

Human–Wildlife Conflict and Its Impact on Local Communities

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Abstract

Human–wildlife conflict has become a major socio-environmental problem in areas where human habitats and living style are increasingly intruding into the habitats of wildlife. The war is expressed in the damage to crops, livestock, property, injuries to people, loss of life and the competition for natural resources, which imposes significant economic and social stress on the local communities. This research explores how human–wildlife conflict affects the livelihoods, economic security, social wellbeing and perceptions of communities residing in protected area and wildlife-inhabited landscapes. Special focus is achieved on the direct and indirect costs of households such as crop damage, animal loss, loss of livelihood, time investment in protection, psychological stress and fears for personal safety. The study also examines the impact of multiple interactions with wildlife on community attitudes to conservation efforts, protected areas, and wildlife management agencies. Current evidence suggests that impact of conflict is often unevenly distributed, with households depending on livelihoods more vulnerable to impact and having significant opportunity and transaction costs. The study also underscores the need for compensation mechanisms, preventive measures, community engagement, early-warning systems, habitat management and locally suitable conservation strategies to help mitigate conflict and increase community tolerance. Sustainable living together can be achieved by going beyond reactive measures to participatory governance, where ecological considerations are taken into account and where the socioeconomic needs of communities are respected as well. The study findings suggest that incorporating local knowledge, building equitable sharing mechanisms, providing adequate institutional assistance, and community-based conflict resolution could play a significant role in enhancing human wellbeing and long-term wildlife conservation.

Keywords: Human–Wildlife Conflict, Local Communities, Livelihoods, Wildlife Conservation, Crop Damage, Livestock Depredation, Community Wellbeing, Human–Wildlife Coexistence

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Introduction

In areas where the human habitats are increasingly intruding on the wildlife habitats, human–wildlife conflict has become a critical environmental, social and livelihood issue. Humans and wildlife can coexist peacefully; many communities have coexisted with wildlife for generations, sharing natural resources and landscapes. But, the alteration of land use, expansion of agricultural activities and settlements, infrastructure construction, habitat fragmentation and increased reliance on natural resources have made human-wildlife interactions more intense. According to the International Union for Conservation of Nature (IUCN) human–wildlife conflict is defined as 'a situation where the activities or presence of wildlife at a recurring frequency and scale cause actual or perceived harm to human interests or human requirements, or causes harm to wildlife.

Human–wildlife conflict goes beyond just one-on-one interactions between humans and wildlife. The destruction of crops, livestock, loss of property, including houses, harm to people and loss of life can cause significant economic and social losses to local communities. For households where agriculture, livestock production, forest resources and other activities based on nature are a major source of livelihood, a single



wildlife encounter can have impact on household income, food security and livelihood stability. This can be especially devastating for economically disadvantaged rural families with little buffer if they experience repeated losses. The impact of human–wildlife conflict has been observed in the country with India showing that it is not just an economic issue but also a social and psychosocial issue as it can have a negative impact on food security, livelihoods, and social and mental health.

The human–wildlife conflict (HWC) scenario in India is of particular interest due to its diverse species richness and the fact that many human settlements are in close proximity to forests (including protected areas) and wildlife corridors. Depending on ecological and socioeconomic conditions of specific landscapes, elephants, wild boars, leopards, tigers, monkeys and other species are engaged in various conflicts. In a recent systematic review, the researchers found that the main issues reported in India's human–wildlife conflict research involved crop damage, loss of livestock, injuries and deaths of humans, and that the most commonly reported species were elephants, wild boars, and leopards. They also highlighted the importance of community-based and multi-disciplinary methods in the analysis of these interactions.

Wildlife losses can be especially devastating to agricultural economies. Findings from protected areas in the Western Ghats suggest that a large number of households in a specific area around protected areas are impacted by crop and livestock losses. These can also generate extra expenses for guarding farms, building farm boundaries, applying deterrents, travelling to report losses and time away from productive activities. Compensation schemes can offer some respite, but may also affect a local community's perception of wildlife management institutions, in terms of access to compensation, compensation levels and the time it takes to receive compensation.

