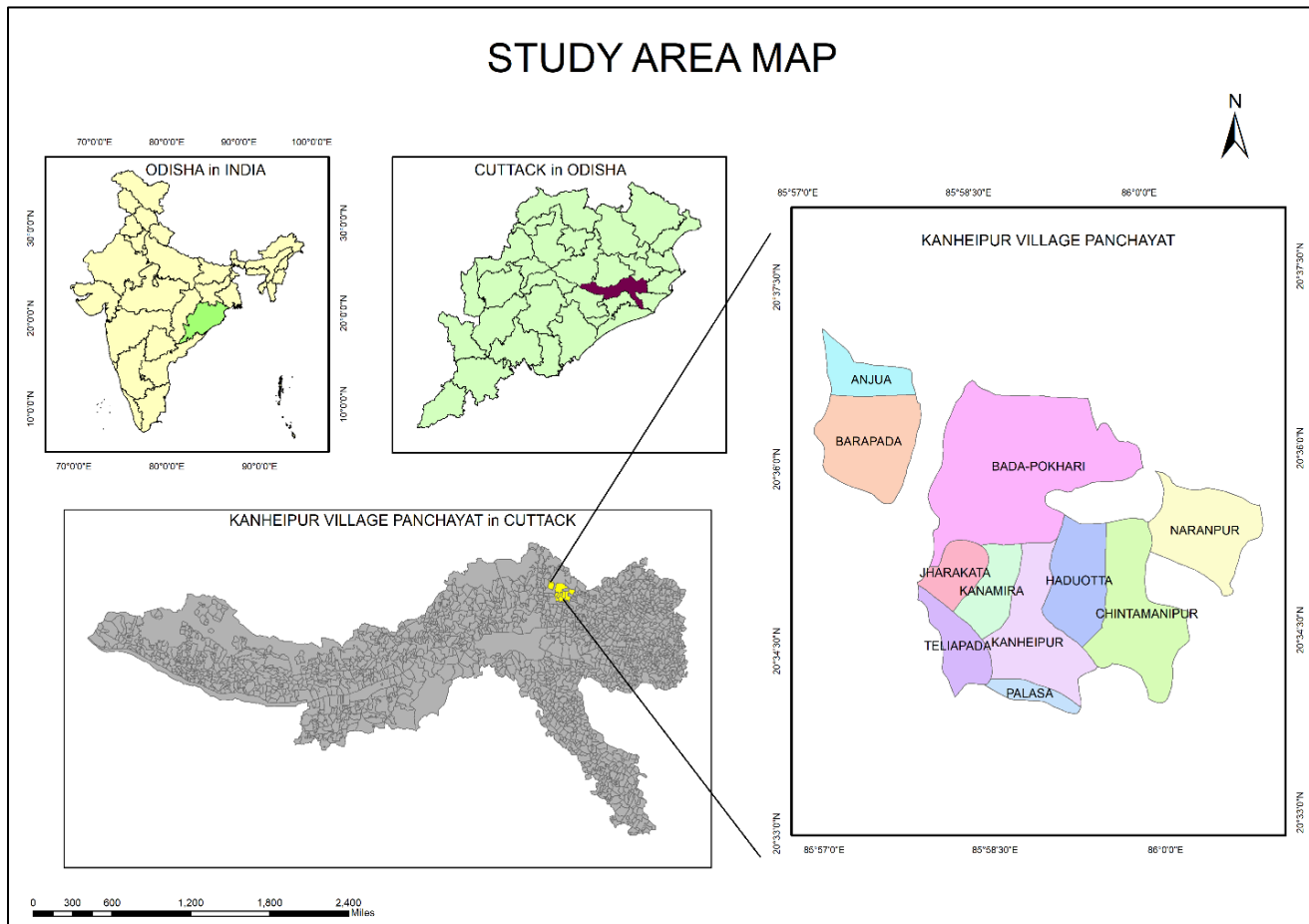


Fig.2: Study Area Mapping (prepared by authors through ArcGIS)

