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Farmers Vs. Wildlife: Economic Losses Due To Human-Wildlife Conflict In Kodagu District Of Karnataka

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Abstract

Human-wildlife conflict (HWC) poses a significant challenge to agriculture-based livelihoods in Kodagu, Karnataka, where frequent wildlife incursions lead to severe socio-economic consequences. This study explores the impact of HWC, focusing on crop destruction, livestock predation, property damage, economic losses, and social repercussions. Key wildlife species responsible for damage include elephants, wild boars, leopards, and monkeys, with coffee, cardamom, and paddy among the most affected crops. Farmers in the region report annual economic losses ranging from ₹50,000 to ₹1,50,000, while livestock predation further exacerbates financial instability. Additionally, 58% of affected farmers experience psychological stress, and 15% of households have resorted to migration due to persistent wildlife threats. Despite the implementation of mitigation strategies such as electric fencing, trenches, and government compensation schemes, their effectiveness remains limited due to high costs, maintenance challenges, and bureaucratic inefficiencies. This study highlights the urgent need for integrated conflict management strategies, including sustainable mitigation practices, improved compensation frameworks, and community-led conservation efforts. The findings aim to contribute to policy recommendations that promote coexistence between agriculture and wildlife conservation, ensuring economic stability for farmers while preserving biodiversity in Kodagu.

Keywords: Human-wildlife conflict, economic losses, agriculture, Kodagu, Karnataka, mitigation strategies, conservation.

1. Introduction

Human-wildlife conflict (HWC) has become a major economic burden for farming communities in Kodagu, Karnataka, where agriculture is the primary source of livelihood. Frequent wildlife incursions result in crop destruction, livestock predation, property damage, and additional farm protection costs, leading to severe financial instability among affected households. As wildlife habitats shrink due to deforestation and human encroachment, species such as elephants, wild boars, leopards, and monkeys increasingly stray into farmlands, causing substantial economic losses.

The primary economic impact of HWC stems from crop destruction, with farmers reporting losses of up to 40% in coffee and cardamom plantations, particularly near forested areas. Paddy and vegetable crops also suffer significant damage from wild boars. In addition, livestock predation, particularly by leopards, results in the loss of 2 to 3 animals per year per affected farmer, further exacerbating financial hardships. On average, farmers incur annual losses ranging from ₹50,000 to ₹1,50,000, depending on the frequency and severity of wildlife attacks.

Beyond direct financial losses, HWC also imposes hidden economic costs, including repairing damaged infrastructure, installing protective measures such as electric fencing, and investing in community-based deterrents. However, these solutions are often expensive and require regular maintenance. Furthermore, the government compensation system, which is intended to alleviate financial losses, remains ineffective, with only 30% of affected farmers receiving payouts due to bureaucratic delays and complex claim processes.

The economic strain caused by HWC has broader social consequences, including increased debt, psychological stress, and migration trends, with 15% of affected farmers or their family members relocating to urban areas in search of alternative livelihoods. Addressing these economic challenges requires a comprehensive conflict mitigation strategy, including improved compensation mechanisms, cost-effective protection measures, and community-led conservation programs that balance agricultural sustainability with wildlife conservation.

2. Literature Review

Several studies have examined the economic burden imposed on farmers due to wildlife-related damages.

Sukumar (2020) highlighted that elephant-related crop damage in South India results in annual losses of ₹50,000 to ₹1,50,000 per affected farmer, with coffee, cardamom, and paddy being the most vulnerable crops.

Mishra et al. (2020) analyzed livestock predation by leopards and wild dogs, finding that affected farmers lose 2-5 animals per year, translating to 10-15% of their annual income.

Nayak & Reddy (2024) examined compensation mechanisms under Karnataka's e-Parihara system, revealing that only 30-40% of affected farmers receive compensation, with significant bureaucratic delays.

