P-ISSN: 2618-0723
E-ISSN: 2618-0731

NAAS Rating (2025): 5.04
www.extensionjournal.com

International Journal of Agriculture Extension and Social Development

Volume 8; Issue 9; September 2025; Page No. 668-672

Received: 19-06-2025
Accepted: 23-07-2025

Indexed Journal
Peer Reviewed Journal

Implications of human-wildlife coexistence: Farmers' perspectives on crop loss, wildlife interactions, and policy awareness in forest fringes of Wayanad

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DOI: https://www.doi.org/10.33545/26180723.2025.v8.i9j.2478

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Abstract

This research investigates human-wildlife coexistence from the perspective of farmers living in the forest fringes of Wayanad, Kerala. By surveying 120 households across four panchayats in Wayanad, the study quantifies direct and indirect impacts of wildlife interactions, including crop loss, livestock depredation, and security concerns, while also analysing farmers' awareness of management policies and compensation schemes. Results show frequent crop damage by elephants, wild boars, and monkeys, with paddy, coconut, and arecanut identified as the most economically vulnerable crops. Although most farmers were aware of government policies for conflict mitigation, their understanding of programme details was uneven, and compensation delivery was perceived as inadequate. Farmers employ multiple strategies such as fencing, scaring, and vigilant guarding to manage interactions with wildlife. The findings highlight the complex, multidimensional nature of human-wildlife coexistence and emphasise the need for participatory, integrated approaches combining formal policy mechanisms and local practical measures for sustainable conflict management.

Keywords: Human-wildlife interaction, farmers perspectives, policy awareness, conflict mitigation

Introduction

Human-wildlife coexistence represents a complex global conservation challenge requiring integrated approaches across multiple dimensions. The challenge encompasses three interconnected aspects: practical ecological interactions involving wildlife impacts on human livelihoods and safety, social dimensions of coexistence, and institutional coordination across scales (Gao *et al*., 2023) [3]. In agricultural settings, human-wildlife conflict (HWC) presents particularly complex direct and indirect implications for coexistence. Direct impacts include loss of human and wildlife lives, crop damage, and property destruction. However, indirect impacts are often overlooked despite their significant effects on farmer well-being. These include mental distress, fears of food insecurity, movement restrictions, and economic anxiety, with gender and wealth status amplifying vulnerabilities (Yeshey *et al*., 2022) [9].

Kerala's forest area spans approximately 11,521.813 square kilometres, accounting for around 29.65% of the state's total land area (GOK, 2022) [4]. People living in the fringes of these forests have long coexisted with wildlife, deriving mutual benefits while simultaneously managing conflicts. In recent years, however, wildlife management in Kerala has faced heightened tensions, with residents near reserve forests and sanctuaries feeling increasingly insecure. The main causes are attributed to pressures from the expanding human population, habitat loss and fragmentation, shifts in agricultural practices, and the rising numbers of wildlife.

An examination of biodiversity conservation threats and natural resource management across different forest divisions in Kerala indicates that human-wildlife coexistence poses a significant challenge in nearly all divisions, particularly in Wayanad and other northern regions. Wayanad, located in the Western Ghats biodiversity hotspot, is especially vulnerable due to its extensive forest cover, high dependence on agriculture, and proximity of farms to protected areas. Here, the interactions between farmers and wildlife such as elephants, wild boar, and monkeys resulting not only in crop and livestock losses but also shape farmer perceptions of security, compensation schemes, and policy interventions.

This study provides insights into both the direct and indirect implications of human-wildlife coexistence in forest fringe agricultural systems. It examines the extent of crop damage by presenting the percentage of different crops affected through wildlife interactions, as well as identifying the crops that farmers reported as experiencing significant losses. The research also documents the major crop-raiding species, highlighting those perceived by farmers as the most problematic.

In addition to ecological impacts, the study captures the farmers' perspectives on management strategies. This includes their awareness of existing policies, opinions on compensation schemes, and evaluations of strategies practiced in their localities. Furthermore, the study explores the management practices adopted by farmers themselves, providing a holistic understanding of how agricultural communities in Wayanad respond to the challenges of coexisting with the wildlife.