3. DATA SOURCES and METHODOLOGY

This study is mainly conducted with primary data collected through household survey. A household survey with random sampling was conducted for data collection. The participatory Rural Appraisal was done with sample size (N) of 100 individuals from the villages of Kanamira, Bhagatpur, Badapokhari and other local hamlets, aiming to include localites, farmers, labourers, and forest officials. The survey interviews were conducted in January 2026 using a semi-structured questionnaire. The questions covered several dimensions including the timings of elephant encounters (season and frequency), damage types and scale (life, crop, property), estimated losses (monetary value), and responses (mitigation measures, compensation etc.). The responses were cross-verified by follow-up and from news articles. For statistical analysis, individual responses are treated as variables. Data were summarized by counts and percentages. Participation was voluntary with informed consent and respondents' identities are anonymized. Secondary data were obtained from news media for data regarding number of elephants involved, death toll, loss amount, government response etc. [Fig. 3](#) represents the entire methodology flowchart.

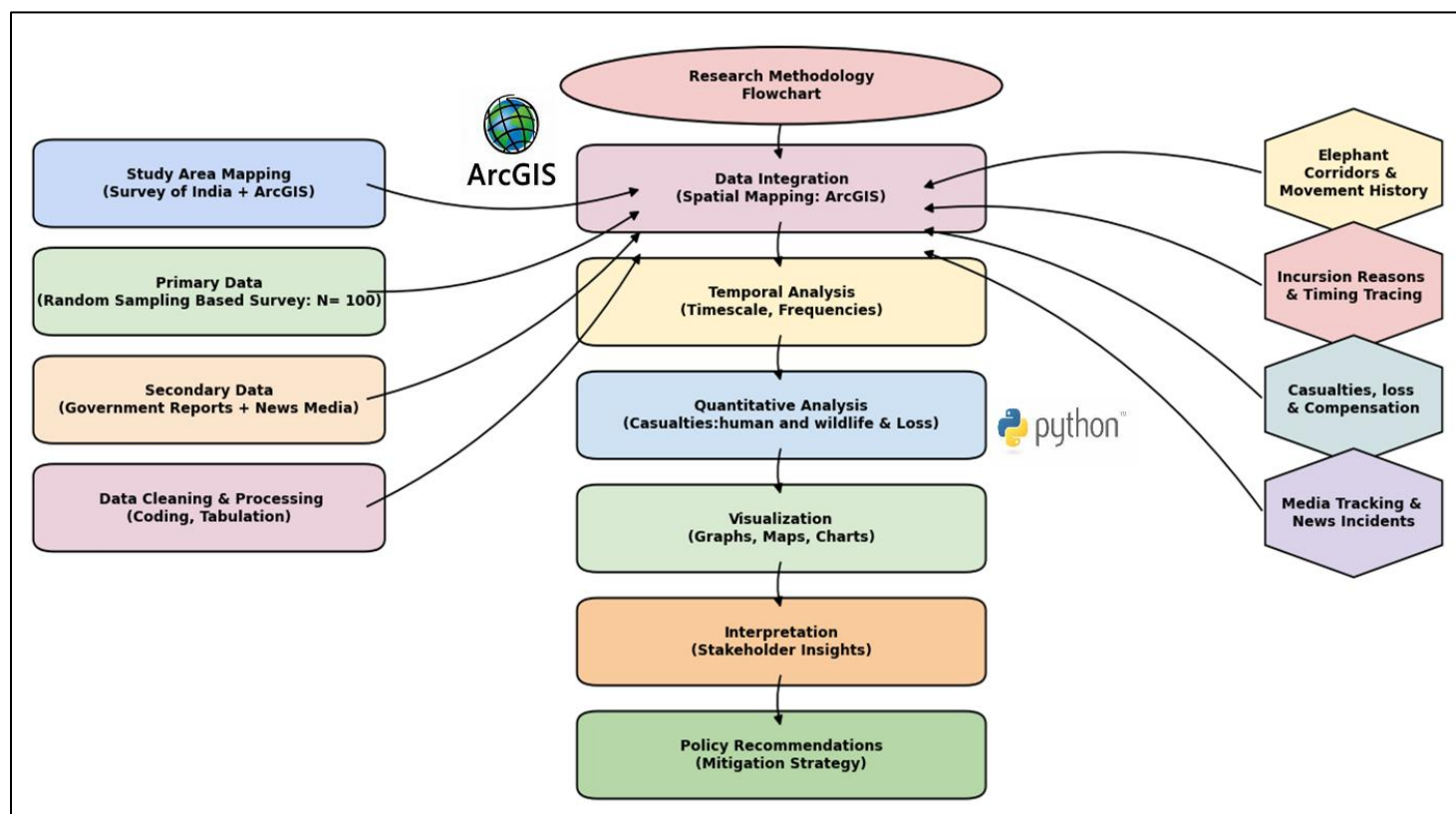


Fig. 3: Methodology Flowchart (generated by authors through python code)

4. RESULTS

4.1 REASON of INCURSION

98% respondents claimed the smell of ripened paddy, habitat decay due to deforestation by both local firewood collectors (a business) and Government's side and industrialisation as the leading causes of incursion. 