**Adoption of Human-Wildlife Conflict Mitigation Measures by Farmers in Telangana**

**Abstract:**

Mitigation of Human-Wildlife Conflict (HWC) in agricultural regions depends not only on awareness but also on the accessibility and effectiveness of available technologies. This study assessed the adoption patterns of HWC mitigation measures among farmers in Telangana. A total of 300 respondents were selected using a purposive sampling method from conflict-prone districts across three agro-climatic zones. Data were collected through pretested structured interviews. The findings revealed that although various mitigation measures- such as scare devices, guarding, and noise devices were used, most were perceived as only partially effective. High cost but more reliable tools like solar fencing and monkey guns etc were rarely adopted due to lack of awareness, financial constraints and limited institutional support. The results suggest a pressing need for promoting affordable, scientifically validated technologies and improving policy-level support to ensure that effective conflict mitigation tools are both available and accessible to smallholder farmers.

**Keywords:** Adoption, Human wildlife conflict, wild boar, monkey mitigation measures

**Introduction:**

The effectiveness of Human-Wildlife Conflict (HWC) mitigation lies not only in the availability of solutions but also in their actual adoption by the farming communities affected (Horgan & Kudavidanage, 2020; Mojo et al., 2014). In forest-adjacent agricultural regions of Telangana, farmers frequently contend with crop damage caused by wild animals such as wild boars (*Sus scrofa*) and monkeys (*Macaca radiata*). To address these issues, various physical (solar fencing, trenches), biological (barrier crops), and behavioral (noise deterrents, guarding), chemical etc strategies have been developed and disseminated by forest departments and research institutions (Kumawat *et al*., 2021; Chelliah *et al*., 2010). However, adoption of these technologies remains limited and uneven, often influenced by cost, awareness, local relevance, and institutional support (Karanth *et al*., 2013; McManus et al., 2015; Kolinski & Milich, 2021).

In regions where livelihoods are largely agrarian and extension outreach is weak, adoption behavior is shaped by a mix of perception, affordability, and trust in efficacy (Barua et al., 2013; Jaleta et al., 2023). For example, although solar fencing is regarded as one of the most effective methods, it involves high initial cost and lack of awareness or subsidy patterns (Noga et al., 2018). Conversely, traditional deterrents such as scarecrows or noise-making tools remain in use not because they are effective, but because they are accessible and culturally familiar. This study focuses on examining the extent to which farmers in Telangana adopt various HWC mitigation strategies for policy and extension services aimed at promoting coexistence between humans and wildlife.

**Methodology:**

The present study was conducted in Telangana using an ex-post facto and exploratory research design to assess the adoption of Human-Wildlife Conflict (HWC) mitigation measures by farmers. Ex-post facto research design was suitable as the adoption decisions and conflict experiences had already occurred. Exploratory research design was used gain deeper insights into the patterns related to human-wildlife conflict, particularly in areas where limited prior research existed. A purposive sampling technique was employed to ensure regional representation across the state's three agro-climatic zones. One district was selected from each zone based on forest cover and frequency of wildlife conflict. Mancherial from the Northern zone, Bhadradri Kothagudem from the Central zone, and Nagarkurnool from the Southern zone were selected. From each district, one mandal with highest incidence of HWC was selected, followed by 5 forest-fringe villages from each mandal. In each village, 20 farmers who had experienced crop loss due to wildlife were purposively chosen, corresponding a total sample of 300 respondents.

Data were collected using a structured and pre-tested interview schedule covering the types of mitigation measures adopted (both traditional and modern). The level of adoption was measured using a three-point scale (fully adopted, partially adopted, no adoption).

**Results and Discussion:**

**Completely Adopted Measures:**

 According to the data in table 1, almost (99.33%) farmers have completely adopted measures like arranging used sarees of different colours around the crop followed by growing thorny bushes and xerophytes like Cacti sp Euphorbia caducifolia, E. meriifolia & opentia sp Opuntia alatior, O.dillenii, Zizipus sp Zizipus oenopolia, Z. mauritiana, and agave sp Agave americana, Caesalpinia cristata to prevent damage of wild boar to crop (95.67%), use of Local dogs for scaring away wild boars (80.67%), Guarding field to minimize the attack of wild boars on field (80.00%).