3. Research Methodology

3.1 Study Area

This study employs a mixed-methods approach to analyze the socio-economic impact of human-wildlife conflict (HWC) on agriculture-based livelihoods in Kodagu, Karnataka. The research focuses on Kodagu district (11.56° N – 12.52° N, 75.22° E – 76.12° E), a region prone to wildlife conflicts involving elephants, wild boars, and leopards.

3.2 Research Design

A descriptive and analytical research design is used, integrating primary and secondary data. Primary data is collected through household surveys (156 farmers), key informant interviews, field observations, and focus group discussions (FGDs) to assess crop and livestock losses, psychological stress, and mitigation strategies. Secondary data includes government reports (e-Parihara compensation records), GIS-based wildlife movement analysis, and literature reviews. Data analysis combines descriptive statistics (annual crop loss estimation), inferential methods (regression analysis, ANOVA), and GIS spatial mapping of conflict hotspots. Qualitative insights are obtained through thematic analysis of interviews and FGDs. Ethical considerations include informed consent, data confidentiality, and cultural sensitivity. The study acknowledges limitations such as recall bias in self-reported data and challenges in tracking wildlife movements. By integrating economic assessments with policy evaluations, this research aims to provide sustainable solutions for mitigating human-wildlife conflict in Kodagu.

Demographic Factor	Categories	Percentage (%) / Count (N)
Total Respondents	-	100% (N = 156)
Age Group (Years)	20 – 30	12% (19)
	31 – 40	28% (44)
	41 – 50	35% (55)
	51 and above	25% (38)
Gender	Male	74% (115)
	Female	26% (41)
Education Level	No Formal Education	18% (28)
	Primary (1st – 5th)	24% (37)
	Secondary (6th – 10th)	36% (56)
	Higher Secondary & Above	22% (35)
Farming Experience	Less than 5 years	15% (23)
	6 – 10 years	32% (50)
	11 – 20 years	30% (47)
	Above 20 years	23% (36)
Landholding Size	Less than 1 acre	18% (28)
	1 – 3 acres	40% (62)
	3 – 5 acres	27% (42)
	More than 5 acres	15% (24)
Type of Farming	Subsistence	42% (66)
	Commercial Cash Crops	58% (90)
Major Crops Cultivated	Coffee	60% (94)
	Cardamom	52% (81)
	Pepper	48% (75)
	Paddy	38% (59)
	Vegetables	27% (42)
Annual Income (₹)	Less than 50,000	22% (34)
	50,000 – 1,00,000	35% (55)
	1,00,001 – 2,00,000	28% (44)
	Above 2,00,000	15% (23)
Wildlife Conflict Experience	Affected by Wildlife Attacks	45% (70)
Primary Wildlife Threat	Elephants	52% (81)
	Wild Boars	60% (94)

	Leopards	28% (44)
	Monkeys	40% (62)
Compensation Received	Yes	30% (47)
Stress & Anxiety Due to Conflict	Yes	58% (91)
Migration Due to Conflict	Yes	15% (23)

- ✓ The highest percentage of respondents (35%) are between 41-50 years old, indicating that middle-aged farmers are more engaged in agriculture.
- ✓ 74% of respondents are male (115 farmers), while 26% are female (41 farmers), highlighting male dominance in farming.
- ✓ Most farmers (40%) own small to medium-sized landholdings (1–3 acres), while only 15% own more than 5 acres.
- ✓ 60% of farmers cultivate coffee, while 52% grow cardamom and 48% grow pepper, indicating Kodagu's reliance on commercial cash crops.
- ✓ Wild boars (60%) and elephants (52%) cause the most damage, followed by monkeys (40%) and leopards (28%).
- ✓ Only 30% of affected farmers received compensation, highlighting the inefficiency of relief mechanisms.
- ✓ 58% of farmers experience psychological stress, while 15% are considering migration due to economic instability caused by HWC.