2% claimed Population pressure and resultant settlement induced forest encroachment to be the leading causes of unusual and increasing elephant incursions. For example, the nearby cement factory established in village Mania, tourism related deforestation in nearby elephant-housing kapilash hills etc. are the major game-changer. 92% residents reported that most farms lie within 1–3 km of forest cover, making them readily accessible to roaming elephants. Seasonal timing of elephant migration, local agricultural land use and hydrology (ponds that attract wildlife) also count in the reason. They often migrate in the cooler months, coinciding with ripened paddy fields, exaggerating the tension since food scarcity in forests compel them to move of in search of food.

4.2 CONFLICT TIMINGS

55% of households (n=100) reported witnessing at least ten elephant intrusions in each of the recent past 5 years. The survey finds that elephant visits are highly seasonal, majority (70%) of which occurred during post- monsoon and winter (October–January) period. Monthly distribution of incursions (Fig. 4) shows dual peak during November (around Kharif harvest) and January, drawn based on survey responses. This aligns with previous studies, noting, Asian elephants tend to move into farmland during the Kharif harvest months of ripened paddy vulnerability. Odisha's agricultural cycle favours such incursion, since, by October most Kharif paddy is ready to harvest, offering rich fodder for elephants. One farmer stated that the elephants are aware of harvest time of paddy crop when maturity nears and the crops turn whitish, , they do frequently visit. In November 2015, a herd of more than 16 elephants raided paddy fields for around a week.