Materials and Methods

The study was conducted in Wayanad district, Kerala, which is administratively divided into four blocks: Mananthavady, Kalpetta, Sulthan Bathery, and Panamaram. From each block, one panchayat was purposively selected in consultation with Forest Officers, Agricultural Officers, and local panchayat representatives, based on two criteria: the presence of significant forest cover and the frequent incidence of HWC. Accordingly, the panchayats of Thirunelly (Mananthavady block), Vythiri (Kalpetta block), Noolppuzha (Sulthan Bathery block), and Panamaram (Panamaram block) were selected for the study. From each panchayat, 30 farmers were randomly chosen, giving a total sample size of 120 respondents.

Primary data was collected through a semi-structured interview schedule that includes questions on the nature and extent of human-wildlife interactions (HWIs), the type and degree of crop damage and the major wildlife species responsible for it, the incidence of livestock loss and the species involved, and the management strategies adopted by farmers to mitigate conflict. The schedule also recorded farmers' perceptions on effectiveness of compensation schemes, measured using a five-point Likert scale, along with their awareness of management strategies and policies implemented in their locality. In addition, information was collected on demographic and socio-economic characteristics such as age, education, gender, primary and additional income and household economic background, as well as whether the respondents or their family members had encountered any human-wildlife conflict events recently.

The data collected from respondents were coded, tabulated, and analysed using IBM SPSS Statistics for Windows, Version 31.0, and Microsoft Excel. Descriptive statistics such as frequency, percentage, mean, and standard deviation were used to summarise and interpret responses related to socio-demographic characteristics, crop and livestock loss, and management practices. The Likert scale responses on compensation schemes and management strategies were analysed using mean scores, while charts and box plots were prepared to present the findings in a clear and easily understandable manner.

Results and Discussion

Demographic information

Among the 120 farmer households surveyed, the majority were male-headed households (93.3%, n = 112), while only 6.7% (n = 8) were female-headed. The age of household heads ranged from 39 to 78 years, with a mean of 56.96 years. Farming was the primary source of income for 67.5% (n = 81) of the households, and among them, 33.3% (n = 27) reported no supplementary income. Other reported primary income sources included business or self-employment (10.8%), government employment (7.5%), private employment (10.8%), and casual labour (3.3%). Agriculture thus forms the livelihood base for most households, and the results are similar to findings from Northern Tanzania, in which occupation influenced perceptions of HWC, with farming households showing greater concern than those in other occupations (Mmbaga, 2024) [6].

All household heads were literate and had attained at least primary education, with 12.5% having completed graduation. In terms of socio-economic status, 36.7% of the households belonged to the Below Poverty Line (BPL) category, while 63.3% were in the Above Poverty Line (APL) category.

Human-wildlife Interaction (HWI)

All 120 surveyed households reported interactions with at least one wildlife species, and since farmers were allowed to select more than one animal and crop species, the data reflects overall patterns of interaction. A majority of encounters (75%, n = 90) occurred in settlement areas, while 25% (n = 30) were reported from cultivated land.