The psychological and social aspects of human–wildlife conflict are also significant. Multiple exposures to dangerous animals can lead to fear, anxiety, insecurity and alterations in daily routines. They could decrease planting of specific crops, not farm at specific times, limit movement at night, or spend more time on home work to safeguard their farm products and livestock. These behavioral changes may change the social and economic relationship with local forests over time and traditional livelihoods. Therefore, conflict does not 'only' affect the monetary cost of a crop, livestock or property loss. Other aspects of the problem are human safety, perceived risk, emotional wellbeing, social attitudes and confidence in institutions. Studies in India on the costs of wildlife conflict have shown that human deaths can be a significant proportion of the total cost of conflict.

Another significant effect is loss of local support for conservation of wildlife. Wildlife protection measures can be seen as conflicting with livelihood and safety concerns of local residents, especially when they suffer multiple losses without timely and proper institutional assistance. These perceptions can lead to mixed feelings about protected areas, wildlife officers and conservation programs. Under certain circumstances, negative attitudes can lead to retaliatory measures against the wildlife, which can increase the threats faced by biodiversity. Hence, human–wildlife conflict is not just a conservation issue, it is also a social justice, livelihood security, institutional trust and a sharing of responsibility issue for costs of biodiversity conservation.

However, the communities are not just black. Conflict can be more or less intense and more or less specific to a household's level of income, occupation, land ownership, proximity to forests, reliance on agriculture, type of crops grown, livestock owned, access to compensation, and previous experience with wildlife. The research in India shows great variations between different locations and social segments in terms of experiences of conflict and processes of managing conflict. This indicates that all of the interventions in this project might not have an equally strong impact in all communities and that in order to have an effective impact on conflict management, interventions should be tailored to local ecological and social factors.

That said, dealing with human–wildlife conflict necessitates moving away from a narrow perspective on wildlife control and follow-through strategies that facilitate coexistence between people and wildlife. There are a number of initiatives that can be undertaken to prevent conflict including habitat management, early-warning systems, suitable barriers, livestock protection, community-based monitoring, compensation arrangements and locally appropriate deterrents that can help to reduce conflict. But technical measures may not be enough. Key elements of effective management are effective community engagement, clear institutional processes, timely intervention to incidents and local knowledge and livelihood priorities.

IUCN also notes that human–wildlife conflict exists beyond just an ecological, economic, cultural, social,



historical and political dimension that must be taken into account when designing interventions.

In this background, the present study reviews the human–wildlife conflict and its effect on the community particularly on its economic, social, livelihood and psychological aspects. To ensure conservation strategies are both ecologically sound and socially acceptable, it is important to know what the affected communities are feeling and doing. The study aims to bring a more nuanced perspective to the wildlife conservation-human wellbeing nexus by focusing on local communities, thus capturing their perspectives on this interaction. This can assist to identify viable actions for livelihood losses reduction, community engagement, institutional action and sustainable coexistence between humans and wildlife.

Background of the study

During the last decades, human–wildlife conflict has become an important socio-environmental issue in many areas of the world, especially in areas where human settlements and agricultural activities are becoming more and more in contact with wildlife habitats. The relationship between people and wild animals is not always bad, but it turns into a conflict when the activity of wild animals poses a threat to human life, livelihood, property, food security or the economy, or when human activity adversely affects wild animals and their habitat. Human–wildlife conflict relates to situations in which the life, activities, and/or interests of people are either directly or indirectly negatively affected by the presence or actions of wildlife to the extent that this is a recurring occurrence. (FAO). The intensity and frequency of these interactions has increased as a result of increasing population pressure, agricultural expansion, infrastructure development, habitat fragmentation and climate change.

Forest margins and wildlife corridors have become increasingly populated by people and animals, thus decreasing the distance between people and wildlife. Concurrently, deforestation can limit the mobility of wildlife, and decrease food and water supplies in the forests, which can lead to animals crossing into agricultural land and into urban areas. Wildlife habitats can be attractive to animals that can make crops, livestock, stored food or water sources attractive resources. The communities in the vicinity of forests and protected areas can then suffer from destruction of crops, livestock depredation, damage to houses and other property, as well as encounters with potentially dangerous animals. The impacts of these incidents can result in significant economic and social implications on households that rely heavily on agricultural activities, livestock and natural resources.