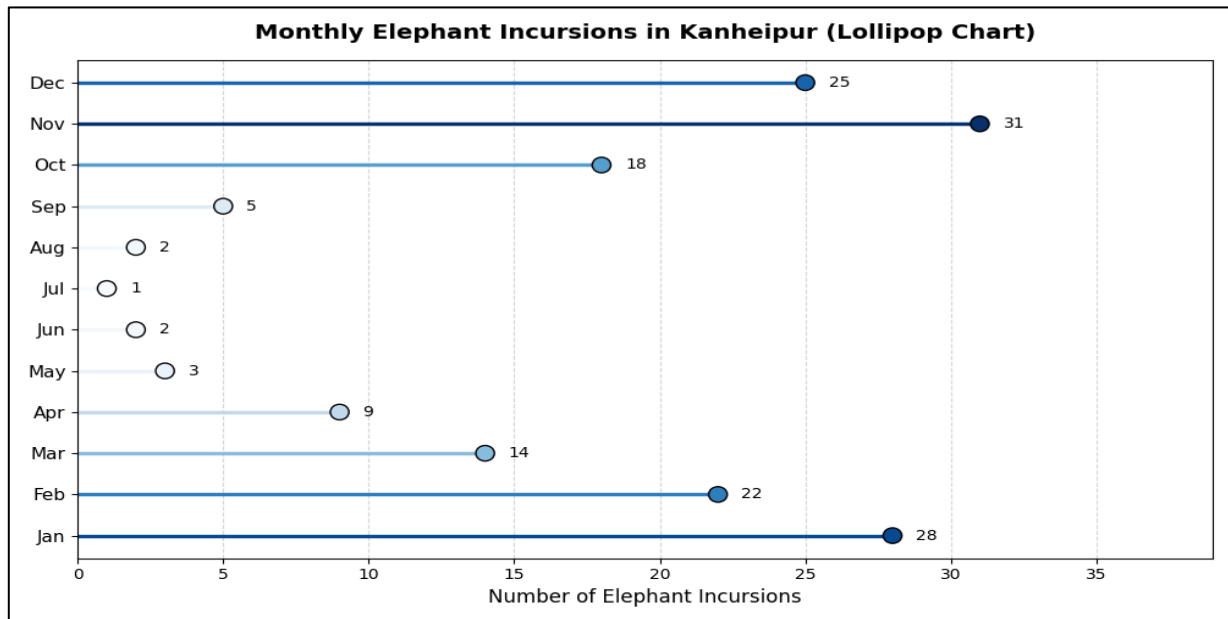


Fig. 4: Lollipop Chart showing Monthly Pattern of Elephant Incursions in the study area (generated by authors through python code based on survey findings)

4.3 LOSS TYPES and SCALE

Crop damage was the most common concern among the respondents, with more than 85% reporting that especially the rich paddy fields were trampled. On an average, each affected household lost about 0.4 hectare of paddy in 2024-2025. Overall, 55% farm households estimated over 150 hectares of paddy destroyed last season. This response is consistent with documented events such as the 2015 herd that destroyed about 40 hectares across in a single week. 17% of affected farmers also reported elephant damage to secondary crops, mainly moong and fruits-vegetables such as banana etc (Fig. 5). which were being harvested in late winter. The farmers estimated losing around 5–7 quintals of paddy per hectare, corresponding to more than 15,000 to 20,000 INR loss per hectare (at MSP prices). Total crop loss in the study sample amounts to more than 9 to 12 lakhs, showcasing the severity of livelihood impact. The Government's compensation scheme was of great relief to the troubled farmers. More than 25 pet and livestock have lost their life and 2 elephants have died in the area in last 2 years because of electric shock and deep water bodies, despite of enormous efforts from the side of forest Department. Property damage included broken houses, vehicles, doors, cowsheds etc. 23% of households, especially those with kachcha house or huts on field edges were the sufferers.