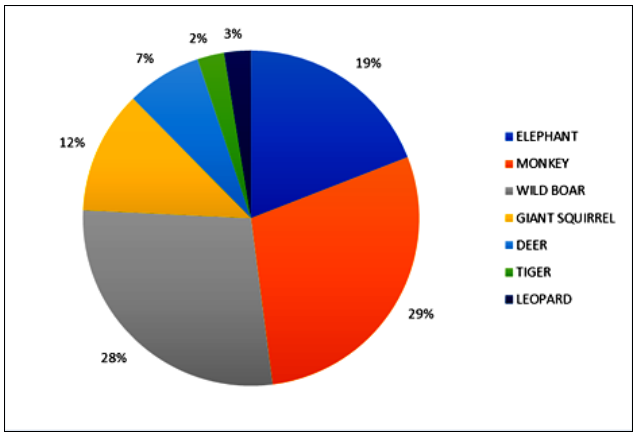


Fig 1: frequently encountered animal species

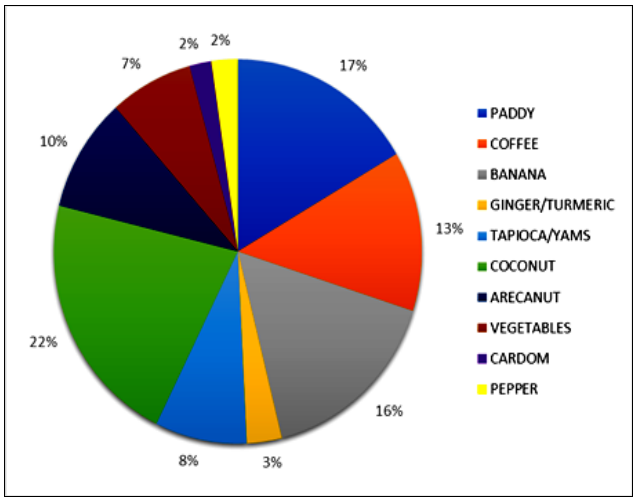


Fig 2: crops affected by HWI

Monkeys (29%) and wild boars (28%) emerged as the most frequently encountered species, followed by elephants (19%), giant squirrels (12%), deer (7%), leopards (3%), and tigers (2%) (Figure 1). Crops that were mostly affected by

HWIs are coconut (22%), paddy (17%), banana (16%), and coffee (13%), with smaller shares in arecanut (8%), vegetables (7%), ginger/turmeric (3%), cardamom (2%), and pepper (2%). (Figure 2).

These findings highlight that HWIs in Wayanad involves multiple species and are multidimensional, affecting both settlement spaces and farmland, and extending across staple as well as commercial crops.

Crops with significant economic loss and wildlife involved

Among the crops reported with major economic losses due to HWIs (Figure 3), paddy accounted for the highest share (37%), followed by coconut (30%) and arecanut (24%). Together, these three crops represented over 90% of the total reported economic loss, while banana (9%) contributed comparatively smaller share. These crops were classified as having significant economic loss because they were often completely destroyed by elephants, monkeys, deer, and wild boars, which rely on them as key food sources.

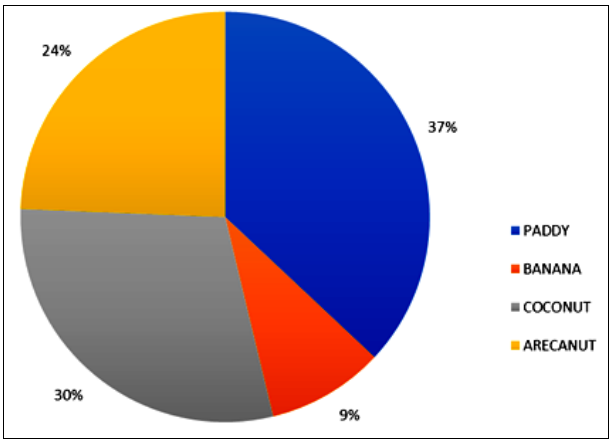


Fig 3: Crops with significant economic loss due to HWI

The animal species involved in major economic loss due to crop raiding can be attributed to Elephants (34%), followed by wild boars (30%) and monkeys (23%). sambar deer and chital/spotted deer played comparatively minor roles, with only 12% and 1% contributions, respectively (Figure 4). This demonstrates that the management efforts should primarily target elephants, wild boars, and monkeys to most effectively mitigate crop loss in the area. In southern India, although elephants feed on over 112 wild plant species, they raid crops such as paddy because cultivated grains offer significantly higher protein, calcium, and sodium compared to wild grasses, making crop raiding an extension of their optimal foraging strategy (Sukumar, 1990) [8]. According to a study in Nilambur, Western Ghats, severe human-elephant conflict has led to major losses in plantain/banana, arecanut, and coconut cultivation (Nair and Jayson, 2021) [7]. Proximity to reserve forests was a key factor influencing raiding, with nearly half of the incidents occurring at around midnight (Anoop *et al*., 2023) [1]. In Central Kerala, elephants caused significant crop damage, reducing farmers' annual income by up to 36% (Govind and Jayson, 2021) [5].