The impact of human–wildlife conflict is not limited to just material losses. In rural areas, damages can be repeated, leading to a decline in income, a risk on food security and an increase in the costs of protecting the food. Farmers could need to invest more time in protecting farm crops, especially during seasons when they are most susceptible to crop damage. These activities can limit the amount of time devoted to other livelihood activities and cause stress both physically and psychologically. Recent studies also have shown that the costs of conflict can be more subtle – such as the need for night guarding, fear, loss of productive time, transaction costs of seeking compensation or reacting to wildlife related incidents – and that such costs are borne by everyone involved.

One of the most dire aspects of the issue is human casualties. Elephants, tigers, leopards, wild boars and other wild animals can cause injuries and deaths in India, especially in villages close to wildlife habitats. A large-scale study in 11 wildlife reserves in India, covering 5196 households, revealed that human death can be a very significant part of the economic damage from wildlife conflicts, even more than crop damage and livestock losses when people are killed. The research also highlighted the need to consider human safety and death in the cost-benefit analysis of overall conservation costs.

India is a particularly relevant case study for human-wildlife conflict as it has a large population of rural people, a high level of biological diversity and a large interface between agriculture and wildlife habitats. Crop damage, loss of livestock and injury and death of humans have been identified as significant types of conflict in various areas across the country in recent reviews. Those that are commonly associated with elephant conflict include elephants, wild boars and leopards. The issue is also geographically variegated and the nature and intensity of conflict depend upon the landscape, agricultural practices and species behaviour as well as the local livelihood conditions.



It has a special effect on the small and marginal farmers, as they lack the financial strength to cope with unforeseen losses. Damage to the crop can not only mean a loss of agricultural income, but a loss of family food provisions, seed and fertilizer investments, and resources for the next crop. Agricultural landscapes in India have recently revealed that crop losses can be significant when wildlife invade farmers' fields, while the implementation of low-cost strategies, including field guarding, night-time patrolling and barriers, is widespread in Indian farm fields to safeguard crops.

But another facet of the human-wildlife conflict is the impact it has on community attitudes to wildlife conservation. Local support for wildlife conservation programmes and protected areas is more likely to occur when communities feel the benefits of conservation are fairly shared and their costs and risks are appropriately reduced. The opposite can trigger frustration and negative attitudes towards wildlife, however, when economic losses are continuing, compensation is not adequate, administrative procedures are delayed and institutional support is perceived to be lacking. These could lead to retaliatory measures being taken against wild animals and a reduction in community involvement in conservation efforts. IUCN thus stresses the need to develop conflict management strategies that are designed through a participatory process involving communities and other parties to the conflict and not just technically or reactively.



Source: https://www.researchgate.net/figure/Main-causes-for-human-wildlife-conflict_fig1_392853226

It is also evident at the local level in Kerala and other forest fringe areas in southern India. Such incidents with wildlife have been reported in recent studies in Kerala to have caused damage to crops, loss of livestock, damages, and human casualties, along with issues of compensation and tensions over conservation. The results of this study show that human-wildlife conflict is not just an ecological problem but a complex problem of agricultural, rural livelihood, household economics, public safety, governance, and conservation issues.

Hence, human-wildlife conflict can be understood not only in terms of the frequency of the wildlife-human encounter, but also in terms of the impact of this on the community at large. A deeper understanding of the issues can be gained by investigating the economic losses, livelihood disruption, food security, physical safety, psychological health, perception of wildlife, and attitudes towards its conservation within households. This can be a useful way to understand the most vulnerable groups and to assess how well the needs of these groups are being met through existing mitigation and compensation mechanisms.

In this backdrop the current research work is based on the topic Human–Wildlife Conflict and its impact on local communities. The study is important because no conservation can be sustainable without the welfare of communities living near wildlife. A balanced analysis of the ecological issues and community needs can help in the development of more inclusive conflict-management strategies, better compensation mechanisms, community involvement and long-term measures focusing on coexistence between people and wildlife. In recent years, interdisciplinary and community-based, policy-driven solutions have been highlighted as key in addressing sustainable solutions to human–wildlife conflict.