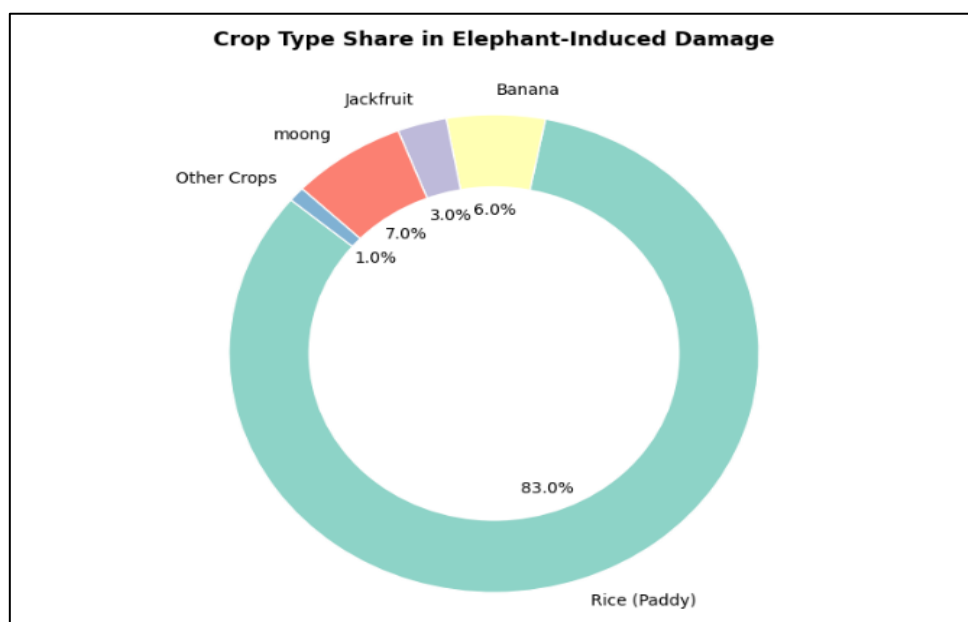


Fig. 5: Pie diagram showing the percentage of each crop type loss to elephant incursions (generated by authors through python code)

Negotiating Coexistence and Territories in Tension: A Case Study of Elephant Incursions and Social Vulnerability from Eastern India

4.4 LIFE LOSS

4% of the respondents reported injury to their family members by an elephant. 47 household reported at least 3 deaths in the past five years. One respondent recounted a summer morning when elephants came to the pond and a neighbour was knocked down and Meena Singh died the next day ([Sambad, 2024](#)). February 2018 death case of Netrananda Dehuri was also surveyed upon ([Dash, 2018](#)). These evidences suggest though human casualties are rare, but consistent over the time. 87 % participants said that they avoid going outside in winter nights. Parents are scared to let their children go for tuition after evening. Villagers in Kanheipur were once so terrified that they were supposed to start a protest when officials failed to act.

4.5 MITIGATION MEASURES TAKEN

Government has instructed the forest departments to establish timely awareness training camps. Cooperation among the Government departments, especially electricity, forest, fire brigade, communication departments are smoothening the situation. Few forested mountains have been surrounded with electric wires of current for shock to elephants with low voltage to avoid their death. Elephant crossing paths have been given corridor sign to avoid human interference with the zones of wildlife. Compensation and crop insurance against crop loss has been guaranteed and hiked by the Government under Anukampa Scheme ([Anukampa, 2025](#); [Mohapatra, 2026](#)).

Night patrols with drums, torches and fireworks are common among the most common measures to be taken by the localites, as reported by 97% respondents. However, such techniques sometimes backfire, distressing them to give return visits ([Niyogi, 2025](#)). Only 2% of the respondents admitted putting illegal electric fencing or barbed wire around their fields. Such live wires have sometimes also electrocuted elephants, causing their deaths ([The new Indian Express, 2018](#)). Few respondents put conflicted views that, if elephants die due to such illegal method, forest officials fine them rather than understanding their concern for crops. Even after years of research and investments, we are still lacking enough mitigation knowledge on the fundamentals of Human Elephant Conflict ([Dickman, 2010](#)). Regarding permanent solutions, 78% respondents favoured solar-powered fences or trenches along the forest boundary, going hand in hand with formal proposals made by the Dalijoda range officers, i.e- to fence the edges of Purusundha, Ambua, Damani hills to block elephants. Some families have already dug partial trenches around plots, often filled by rains. Only 45% respondents had applied for crop-compensation, since the Government process is slow, indicating a gap between urgent community needs and the current proceedings.

5. DISCUSSION

The Kanheipur case study aligns with the typical characteristics of Odisha's human–elephant conflict pattern. The seasonal concentration of incursions in winter windows showcase larger migration picture. A study in Keonjhar identified paddy-raiding as the most common HEC damage, followed by house damage and human casualty. Around 1,176 hectares of crops damage by wildlife in Odisha, of which, this study alone accounts for around 15% in a single year. [Palita & Purohit \(2008\)](#) found paddy as the major cause, between 2001 and 2007, 23,241 acres of paddy was destroyed statewide.