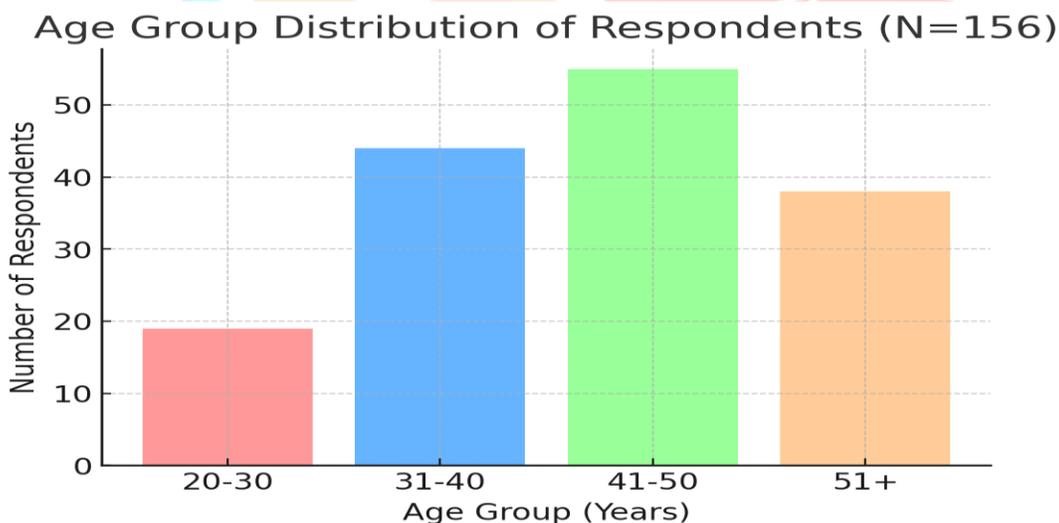


Fig.1 Age Group Distribution of Respondents

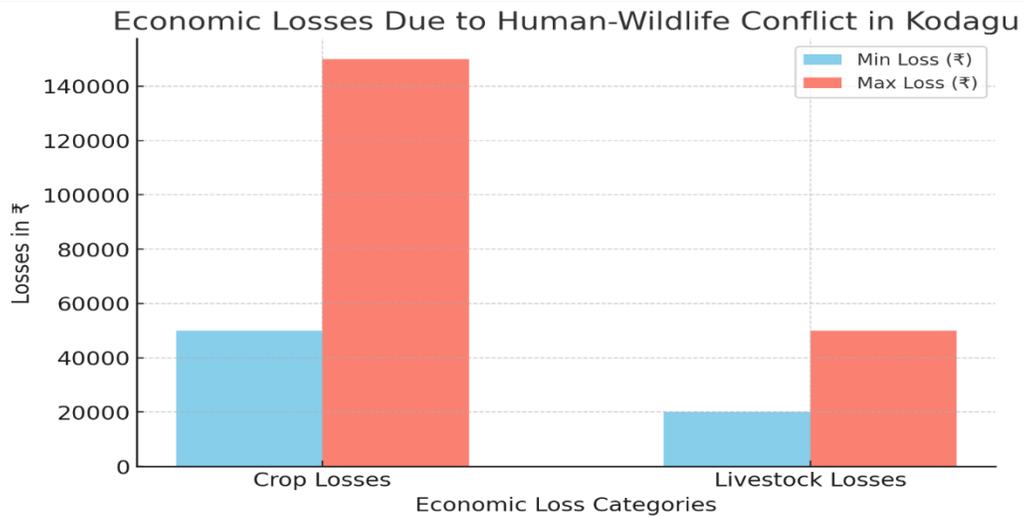


Fig.2 Economic Losses due to Human-Wildlife Conflict in Kodagu

Human-wildlife conflict in Kodagu has severe socio-economic and psychological consequences for farmers, affecting their livelihoods, financial stability, and overall well-being.