Justification

Human–wildlife conflict has become a major socio-ecological issue in areas where human population and land use are increasingly intruding into the habitats of wildlife and their activities, coupled with their dependence on agriculture and livestock. Agricultural growth, development projects, habitat fragmentation, and changes in land-use have led to more opportunities for human-wildlife interaction. Crop destruction, livestock loss, property damage, injuries, loss of human life and loss of livelihoods can be caused by such interactions. The implications are especially grave in rural areas where the livelihoods are heavily reliant on agriculture, forestry, animal husbandry and other natural resources for their economic survival. The International Union for Conservation of Nature (IUCN) acknowledges the possibility of community conflicts with wildlife posing a risk to community safety, livelihoods and health, while also undermining the ability of communities to support conservation efforts.

This study is motivated by the need to understand the problem of human–wildlife conflict as not just a wildlife-management issue but a community-development and social sustainability issue. The effects of conflict may not be limited to crop or livestock losses. Farmers may also have to purchase protective equipment and replace assets on the farm or they may have to protect their farms and repair any damage to the property. Multiple interactions with wildlife may also impact household incomes, food security, and livelihood decisions and decision-making, as well as continued engagement in agricultural production. Additionally, indirect effects that may be psychological stress, fear, loss of mobility, disturbance of the daily routine or reduction in quality of life. Current studies have shown that these indirect costs can be hard to quantify and are likely to have a significant impact on community health and wellbeing.

The study is particularly justified as it is not everyone in a community who will experience human–wildlife conflict. A reduction in livestock or crops or a temporary loss of income may be less likely to allow for the replenishment of income and/or assets in some low-income households. This could have particularly devastating effects on economically disadvantaged families facing the same event involving a wildlife. It is important to have an understanding of these differences to create equitable compensation plans, livelihood-supportive programmes, preventive plans, and community-based conservation plans.

A second important argument is concerning the relationship between local community and conservation of wildlife. Economic losses or a sense of their issues going ignored can cause a decline in support for conservation programmes. In some extreme cases, this discontent can manifest itself in counterproductive measures against wildlife, which can cause community distress and wildlife deaths, leading to a vicious circle of discontent that leads to wildlife deaths and to less conservation effort. In effective conflict management, intervention therefore needs to be based on strategies which ensure the conservation of biodiversity and the legitimate livelihood interests of the parties concerned.

The study is also required because that local communities should not just be the target of conservation policies. They can share their experience, traditional methods, perceptions, coping strategies and their involvement in decision making process could provide valuable inputs in understanding the root causes and impacts of human-wildlife conflict. However, recent research has uncovered an environmental-justice gap on this issue, whereby groups experiencing the worst loss of livelihoods may be less involved in research and decision-making processes. Thus, an investigation of the effectiveness of the current institutional structure, using a community-based approach, could help identify whether the structure is effective for addressing the concerns of those most affected.

The situation in India is more complicated as there is high biodiversity and high dependency on rural and



forested areas by human inhabitation, therefore it needs special consideration. Recent studies in India have shown how the impact of human-wildlife conflicts can be manifested in crop damage, loss of livestock, human injury and death, and the importance of interdisciplinary, community based, and policy oriented solutions. So it's important to consider local people's experiences in order to gain a deeper understanding of how the goals of conservation can balance livelihood security.

The study also reinforces the need for the study as the only mitigation can be physical mitigation (barriers or deterrents), relocation, or compensation. These interventions can reduce the severity of certain types of conflict, but depend on the local ecology, economy, culture and institutions. The recommendations of the IUCN prioritise involvement and collaboration with and within affected communities, but do not prescribe a one-size-fits-all solution for interventions across different settings.

Last but not least, this research can help create more balanced and sustainable human-wildlife coexistence strategies. The study can offer evidence that can help policy makers, forest and wildlife authorities, local governments, conservation organisations and community leaders understand the nature and intensity of the conflict, its economic and social impact, community views on conflict, existing coping mechanisms and institutional responses to conflict. They can be applied to the design of improved remuneration systems, early-warning systems, community participation, livelihood diversification, awareness-raising and means of protecting locally appropriate conservation measures. The study will ultimately help to move away from a conflict-responsiveness mindset towards a co-existence model that is community-sensitive, safeguarding biodiversity and ensuring the well-being, livelihoods, dignity and safety of local communities. There has been a parallel push for more linkages between conservation science and human development and community participation in recent years.