This study results show casualty rate that aligns with the previous published figures ([Maharana, 2025](#)). Though rare, still the life loss dimension cannot be avoided in this context, since innocent lives matter. The reasons of such incursions have multiple dimensions to it, i.e- proximity of fields to elephant habitats, water bodies (ponds) that can trap elephants around homes ([Niyogi, 2025](#)). Farm ponds, designed for fishery and to store water during summer make the place more enticing to elephants. Besides, the area lies between forested mountain and movement corridor between the hill ranges of Dalijoda, Damani, Kaapilash etc, through which, elephant groups move during winters

The consequences are far reaching and disproportionately affect the poor section. Small holder farmers lose their livelihood income and get trapped into debt cycle, with many compelled to replant vegetables to get sustained income. On the conservation mirror, retaliatory actions such as electric fencing and shocking etc. harm elephants, sometimes even causing their death.

5.1 FUTURE ACTIONS NEEDED

89% respondents agreed that all future solutions must be participatory than retaliatory. Best management practices such as solar fencing, community early-warning systems, mobile SMS alerts during potential conflict, timely compensation payouts, long-term land-use planning to secure elephant corridors and creation and maintenance of water bodies in forests can go a long way in ensuring less future conflict. Farmers should shift towards early maturing variety of kharif rice to avoid crop loss. Government's subsidy towards the same type of paddy variety can help farmers take better decision regarding this. Compensation schemes should be more rigorously applied and official proceedings should avoid delays and amount hike should be improvised on timely basis ([Mohapatra, 2026](#)). Rural electrifications should be boosted, since elephants are afraid of lights. Social forestry and other forms of community driven afforestation schemes should be launched in elephant source regions for better fodder availability at their home itself. Vigilant watch group formation, anti-poaching squad deployment and public awareness creation should be priority work for forest officials in winters.

6. CONCLUSION

Kanheipur village panchayat has become a recurrent elephant incursion destination with hectares of paddy crop loss, death and injury along with property damage, a pattern that mirrors the regional conflict pattern of Odisha and reflect the geography of human elephant conflict. The findings point towards rural vulnerability in the eastern Indian state Odisha, that unfortunately disproportionately pays for the natural event, rendering heavy burden of economic hardship. At the same time, elephant life also matters and need preservation and conservation efforts, since they come to conflict scenario only in search of food and water or migration. Both preventive and adaptive strategies with community-driven scientific approach are needed for sustainable mitigation aspects. More rigorous training and manpower to forest department and co-ordination among other departments is indeed needed to tackle this unfolding disaster. With combined local and government efforts, the panchayat in particular and Odisha in general can better safeguard livelihoods while coexisting with wildlife. The case study signifies how Anthropocene interferences are disproportionately targeting the poorer section while paying back and why co-existence with the wildlife is important.