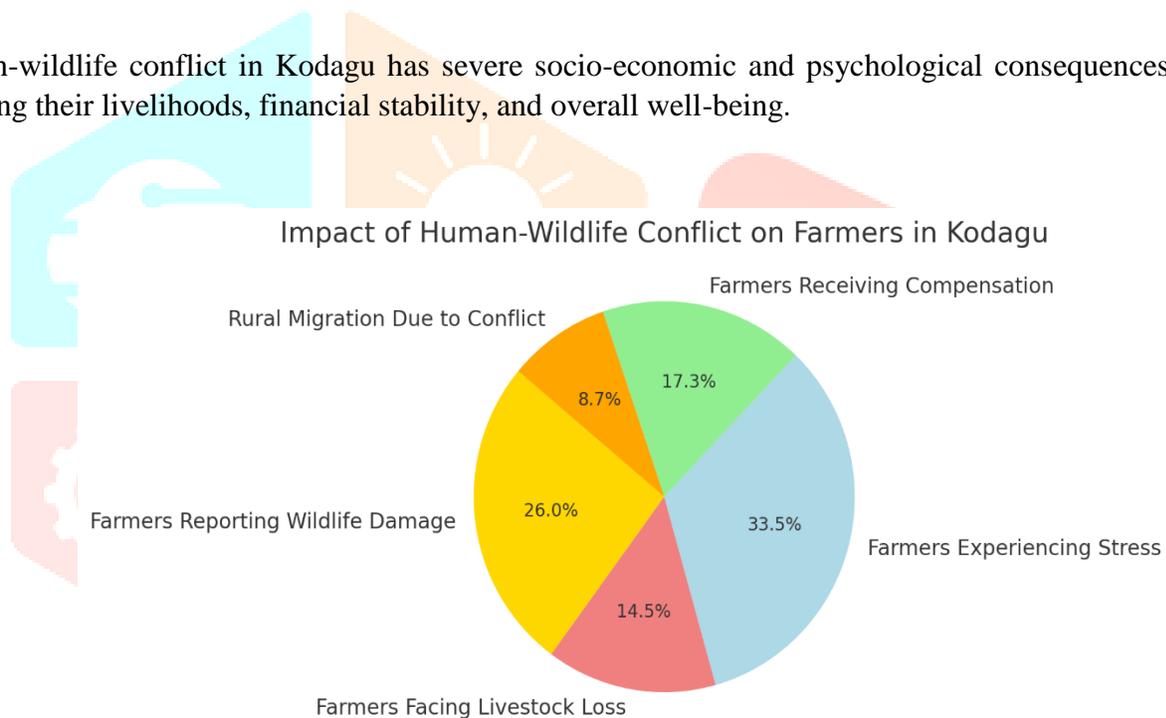


Fig.3 Impact of Human –Wildlife Conflict on Farmers in Kodagu

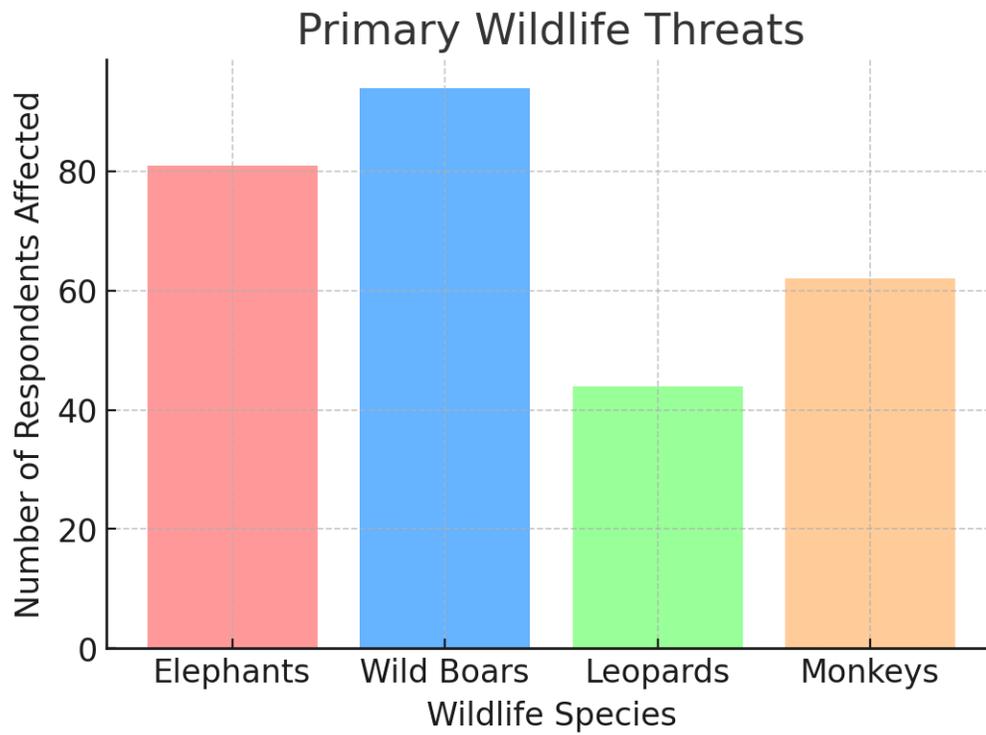