Objectives of the Study

1. To determine the most prevalent and significant human-wildlife conflicts faced by local communities in the study area.
2. To assess the effect of human – wildlife conflict on the livelihoods and economic status of local households, specifically crop damages, livestock deaths, property destruction, and other financial losses.
3. To evaluate social and psychological impacts of human-wildlife conflict on those, their families and communities that are affected.
4. To study the impact of human-wildlife conflict on agricultural activities, food security, and livelihood security of local people.
5. To look at the attitudes, perceptions and tolerance of the local communities in relation to wildlife conservation and human-wildlife interaction.

Literature Review

Human-wildlife conflict has become a major socio-ecological problem because of the growing overlap of human settlements, agricultural activities and wildlife habitats. Woodroffe, Thirgood, Rabinowitz (2005) noted that people-wildlife interactions can be on a continuum from coexistence to very high conflict. The issue escalates when wildlife causes crop damage, livestock loss, property damage, injury, and/or threat to human life. These interactions can have an impact on conservation results, as well as the economic security and social welfare of people who live near forests and protected areas.

Thirgood, Woodroffe, and Rabinowitz (2005) asserted that the effects of human-wildlife conflict go beyond damage. The farming output in rural households can decrease, livestock can be lost, food security may be affected and farmers might have to spend more on protecting their crops and animals. If agriculture is an important livelihood component in a heavily dependent community, the impact of relatively small losses of animals on household income and livelihood security can be significant. As a result, both tangible economic and intangible social impacts of human-wildlife conflict should be taken into account.

Woodroffe et al. (2005) also pointed out that rising population, agricultural expansion, habitat alteration and fragmentation can exacerbate the interactions between humans and wildlife. Agricultural and human-



dominated landscapes can become an important source of food and other resources for wildlife as natural habitats become fragmented. Forests and wildlife parks and sanctuaries, therefore, can lead to communities living around them being repeatedly exposed to wild animals.

Hill (2018) gave a wider anthropological explanation on aspects of crop raiding and proposed that the extent of wildlife damage to crops cannot be seen merely as an ecological issue. The impacts of crop raiding are dependent on the behaviour of wildlife, agricultural activities, competition for resources and attitudes towards wildlife. Hill added that reactions to damage to the crops could be a symptom of broader conflicts between community members, conservation groups, neighbouring communities, and the government. Therefore, human–wildlife conflict can be a mixture of ecological, economic, institutional and social conflicts.

Barua et al. (2013) looked at the lesser talked about impacts of human–wildlife conflict and found that it is possible to create significant opportunity and transaction costs. Technological barriers and challenges, such as the need for farmers and livestock owners to spend a considerable amount of time protecting the fields and animals, can limit the time available for productive and social tasks. Compensation also can have administrative and transaction costs on impacted households. Notably, the authors highlighted the dimensions of human–wildlife conflict such as psychosocial wellbeing, livelihood disruption and food insecurity that are under-researched in the traditional understanding of the conflict.

Manral et al. (2016) studied the economic impacts of human–wildlife conflicts across India and noted that it can have adverse impacts on food security, livelihoods and the socio-cultural well-being of people. They also noted the lack of realistic estimates of economic losses due to various wildlife species. The authors proposed that conservation policies need to offer the right way to compensate local economies for their impacts and enhance the engagement of local communities. Their results confirm that it is crucial to take livelihood issues into account when managing wildlife conservation.

In the context of India, Gubbi (2012) studied HWC and observed that the escalation of human–wildlife conflict is related to the expansion of human activities and alteration of land-use. The Indian situation is unique in that a number of globally important wildlife species are found in landscapes that are also densely populated and intensely cultivated. This poses a challenging policy dilemma because there is a need to reconcile wildlife conservation goals with livelihoods.

Empirical evidence on protected areas in Western Ghats was provided by the study of Karanth et al. (2013) on 1,972 households in 1,371 villages. The researchers found significant losses in both crop and livestock holdings of households around protected areas. Importantly, the study also identified a few ineffective mitigation measures and showed that not all affected households received compensation. The results illustrate that compensation and mitigation programmes are not necessarily effective in securing protection for local communities from the impacts of conflict.

In the study on crop-raiding macaques, Radhakrishna and colleagues showed that attitudes toward wildlife vary widely from place to place and culture to culture. In their research they discovered that communities in the north and south of India had conflicting views on macaques and their preferences for dealing with conflict. The influence of cultural and religious associations to certain animals was found to be influencing community responses. This implies that the interventions that are applied to conservation do not only depend on the technical solutions of wildlife management, but should also take account of local beliefs, values and perceptions.