REFERENCES

- 1) Adeniyi, A. O. (2024). Environmental law and the protection of biodiversity in Nigeria: Militating factor to achieving sustainable development goals. *International Journal of Social Science and Human Research*, 7(11), 8580–8588. <https://doi.org/10.47191/ijsshr/v7-i11-64>
- 2) Badotra, S., Panda, S. N., Bath, K. S., Pattnaik, P. K., Rani, R., Tanwar, S., & Sundas, A. (2019). of Agricultural Land from Elephant. *IoT and Analytics for Agriculture*, 63, 69. https://doi.org/10.1007/978-981-13-9177-4_4
- 3) Dash, D. (2018, June 18). Jumbo kills one more in Cuttack district. *The Times of India*. <https://timesofindia.indiatimes.com/city/bhubaneswar/jumbo-kills-one-more-in-cuttack-dist/articleshow/64625785.cms>
- 4) Department of Forest & Environment, Government of Odisha. (2025). *Wildlife Activities Annual Report 2024–25*. <https://www.odishaforest.in/>
- 5) Dickman, A. J. (2010). Complexities of conflict: The importance of considering social factors for effectively resolving human–wildlife conflict. *Animal Conservation*, 13(5), 458–466. <https://doi.org/10.1111/j.1469-1795.2010.00368.x>
- 6) Government of Odisha, Forest, Environment and Climate Change Department. (n.d.). *Anukampa: Online system for wildlife damage compensation*. <https://anukampa.odisha.gov.in>
- 7) India Today. (2021, September 2). Odisha: 5 elephants electrocuted after coming in contact with live wire. <https://www.indiatoday.in/india/story/odisha-5-elephants-electrocuted-dhenkanal-live-wire-1847754-2021-09-02>
- 8) Maharana, S. (2025, October 11). 106 elephants perished, 171 human casualties reported in Odisha in 2024–25: Wildlife report. *The New Indian Express*. <https://www.newindianexpress.com/states/odisha/2025/Oct/11/106-elephants-perished-171-human-casualties-reported-in-odisha-in-2024-25-wildlife-report>
- 9) Maharana, S. (2024, November 29). *First winter census report puts elephant count at 2,103 in Odisha*. *The New Indian Express*. <https://www.newindianexpress.com/states/odisha/2024/Nov/29/first-winter-census-report-puts-elephant-count-at-2103-in-odisha>
- 10) Menon, V., Tiwari, S. K., Kyarong, S., Ganguly, U., & Sukumar, R. (2017). *Right of passage: Elephant corridors of India*. Conservation Reference Series No. 31. Wildlife Trust of India.
- 11) Mishra, S. D. (2025). *Odisha tops elephant attack deaths: 624 lives lost in 5 years*. *Argus English*. <https://argusenglish.in/odisha/odisha-tops-elephant-attack-deaths-624-lives-lost-in-5-years>
- 12) MoEF, and CC. (2018). Government of India Ministry of Environment, Forest and Climate Change New Delhi-110003. *Indira Paryavaran Bhavan: MoEF*.
- 13) Mohanty, N., and Mishra, S. P. (2017). Human-elephant conflict: a case study from bamra (WL) forest division, Sambalpur, Odisha, India. *American-Eurasian J. Agric. & Environ. Sci.* 17, 432–439. Doi: 10.5829/idosi.aejaes.2017.432. 439
- 14) Mohapatra, D. (2026, January 23). *Odisha gram rakhis get monthly remuneration hike from Rs 1,800 to Rs 2,500*. *The Times of India*. <https://timesofindia.indiatimes.com/city/bhubaneswar/odisha-gram-rakhis-get-monthly-remuneration-hike-from-rs-1800-to-rs-2500/articleshow/127185767.cms>
- 15) Niyogi, D. G. (2025, December 4). *Irrigation water and drought fuel rising human-elephant conflict*. *Down To Earth*. <https://www.downtoearth.org.in/wildlife-biodiversity/irrigation-water-and-drought-fuel-rising-human-elephant-conflict>
- 16) Palita, S. K., & Purohit, A. K. (2008). Crop depredation by elephants in different land use patterns in northern Odisha, India. *The Indian Forester*, 134(9), 1205–1214. <https://doi.org/10.13140/RG.2.1.3326.6007>
- 17) Palei, N. C., Rath, B. P., Pradhan, S. D., & Mishra, A. K. (2015). An assessment of human elephant (*elephas maximus*) conflict (hec) in mahanadi elephant reserve and suggested measures for mitigation, Odisha, India. *Middle-East J. Sci. Res*, 23, 1824-1831. <https://doi.org/10.5829/idosi.mejsr.2015.23.08.22445>
- 18) Palei, N. C. & Rath, B. P. (2017). *Troublesome visitors: Human-elephant conflict by elephants coming into Odisha from Chhattisgarh*. *Gajah*, 47, 36–39.