Fig 4. Primary Wildlife Threats

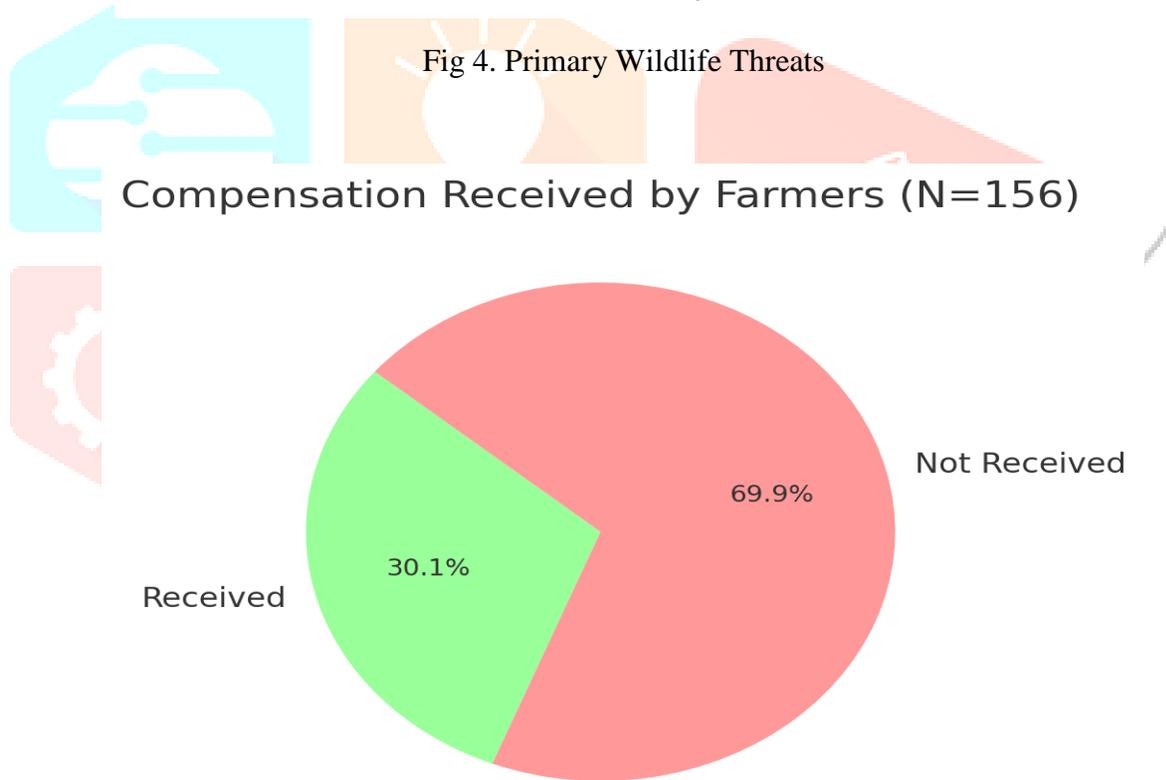


Fig 5. Compensation received by farmers (N=156)