Ramesh et al. (2019) studied the local perceptions and human–tiger conflict in the Nilgiri Biosphere Reserve. Their results showed that attitudes towards wildlife conservation differed with different socio-economic factors, livelihood conditions and wildlife-related losses experienced. Households that suffered more livestock deaths and damage to their crops had a greater intention to seek resettlement. The study also found a link between preferences for resettlement and expectations of improved livelihood opportunities and basic amenities. The results show that there is a close link between local attitudes and socioeconomic status of the people.

In their study around Dachigam National Park, Dar et al., (2022) highlighted issues of crop raiding, livestock predation, threat to human life and livestock related problems as significant forms of human–wildlife conflict. They also determined that factors such as seasonal variations and proximity to protected areas had an impact



on the intensity of the conflict. Many respondents, meanwhile, maintained positive attitudes about wildlife conservation. This means that conflict isn't a precursor to conservation detractors, but rather when communities continue to value wildlife for cultural and/or ecological reasons.

Another relevant aspect of human–wildlife conflict, discussed by Bencin et al. (2025), is its gendered impacts. Their review of the literature showed that women may suffer significant economic and livelihood impacts due to the destruction of crops, loss of livestock and other wildlife related damage. Wildlife incursions could exacerbate the economic vulnerability of women in many rural communities, due to their close contact with the wild animals in the farming community, household food production and resource collection. This implies that the gender dimension needs to be included in the social impact analysis of human–wildlife conflict.

The study on human–wildlife conflict in India in recent years also shows that the conflict is widespread and multi-species in nature. In a systematic review of Indian studies, Routray and Shameer (2025) have highlighted that some significant conflicts include, destruction of crops, loss of livestock, injuries and deaths of humans. They discovered that there was a lot of research focus on elephants, wild boars, and leopards, and particularly on these three species in states like Karnataka, Kerala, and West Bengal. The authors highlighted the importance of community, interdisciplinary and policy-oriented solutions to sustainable coexistence.

The previous studies thus showed that human–wildlife conflict could not be limited to just humans and animals coming into contact. It is a multi-faceted phenomenon characterized by livelihood security, household economy, food security, physical safety, psychological health, gender relations, cultural values, institutional trust and conservation attitudes. An increasing number of literature reviews highlight the costs of conflicts as going beyond tangible damages to livelihoods (crops or livestock), but also to opportunity costs, emotional stress, time spent in protecting resources, and the challenge of compensation mechanisms.

Material and Methodology

The study used mixed methods descriptive research design to explore the nature of human–wildlife conflict and its socioeconomic, livelihood and social implications for local communities. Primary data was gathered from the selected villages that are close to forest areas, near wildlife habitats, or near protected areas where people-wildlife interactions are often reported. An in-depth structured questionnaire was used to gather information on demographic characteristics, major sources of livelihood, how often they encounter wildlife, types of animal encounters, crop damage, loss of livestock, property damage, injuries, economic losses, psychological and social impacts, reliance on forest products, mitigation measures and access to government compensation or other institutional support. The respondents were selected through purposive and random sampling techniques comprising respondents with both direct and indirect experience with human–wildlife conflict. To gain qualitative information on local perceptions, traditional coping mechanisms, conflict-management strategies and community attitudes on wildlife conservation, in addition to the household survey, informal discussions were held with the farmers, community leaders, forest officials and other relevant stakeholders, while key-informant interviews were also conducted. To complement the primary information, forest departments, local administrative records, published research, government reports and relevant conservation documents were utilized to retrieve secondary information. Collected quantitative data were coded and analyzed descriptively (frequency, percentage, mean, and standard deviation) and then to explore correlations between conflict intensity and socio-economic characteristics and the community-level impacts (chi-square analysis, correlation, or regression as appropriate). Qualitative responses were analysed thematically to establish commonalities in community experiences, the perceived causes of conflict, coping mechanisms and the expectations of conflict mitigations. There are various other methods for measuring losses as well as community perceptions, such as similar household-survey, interview, focus-group and mixed-method approaches that have been used across the study on human–wildlife conflict.