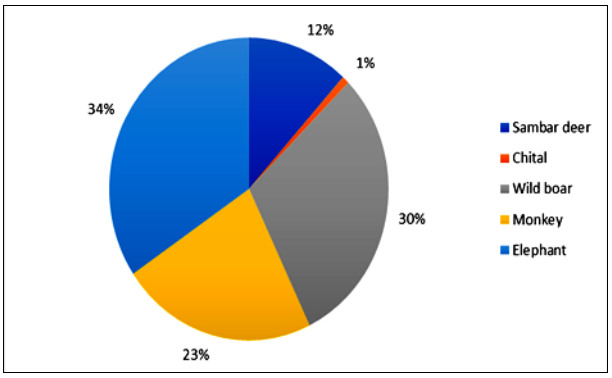


Fig 4: Major crop damaging species

Livestock depredation and Attack on humans

Out of the 120 households surveyed, only 10 (8.3%) reported cases of livestock depredation. Of these incidents, 9 (90%) involved chicken predation, while a single case (10%) involved a cow killed by a tiger. The low number of cases reflects the fact that just 6% of respondent households engaged in livestock rearing, primarily as a supplementary source of income. Moreover, households that did keep animals generally housed them in shelters, which likely reduced their exposure to predation. These findings indicate that livestock depredation is relatively uncommon in the study area, largely due to the limited practice of animal husbandry within the community. This is because conflicts are more pronounced in areas adjoining protected boundaries, where habitat fragmentation and human encroachment prevail (Yimam, 2021) [10]. The resulting economic strain compels farmers to change agricultural practices and adapt their farming methods, highlighting the profound effect of HWC on rural livelihoods.

Similarly, only two households reported incidents of human attack, and in both cases elephants were responsible. Despite frequent interactions reported with species like wild boar, tiger, and leopard, none of these animals were associated with direct attacks on people. Thus, the primary risk of human injury in the region is associated with elephants, while other species pose minimal direct threat, mainly because people are quickly alerted at their sighting.

Compensation and conflict management practices

Among the 120 households surveyed, 58.33% reported applying for compensation following conflict incidents; however, only 23.33% received any payment, and none of the recipient's expressed satisfaction with the amount provided. This discrepancy highlights a significant gap between compensation delivery and community expectations. Despite this dissatisfaction, the same number of households (70) still perceived compensation as an effective means of managing HWC, reflecting its importance in local conflict mitigation efforts. This indicates that while farmers view HWC compensation schemes as important, their effectiveness is undermined by challenges such as inadequate funding, bureaucratic delays, and inequitable distribution, which limit the actual support provided to affected communities (Charamba *et al*., 2024) [2].

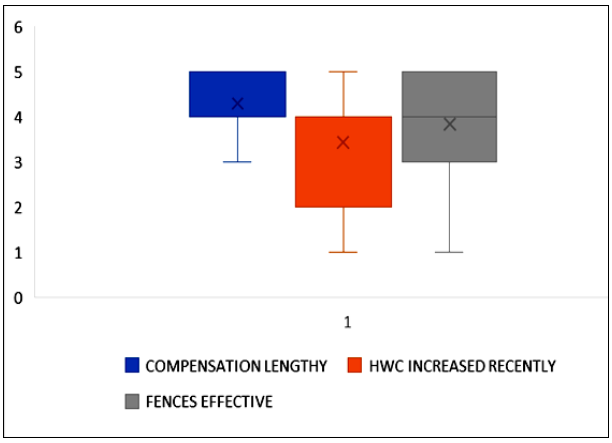


Fig 5: Farmers' responses on compensation length, recent conflict trends, and effectiveness of fences (Likert scale).