**Partially Adopted measures:**

 According to the data in table 1 chain link meshes of 3 ft height around the crop by maintaining a distance of 1 ft away from the crop were partially adopted by 65.33%, followed by Barbed wire around the field in 3 rows with first row at the height of 1 ft from the ground (62.33%).

**No Adoption:**

 Data in table 1 speaks about, almost (98.33%) no respondent adopted placing dried cakes made from dung of local pigs burnt by placing them in earthen pots around the field followed by spraying dung solution on soil to the width of 1 ft around the crop collected from local pigs (98%), spreading the human hair collected from local barber shops around the field (87%), arrange coconut ropes soaked in a sulphur + pig fat oil mixture in 3 rows around the field by keeping 1 ft distance between the rows with the help of wooden poles (84.6%).

**Overall adoption level of farmers:**

The data from the table 2 and figure 1 depicts that majority (57.34%) of the respondents fall into the medium adoption category, indicating that they are implementing some mitigation strategies, and their adoption is not comprehensive. A significant portion (23.33%) of farmers have a low adoption level, suggesting barriers such as lack of awareness, financial constraints, or ineffective implementation of mitigation measures. Only 19.33% of farmers exhibit a high adoption level, implying that relatively few have fully embraced and integrated effective strategies to reduce conflict. This pattern suggests the need for enhanced awareness programs, improved access to affordable and innovative, effective mitigation techniques, and better support from Government and Extension agencies to encourage wider adoption of conflict mitigation measures.

**Table 1. Response wise analysis of farmers based on adoption level of human wildlife conflict mitigation measures among farmers**