- 19) Sambad English. (2018, July 6). *Tribal woman trampled to death by elephant in Odisha*. <https://sambadenglish.com/tribal-woman-trampled-to-death-by-elephant-in-odisha/>
- 20) Sambad English. (2015, November 27). *Elephant herd damages paddy crops in Odisha village*. <https://sambadenglish.com/elephant-herd-damages-paddy-crops-in-odisha-village/>
- 21) Sambad English Bureau. (2018, July 19). *Locals block road after elephant tramples woman to death in Cuttack*. Sambad English. <https://sambadenglish.com/locals-block-road-after-elephant-tramples-woman-to-death-in-cuttack/>
- 22) SAR, C., & LAHIRI-CHOUDHURY, D. K. (2009). PROJECT: ELEPHANT–HUMAN CONFLICT IN ASIA REPORT ON ORISSA-INDIA (PART–I).
- 23) Senapati, A. (2024, November 15). *Odisha's farmers grapple with wild elephant depredations during harvest season*. *Down To Earth*. <https://www.downtoearth.org.in/wildlife-biodiversity/odishas-farmers-grapple-with-wild-elephant-depredations-during-harvest-season>
- 24) Singh, P. B., Awasthi, A., & Badola, R. (2021). Mapping hotspots of human-elephant conflict in northern Odisha using geospatial tools. *Frontiers in Conservation Science*, 2, 680089. <https://doi.org/10.3389/fcsc.2021.680089>
- 25) Statesman News Service. (2025, April 4). *With 94 elephant fatalities in a year, Odisha turns into India's jumbo graveyard*. *The Statesman*. <https://www.thestatesman.com/cities/bhubaneshwar/with-94-elephant-fatalities-in-a-year-odisha-turns-into-indias-jumbo-graveyard-1503416043.html>
- 26) Sukumar, R. (1994). *Elephant days and nights: Ten years with the elephant*. Oxford University Press.
- 27) Swain, S. C. (2022). Seasonal pattern of elephant movement and conflict in Odisha. *Journal of Wildlife and Biodiversity*, 6(2), 101–113. <https://doi.org/10.22120/jwb.2022.135478.1223>
- 28) The New Indian Express. (2018, February 19). *Rogue elephant tramples man to death in Odisha*. <https://www.newindianexpress.com/states/odisha/2018/feb/19/rogue-elephant-tramples-man-to-death-in-odisha-1775635.html>
- 29) The New Indian Express. (2018, July 26). *Jumbo panic grips Cuttack villages*. *The New Indian Express*. <https://www.newindianexpress.com/odisha/2018/Jul/26/jumbo-panic-grips-cuttack-villages-1848781.html>
- 30) The New Indian Express. (2018, September 5). *Electrocution menace haunts jumbos*. *The New Indian Express*. <https://www.newindianexpress.com/odisha/2018/Sep/05/electrocution-menace-haunts-jumbos-1867796.html>
- 31) The Wire Staff. (2018, August 30). *Odisha tops India in human deaths due to elephant attacks*. *The Wire*. <https://thewire.in/environment/odisha-elephant-deaths-human-wildlife-conflict>
- 32) Tripathy, B. R., Liu, X., Songer, M., Kumar, L., Kaliraj, S., Chatterjee, N. D., ... & Mahanta, K. K. (2021). Descriptive spatial analysis of human-elephant conflict (HEC) distribution and mapping HEC hotspots in Keonjhar forest division, India. *Frontiers in Ecology and Evolution*, 9, 640624. <https://doi.org/10.3389/fevo.2021.640624>
- 33) Zoological Survey of India (ZSI). (2020). *Elephants in India: Status, Distribution and Conservation Challenges*. ZSI, Ministry of Environment, Forest and Climate Change. <https://zsi.gov.in/>



There is an Open Access article, distributed under the term of the Creative Commons Attribution – Non Commercial 4.0 International (CC BY-NC 4.0) (<https://creativecommons.org/licenses/by-nc/4.0/>), which permits remixing, adapting and building upon the work for non-commercial use, provided the original work is properly cited.