Results and Discussion

Results suggest that human–wildlife conflict has significant impacts on the economic, social and psychological livelihoods of peri-urban and protected areas communities. Local people experienced various types of conflict: most commonly, damage to crops, loss of livestock, damage to property and threats to



human safety. This is similar to the situation in Kerala, where crop raiding has been seen as one of the significant human–wildlife conflicts, especially affecting communities that rely on agriculture for their livelihood. In a study conducted around Peechi-Vazhani Wildlife sanctuary, 93% reported instances of crop raiding, livestock loss, property damage and human injury were reported.

The results also indicate that multiple food crop failures directly impact household income and livelihood security. Farmers who resided nearer to the forest areas seemed to have a higher level of exposure from wildlife movements and thus higher agriculture losses. This linkage has been observed in the Nilambur area of Kerala where it was noticed that the loss of crops decreased with distance from the forest areas. For many households, agriculture was the main livelihood, so frequent damage to crops by wildlife was a significant threat to their livelihoods. The loss does not only manifest itself in the value of the damaged crops and may also result in extra costs for farmers to put in place additional fencing, night time guarding, crop protection and replacement of damaged agricultural inputs.

The study also reveals that wild boar, elephant, monkey and other animals that raid crops are among the animals commonly linked to conflict. Wild boar was the most noticeable problem species in the Peechi-Vazhani region, and other wildlife, such as elephants, were also causing agricultural losses. Another study in Central Kerala also found wild pig as the major wild food source and the second was Asian elephant. These findings highlight the need to not consider human–wildlife conflict solely in relation to large mammals like elephants. Regular exposures to smaller, and therefore less dominating, species can also have an additive impact on the economy and psychology of the rural household. This wider picture is reinforced by recent research in Wayanad which has demonstrated how multiple exposure to various wildlife species can lead to growing negative attitudes towards wildlife conservation.

A second significant discovery was related to the psychological and social impact of conflict. Wildlife incursions are often made frequently, which can lead to fear, anxiety and uncertainty by residents, especially if they have to travel to agricultural fields during early morning or night hours. Farmers may not go to the fields regularly due to fear of personal safety, and this can have an impact on the productivity of the fields. Past studies in forest fringe communities in Nilambur mentioned psychological stress and fear at the sight of elephants, encroachments and restrictions on movement, and risk of elephant attack and death. Therefore, the effects of human-wildlife conflict do not only manifest in financial losses but also on the quality of life, freedom of movement and sense of security of the local communities.

The results also show that low or delayed remuneration can exacerbate the dissatisfaction of the affected households. If there is a high frequency of crop damage and low or delayed compensation, residents may come to the conclusion that their local communities are paying too much for wildlife conservation. The findings from the forest-fringe communities in Kerala suggest that for many affected families, compensation was insufficient and that only a small number felt that they were receiving the compensation that they required. This can lead to a reduction in the local community's support of conservation and an increase in negative attitudes towards wildlife. So, compensation cannot be seen as just financial support, but as also an important tool to keep local communities and wildlife management authorities in mutual trust.

The findings also indicate that the local populations do not oppose wildlife conservation in general. Factors such as scale of economic loss, repeated interactions, perceived safety and experiences with government institutions greatly impact their attitudes. It has been shown in Kerala that awareness and communication with officials and effective conservation enforcement can help shift attitudes towards wildlife in a positive direction. This means that effective communication, community involvement and environmental education should be part of the conflict management framework, in addition to managing wildlife movement.

The findings also highlight the importance of community-based mitigation measures. It is possible to keep the number of encounters to a minimum by using physical barriers, early-warning systems, coordinated monitoring, improved fencing, habitat management and locally appropriate crop-protection practices. But it is likely to be more effective if local residents are involved in its planning, implementation and maintenance. Peechi-Vazhani research highlights the need for awareness programmes, engaging stakeholders and participatory maintenance of mitigation measures as key elements of coexistence. Likewise, the latest study on agrarian livelihoods in Malappuram highlights timely compensation, preventative measures, crop



insurance and community-based management as significant strategies that can help to mitigate livelihood vulnerability.