|  |  |  |
| --- | --- | --- |
| **Sl. No.** | **Mitigation measures** | **Response** |
| **Complete Adoption** | **Partial Adoption** | **No Adoption** |
| ***f*** | **%** | ***F*** | **%** | ***F*** | **%** |
|  | **Wild boar mitigation measures** |
| 1 | Do you use Local dogs for scaring away wild boars | 242 | 80.67 | 47 | 15.67 | 11 | 3.67 |
| 2 | Do you guard your field to minimize the attack of wild boars on field | 240 | 80.00 | 59 | 19.67 | 1 | 0.33 |
| 3 | Do you use barbed wire around the field in 3 rows with first row at the height of 1 ft from the ground | 60 | 20.00 | 187 | 62.33 | 53 | 17.67 |
| 4 | Do you use Iron wire fixed with sharp razor blades at regular distance of 1 ft away from cropped area | 92 | 30.67 | 150 | 50.00 | 58 | 19.33 |
| 5 | Do you use chain link meshes of 3 ft height around the crop by maintaining a distance of 1 ft away from the crop | 76 | 25.33 | 196 | 65.33 | 28 | 9.33 |
| 6 | Do you use bioacoustics to minimize wild boar attack/damage to crops | 11 | 3.67 | 72 | 24.00 | 217 | 72.33 |
| 7 | Do you practice of having 4-5 rows of safflower crop as a border crop around Ground nut to prevent damage of wild boar to main crop | 7 | 2.33 | 74 | 24.67 | 219 | 73.00 |
| 8 | Do you practice of having 4-5 rows of castor crop as a border crop around Maize to prevent damage of wild boar to main crop | 10 | 3.33 | 116 | 38.67 | 174 | 58.00 |
| 9 | Do you grow thorny bushes and xerophytes like Cacti sp Euphorbia caducifolia, E. meriifolia & opentia sp Opuntia alatior, O.dillenii, Zizipus sp Zizipus oenopolia, Z. mauritiana, and agave sp Agave americana, Caesalpinia cristata to prevent damage of wild boar to main crop | 287 | 95.67 | 8 | 2.67 | 5 | 1.67 |
| 10 | Do you grow karanda around the crop as bio fence to prevent damage of wild boar to main crop | 5 | 1.67 | 126 | 42.00 | 169 | 56.33 |
| 11 | Do you use GI wire fence around the crop with the help of poles with a height of 1 feet from the ground | 121 | 40.33 | 117 | 39.00 | 62 | 20.67 |
| 12 | Do you use solar fence around the field with 12 volts electricity to prevent damage of wild boar to main crop | 17 | 5.67 | 112 | 37.33 | 171 | 57.00 |
| 13 | Do you dig 2 ft wide and 1½ feet deep trench around the cropped area at a distance of 1 ft from crops to keep away the wild boars from the field | 61 | 20.33 | 159 | 53.00 | 80 | 26.67 |
| 14 | Do you spray egg solution 20 ml/lt of water around the field to prevent damage of wild boar to main crop | 8 | 2.67 | 70 | 23.33 | 222 | 74.00 |
| 15 | Do you arrange coconut ropes soaked in a sulphur + pig fat oil mixture in 3 rows around the field by keeping 1 ft distance between the rows with the help of wooden poles | 4 | 1.33 | 42 | 14.00 | 254 | 84.6 |
| 16 | Do you spray dung solution on soil to the width of 1 ft around the crop collected from local pigs | 0 | 0.00 | 6 | 2.00 | 294 |  98 |
| 17 | Do you spread the human hair collected from local barber shops around the field | 7 | 2.33 | 32 | 10.66 | 261 |  87 |
| 18 | Do you arrange used sarees of different colours around the crop | 298 | 99.33 | 1 | 0.33 | 1 | 0.33 |
| 19 | Do you place dried cakes made from dung of local pigs burnt by placing them in earthen pots around the field | 0 | 0.00 | 5 | 1.66 | 295 | 98.33 |
| **Monkey Mitigation Strategies** |
| 20 | Do you hire labour to keep monkeys away from the crops | 61 | 20.33 | 157 | 52.33 | 82 | 27.33 |
| 21 | Do you install acoustic devices in the field to reduce crop damage by monkeys | 5 | 1.67 | 56 | 18.67 | 239 | 79.67 |
| 22 | Do you use Professionally trained dogs to chase the monkeys | 16 | 5.33 | 196 | 65.33 | 88 | 29.33 |
| 23 | Do you place bananas and biscuits mixed with red chilli powder around the field | 0 | 0.00 | 86 | 28.67 | 214 | 71.33 |
| 24 | Do you use firecrackers to scare away monkeys | 286 | 95.33 | 11 | 3.67 | 3 | 1.00 |
| 25 | Do you use a monkey-proof mesh to prevent damage to the kitchen garden | 152 | 50.67 | 113 | 37.67 | 35 | 11.67 |
| 26 | Do you use Monkey guns to protect the crops | 32 | 10.67 | 246 | 82.00 | 22 | 7.33 |
| 27 | Do you use Solar fencing around the field to protect the crops | 17 | 5.67 | 199 | 66.33 | 84 | 28.00 |
| 28 | Do you use Sling shot to scare away monkeys | 298 | 99.33 | 1 | 0.33 | 1 | 0.33 |
| 29 | Do you use Sealed tiny packages of boneless dry fish pieces throughout field to keep away monkeys | 0 | 0.00 | 251 | 83.67 | 49 | 16.33 |
| 30 | Do you use net to capture monkeys and translocate them to other places | 16 | 5.33 | 210 | 70.00 | 74 | 24.67 |
| 31 | Do you use loudspeakers to play the barking of four or more dogs to lessen the lessen the monkeys’ threat | 295 | 98.33 | 3 | 1.00 | 2 | 0.67 |
| 32 | Do you use a lifelike model resembling a human figure is strategically placed in the field to deter monkeys | 300 | 100.00 | 0 | 0.00 | 0 | 0.00 |
| 33 | Do you follow sterilization method to control the population of monkeys | 0 | 0.00 | 186 | 62.00 | 114 | 38.00 |