Boxplot analysis (Figure 5) of the survey responses provides insights into farmers' perspectives on conflict management mechanisms in the study area:

For the statement regarding compensation procedures, responses were strongly clustered towards agreement, with a median score of approximately 4.5 and an interquartile range (IQR) of 4-5. This indicates that vast majority of farmers perceive the compensation process as lengthy, showing a strong consensus on this issue with low variability in opinion.

In contrast, opinions about whether human-wildlife conflict has increased recently were much more divided. The median response here was around 3.5, and the IQR ranged from 2 to 4, with the distribution spanning the full Likert scale. This suggests that there is no clear consensus among farmers, as viewpoints ranged from strong disagreement to strong agreement. A possible reason for this variation is the proximity of farms to forest borders farmers residing very close to the forest tend to disagree, perceiving conflict as a long-standing issue rather than an increasing one, while those located further away are more likely to agree, as they experience wildlife incursions into new areas.

Regarding the effectiveness of fences as an animal attack mitigation strategy, responses were generally positive, with a median of approximately 4 and an IQR of 3-5. Most farmers felt that fences were effective in reducing wildlife incursions, although a small proportion strongly disagreed, reflecting doubts within the community.

Overall, the findings reveal broad agreement on the prolonged nature of compensation processes, divergent opinions regarding recent trends in HWC, and widespread, though not unanimous, support for fencing as an effective management measure.

All surveyed households were aware of the government policies and programmes designed to address human-wildlife conflict in the area. However, while awareness was universal, knowledge and understanding of the specific details and implementation of these programmes varied considerably among respondents. The number of people reporting familiarity with different policies ranged widely, indicating uneven dissemination of information and engagement across the community. This suggests that although information about conflict mitigation initiatives has reached everyone, deeper comprehension and active participation remain limited for many. Consequently, this disparity between awareness and knowledge highlights the need for improved communication, education, and capacity-building efforts to ensure that community members can effectively utilise and benefit from these management strategies.

Alongside government policies and programmes, community members employed a variety of measures to reduce HWC (Figure 6). The majority relied on scaring animals away using sounds or firecrackers (47%), while 30% adopted fencing as a prevention strategy. Additionally, 23% reported using other approaches such as raising guard dogs, night guarding and community guarding to deter wildlife incursions. Studies shows that guardian dogs can reduce predation by 11-100% (Smith *et al*., 2000). These findings indicate a strong reliance on locally-driven, active deterrence methods, supplemented by physical barriers and community vigilance to minimize conflict with wild animals.

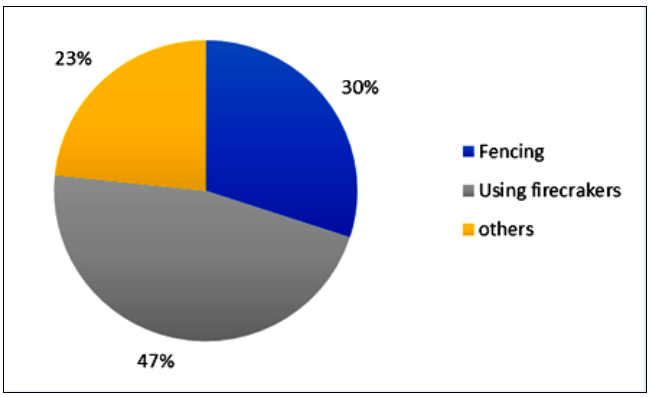
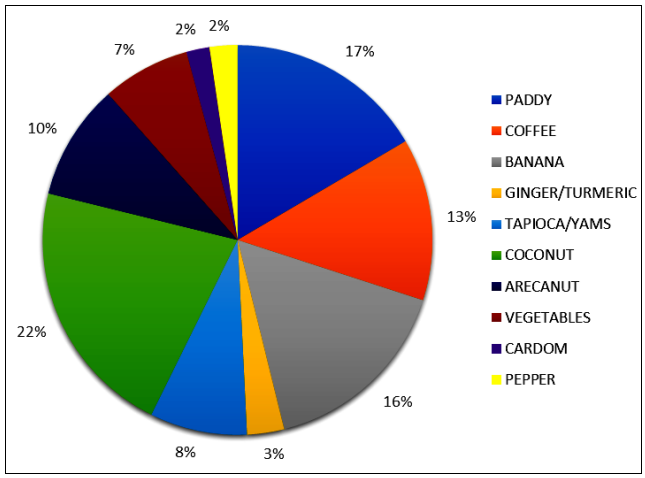