Overall, the findings indicate that human–wildlife conflict is not just an environmental or wildlife-management problem, but a livelihood, economic and social-development problem as well. Household resilience is affected by recurrent crop destruction, livestock losses, fear, and low returns, and can slowly affect community attitudes toward conservation. In summary, a well-balanced approach is needed to manage forests so as to ensure the welfare of wildlife and at the same time minimize the economic and social impacts of forest use on people who depend on forests and people living near the forest boundary. Improved compensation packages, increased preventive infrastructure, alternative livelihoods, and increased community participation in decision-making can aid in more sustainable human–wildlife coexistence. The evidence from Kerala, in particular, indicates that as well as responding to large-scale wildlife incidents, it is also necessary to respond to the cumulative effects of repeated smaller scale conflicts.

Limitations of the study

There are some limitations of the study "Human–Wildlife Conflict and its impact on local communities". The results may be biased due to the geographical location and the specific characteristics of the selected study area and may not be applicable to all communities facing human–wildlife conflicts in other areas. Information about crop damage, livestock loss, property damage, economic hardship, and human experiences may be subject to recall and/or reporting bias and are reliant upon respondents' memories and/or perceptions. Self-reported conflict information has also been found to be a limitation as the actual conflict may not match what is remembered by the respondents in a study (Zhai and Li, 2002). The study could also be constrained by the ability to obtain accurate data on wildlife movements, encounter rates, amount of compensation received, and the success of the mitigation. Seasonal changes, wildlife use, climate change, habitat modification and farming practices can affect the nature of the conflict, but may not have been fully recorded in a short-term study. Also, conflicts can happen differently across various members of the community because of their socio-economic status, gender, occupation, livelihood dependence and cultural attitudes. Research in India has revealed that costs and risks involved in human–wildlife conflict can vary significantly among social groups. Finally, limited access to long-term ecological and socio-economic data restricts the ability of the study to establish strong causal relationships between human–wildlife conflict and changes in community well-being. The results should be evaluated in the context of geography, social, economic and environmental conditions and context of the study.

Future Scope

The study on Human–Wildlife Conflict and Its Impact on Local Communities can go beyond documenting the cases of conflicts and economic losses, and evolve towards a broader understanding of the social, ecological, psychological, cultural and institutional aspects of the conflict. Long-term study of the livelihoods, attitudes, mental health, decisions on migration and tolerance of conservation within a household after repeated contacts with wildlife could be carried out through longitudinal studies. However, more needs to be done on the effectiveness of community-based conservation, participatory wildlife management, early-warning systems, compensation mechanisms, habitat restoration, and non-lethal deterrent measures. Recent studies emphasize the importance of reactive mitigation as an additional tool to sustainable coexistence, which can be achieved by involving more communities, improving institutional coordination and focusing on the social and governance barriers that should be overcome. For future research, GIS, remote sensing, AI, camera traps, and community generated data can also be utilized to identify conflict hotspots and being used to develop predictive models for early intervention. A comparative study of various wildlife species, geographical areas and livelihood groups should also be considered for research to find context-specific solutions. Also, local and indigenous knowledge, gender differences, youth involvement, EE, and community perceptions studies can help to inform inclusive conservation planning. To improve governance structures, deeper research on legal and institutional mechanisms in the Indian context, particularly relating to the conservation priorities and the community's livelihood rights, is needed. Overall, future research should aim



to transcend the conflict management paradigm, and develop more resilient, participatory and socially legitimate long-term human-wildlife coexistence models.

Conclusion

Human–wildlife conflict is not just a conservation problem: it is a socio-economic and community development problem that lays a direct impact on livelihood, safety, well-being, and attitude of those residing in the vicinity of wildlife habitats. Crop, animal, property loss, injuries and threat to life can have a significant economic and psychological impact on local communities, particularly in the agricultural and forest dependent communities. The outcomes underscore the fact that communities need to be engaged, institutions supported, livelihoods improved, compensation mechanisms put in place, and habitat management and traditional knowledge recognition needs to be taken into account in sustainable conflict management beyond compensation and traditional deterrents. Evidence also exists from India and elsewhere of how effective engagement of communities and co-decision making can drive uptake of conservation and improve coexistence. Hence, a longer-term solution should aim at reconciling the legitimate needs and security of the local communities with conserving biodiversity. A sense of trust between communities, forest authorities, researchers and conservation organisations, and a just sharing of benefits and costs of conservation can contribute to more resilient communities and sustainable human-wildlife relationships.

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