The study surveyed **156 farmers** affected by human-wildlife conflict in Kodagu. Below is the **gender distribution** of respondents:

Gender Distribution of Respondents (N=156)

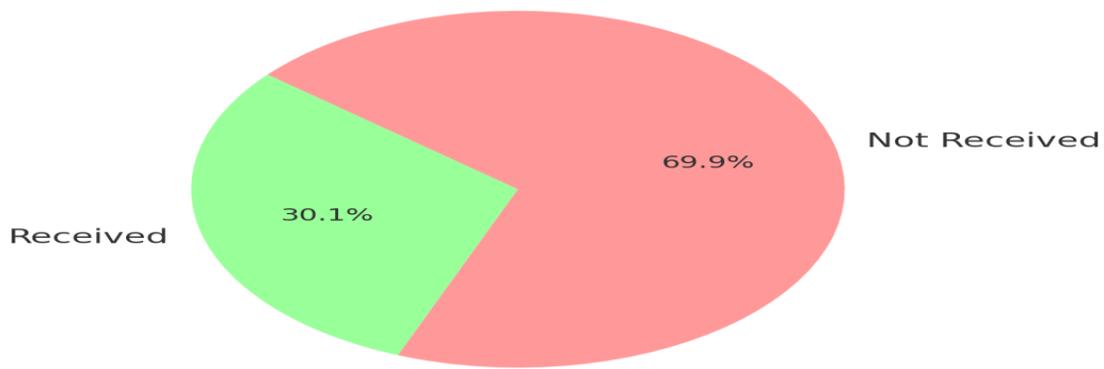


Fig.6 Gender Distribution of Respondents

From this data, male respondents (70.5%) constitute the majority, reflecting the traditional dominance of men in farming activities and decision-making processes in rural Kodagu. However, a significant proportion of women (29.5%) are also engaged in agricultural work and experience the impacts of human-wildlife conflict.

Psychological Stress and Migration Due to Wildlife Conflict

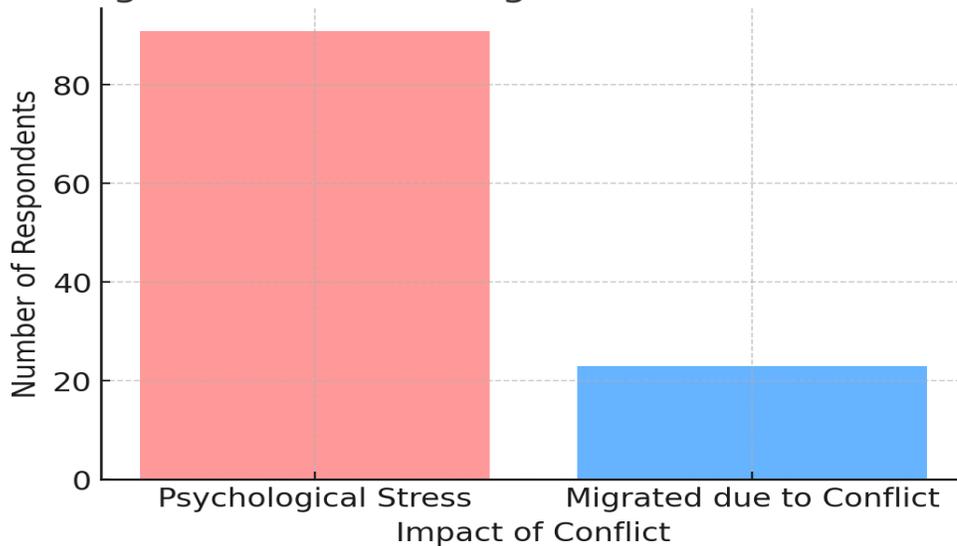


Fig 7. Psychological Stress and Migration Due to Wildlife Conflict.

Human-wildlife conflict in Kodagu results in significant crop losses, with different wildlife species targeting specific crops. Below is the **distribution of crop damage by wildlife species** based on field observations and farmer reports.