Fig 6: HWC prevention measures used by farmers

Together, these findings illustrate the complex and multifaceted nature of HWC management in the study area. While compensation remains a crucial tool, significant challenges exist in effective delivery and satisfaction. Likewise, awareness of policies alone is insufficient without deeper understanding and participation. The mixed perceptions on conflict trends and the combination of formal and informal strategies highlights the need for integrated, participatory approaches that combine effective compensation, clear policy communication, and support for local mitigation practices to achieve sustainable coexistence between humans and wildlife.



Conclusion

The study reveals that human-wildlife coexistence in Wayanad's forest fringes entails significant social and economic costs, particularly for farming households that rely on agriculture as their primary livelihood. Crop damage by elephants, wild boars, and monkeys remains the chief concern, with paddy, coconut, and arecanut crops facing the greatest economic losses. Livestock depredation and direct attacks on humans were infrequent, indicating that crop loss is the predominant impact channel. While compensation schemes are viewed as crucial tools, their effectiveness is undermined by procedural delays and unsatisfactory payouts, creating a gap between policy interventions and local realities. Farmers rely heavily on locally-driven deterrence methods and physical barriers, supplemented by general awareness of government initiatives, although deeper program participation and understanding remain limited. These insights underscore the necessity for integrated, participatory management strategies that combine improved compensation delivery, effective policy communication, and support for community-based mitigation practices to foster sustainable coexistence between humans and wildlife in Kerala's Forest fringe agricultural communities.

References

1. Anoop NR, Krishnan S, Ganesh T. Elephants in the farm—changing temporal and seasonal patterns of human-elephant interactions in a forest-agriculture matrix in the Western Ghats, India. Front Conserv Sci. 2023;4:1142325.
2. Charamba G, Ganye HN, Chikwati T. Examining the efficacy of compensation blueprints for livestock, human, and crop losses in Zimbabwe's human-wildlife conflict hotspots. Asian J Geogr Res. 2024;7(4):67-80.
3. Gao Y, Lambert A, Clark SG. Grand strategy for human-wildlife coexistence. Front Ecol Environ. 2023;21(7):308-9.
4. Government of Kerala (GOK). Working group on addressing issues related to human-wildlife interactions in Kerala (2022–2027). 2022. https://spb.kerala.gov.in/sites/default/files/inline-files/Human%20wildlife%20conflict.pdf
5. Govind SK, Jayson EA. Human–wildlife interactions and people's attitudes towards conservation: a case study from Central Kerala, India. Anim Biodivers Conserv. 2021;44(2):139-51.
6. Mmbaga NE. Community perspectives on existence of human wildlife conflicts and underlying mitigation measures adjacent to protected areas in Northern Tanzania. Discov Sustain. 2024;5(1):370.
7. Nair PR, Jayson EA. Estimation of economic loss and identifying the factors affecting the crop raiding behaviour of Asian elephant (*Elephas maximus*) in Nilambur part of the southern Western Ghats, Kerala, India. Curr Sci. 2021;121(4):521-8.
8. Sukumar R. Ecology of the Asian elephant in southern India. II. Feeding habits and crop raiding patterns. J Trop Ecol. 1990;6(1):33-53.
9. Yeshey, Ford RM, Keenan RJ, Nitschke CR. Subsistence farmers' understanding of the effects of indirect impacts of human-wildlife conflict on their psychosocial well-being in Bhutan. Sustainability. 2022;14(21):14050.
10. Yimam IA. Human-wildlife conflict in Ethiopia: a review. Int J Zool Anim Biol. 2021;4(1):1-5.