**Table 2. Overall adoption level of Human Wildlife Conflict Mitigation Measures**

|  |  |  |
| --- | --- | --- |
| **Sl. No.** | **Adoption level of mitigation measures** | **Response** |
| **Number** | **Percent** |
| 1 | Low (57 to 63) | 70 | 23.33 |
| 2 | Medium (63 to 69) | 172 | 57.34 |
| 3 | High (69 to 75) | 58 | 19.33 |
| **Total** | **300** | **100.00** |

 **Fig. 1. Distribution of respondents according to overall adoption level**

**Conclusion:**

This study sheds light on the practical reality that farmers, despite their willingness, are constrained by the lack of access to effective and affordable mitigation tools. Most rely on traditional or makeshift techniques—not because they are highly successful, but because they are simple, low-cost, and culturally accepted. The data reveal that innovative and scientifically backed methods like solar fencing and monkey guns are known to be effective yet remain out of reach for the majority due to high costs and lack of operational support. Even when adoption occurs, it often reflects a compromise between affordability and efficiency, rather than informed choice. The results underscore the need for policy-level changes that not only promote advanced technologies but also make them financially and logistically accessible to smallholder farmers. Future interventions should prioritize locally adaptive innovations, shared community models for high-cost tools, and integration of indigenous knowledge with formal extension services. Building such an ecosystem can transform mitigation from a survival strategy into a sustainable, community-driven solution.

**References:**

Barua, M., Bhagwat, S. A., & Jadhav, S. (2013). The hidden dimensions of human–wildlife conflict: Health impacts, opportunity and transaction costs. *Biological Conservation, 157*, 309–316. https://doi.org/10.1016/j.biocon.2012.07.014

Chelliah, K., Kannan, G., Kundu, S., Abilash, N., Madhusudan, A., Baskaran, N., & Sukumar, R. (2010). Testing the efficacy of a chilli-tobacco rope fence as a deterrent against crop-raiding elephants. *Current Science, 99*(9), 1239–1243.

Jaleta, B. D., Aticho, A. T., & Tesfaye, A. (2023). Factors influencing smallholder farmers' adoption of wildlife deterrents in Africa. *Journal of Environmental Management, 324*, 116350. https://doi.org/10.1016/j.jenvman.2022.116350

Karanth, K. K., DeFries, R., Srivathsa, A., & Sankaraman, V. (2013). Patterns of human–wildlife conflicts and compensation: Insights from Western Ghats protected areas. *Biological Conservation, 166*, 175–185. https://doi.org/10.1016/j.biocon.2013.06.027

Kumawat, R. N., Meena, H. R., & Meena, B. S. (2021). Adoption of crop protection technologies by farmers in wildlife-affected areas. *Indian Journal of Extension Education, 57*(2), 120–124.

Horgan, F. G., & Kudavidanage, E. P. (2020). Farming on the edge: Farmer training to mitigate human-wildlife conflict at an agricultural frontier in south Sri Lanka. Crop protection, 127, 104981.

McManus, J. S., Dickman, A. J., Gaynor, D., Smuts, B. H., & Macdonald, D. W. (2015). Dead or alive? Comparing costs and benefits of lethal and non-lethal human–wildlife conflict mitigation on livestock farms. Oryx, 49(4), 687-695.

Noga, S. R., Kolawole, O. D., Thakadu, O. T., & Masunga, G. S. (2018). ‘Wildlife officials only care about animals’: Farmers' perceptions of a Ministry-based extension delivery system in mitigating human-wildlife conflicts in the Okavango Delta, Botswana. Journal of rural studies, 61, 216-226.

Kolinski, L., & Milich, K. M. (2021). Human-wildlife conflict mitigation impacts community perceptions around Kibale National Park, Uganda. Diversity, 13(4), 145.

Mojo, D., Rothschuh, J., & Alebachew, M. (2014). Farmers’ perceptions of the impacts of human–wildlife conflict on their livelihood and natural resource management efforts in Cheha Woreda of Guraghe Zone, Ethiopia. Human-wildlife interactions, 8(1), 67-77.