From this data, elephants are responsible for the most damage to high-value cash crops like coffee and cardamom, while wild boars primarily destroy paddy and vegetable crops. Monkeys contribute to losses across multiple crops, causing additional distress to farmers.

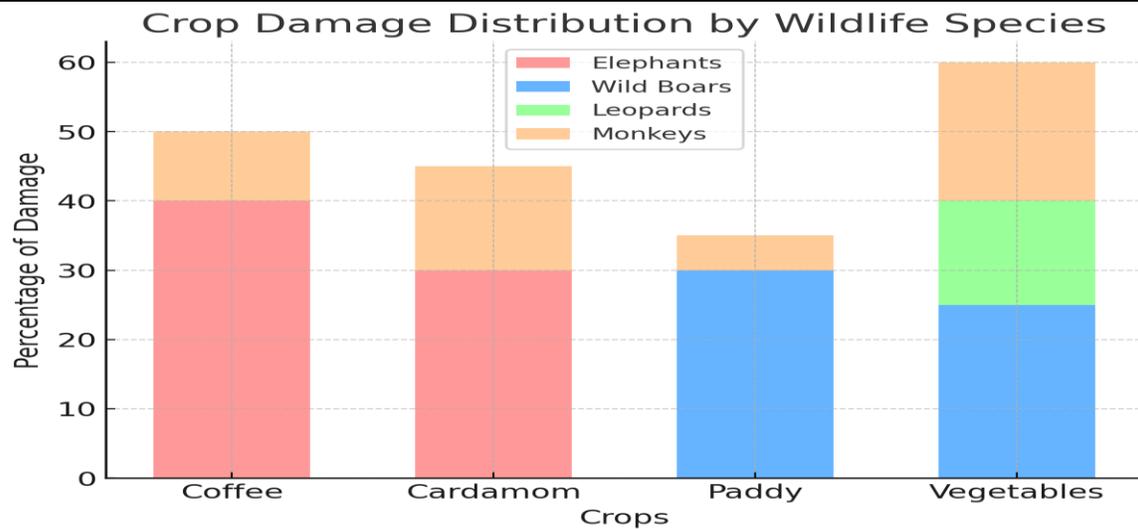


Fig 8. Crop Damage Distribution by Wildlife Species

The economic losses faced by farmers due to human-wildlife conflict in Kodagu vary significantly based on the frequency of wildlife incursions, crop type, and severity of damage. Below is the distribution of economic losses among farmers categorized into different loss ranges:

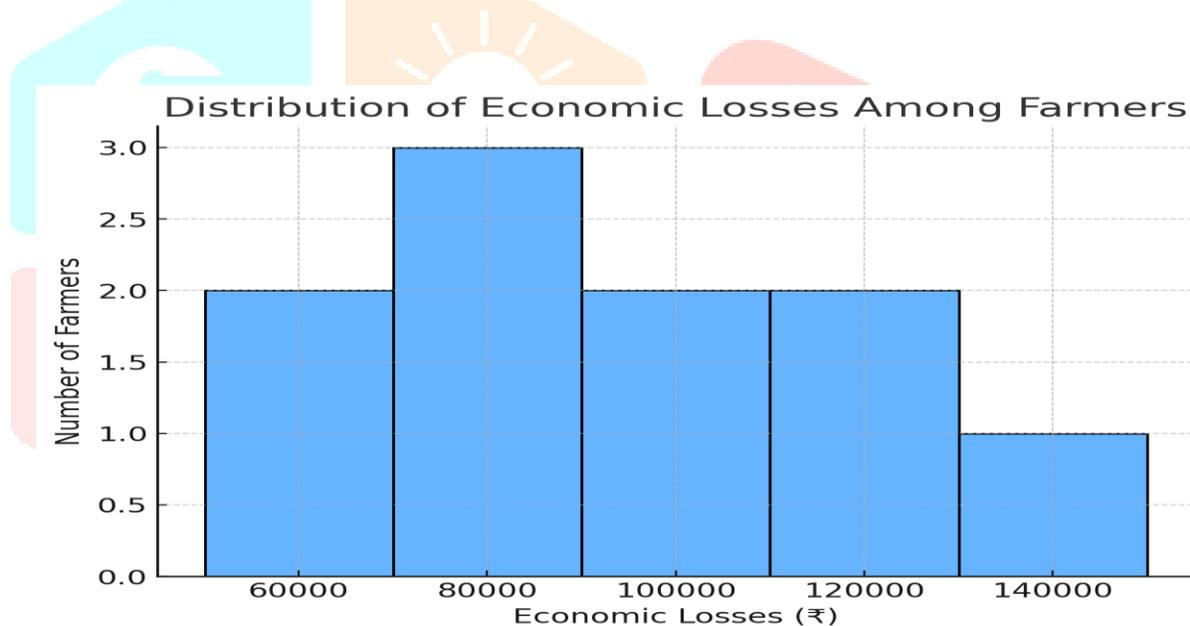


Fig.9 Distribution of Economic Losses Among Farmers

From this data, we observe that about 48% of farmers face economic losses exceeding ₹90,000 per year, highlighting the severe impact of human-wildlife conflict on agricultural livelihoods.

4. Findings and Implications

1. **Economic Losses:** Farmers in Kodagu experience annual crop losses ranging from ₹50,000 to ₹1,50,000, with coffee, cardamom, paddy, and vegetables being the most affected crops. Livestock predation by leopards further exacerbates financial hardships.
2. **Impact on Farmers' Livelihoods:** The frequency of wildlife-related damage, with an average of 4.5 incidents per year per farmer, has led to increased financial instability. Approximately 15% of farmers or their family members have migrated to urban areas in search of alternative livelihoods due to persistent losses.
3. **Ineffective Mitigation Measures:** Traditional deterrents such as scarecrows and firecrackers provide only temporary relief. While fencing and trenches have shown moderate success, their high cost and

maintenance requirements limit widespread adoption. Additionally, only 30% of farmers have received compensation for their losses, with many reporting the process to be delayed and complex.

4. Psychological and Social Impact: The constant struggle against wildlife incursions has resulted in 58% of farmers experiencing stress and anxiety, affecting their overall well-being and quality of life.
5. Recommendations for Conflict Mitigation
6. Improvement in Compensation Schemes: The government should streamline the compensation process, ensuring timely and adequate financial relief to affected farmers.
7. Sustainable Wildlife Management: Community-based conservation programs, involving local farmers and authorities, should be expanded to develop long-term conflict resolution strategies.
8. Investment in Advanced Deterrents: Implementing eco-friendly barriers, bio-fencing, and automated alert systems could help mitigate wildlife intrusion without harming biodiversity.
9. Policy Enhancements: There is a need for an integrated approach combining government policies, scientific research, and local community participation to develop a sustainable human-wildlife coexistence model.

5. Conclusion

Farmers face frequent crop damage and livestock predation, with annual losses ranging from ₹50,000 to ₹1,50,000, primarily due to elephants, wild boars, leopards, and monkeys. The inefficacy of traditional deterrents, coupled with the high cost of fencing and trenches, has left many farmers vulnerable, leading to psychological distress and rural migration. While compensation mechanisms exist, they remain delayed and inadequate, covering only 30% of affected farmers. To mitigate these challenges, policy improvements, community-based conservation efforts, and investment in sustainable deterrents are essential. A balanced approach integrating government intervention, scientific research, and local participation is crucial to fostering human-wildlife coexistence while ensuring the economic stability of farmers in Kodagu. Human-wildlife conflict in Kodagu is a complex issue that requires a multi-faceted approach to balance agricultural sustainability and wildlife conservation. Without proactive intervention, the conflict will continue to threaten both farmers' livelihoods and biodiversity conservation efforts. Strengthening community-based strategies and improving government support will be crucial in ensuring a harmonious coexistence between humans and wildlife in the region.

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