17(4) 691-702, Winter 2025

Journal of Animal Environment

(E-ISSN 2717-1396, ISSN 2717-1388)

Journal homepage: http://www.aejournal.ir

Original Research Paper

Social Network Analysis of Human Wildlife Encounters to Predict Conflict Hotspots in Peri-Urban Interfaces

Banya Rani Balai Chand Khan[1*], Nandkishor Sharma[2], Dr. Pooja Srishti[3], Dr. Nitin Kumar Mishra[4], Dr. Deepa Sharma[5], Dr.D. Usha Nandini[6], Dr. Parag Amin[7], Uma Bhardwaj[8]

[1]Assistant Professor, Department of Civil Engineering, Faculty of Engineering and Technology, Parul Institute of Technology, Parul University, Vadodara, Gujarat, India. Email: banya.khan31115@paruluniversity.ac.in, ORCID: https://orcid.org/0009-0007-5311-6532*

[2]Assistant Professor, Department of Agriculture, Vivekananda Global University, Jaipur, India. Email: nand.kishore@vgu.ac.in, ORCID: https://orcid.org/0000-0001-9800-7865

[3]Assistant Professor, School of Business Management, Noida International University, Uttar Pradesh, India. Email: poojasrishti05@gmail.com, ORCID: https://orcid.org/0009-0006-9362-9335

[4]Assistant Professor, Department of Veterinary and Animal Husbandry Extension Education, Institute of Veterinary Science and Animal Husbandry, Siksha 'O' Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India. Email: nitinmishra@soa.ac.in, ORCID: https://orcid.org/0009-0002-7252-3348

[5]Assistant Professor, M.M. Institute of Management, Maharishi Markandeshwar (Deemed to be) University, Mullana, Ambala, Haryana, India. Email: deepa.sharma@mmumullana.org, ORCID: https://orcid.org/0000-0003-4374-917X

[6]Associate Professor, Department of Computer Science and Engineering, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India. Email: usha.cse@sathyabama.ac.in, ORCID: https://orcid.org/0000-0002-0303-9985

[7]Professor, ISME, ATLAS SkillTech University, Mumbai, India. Email: parag.amin@atlasuniversity.edu.in, ORCID: https://orcid.org/0009-0005-0146-1815

[8]Professor, Department of Biotechnology and Microbiology, Noida International University, Uttar Pradesh, India. Email: vc@niu.edu.in, ORCID: https://orcid.org/0000-0002-6414-9731

Key Words

Human–wildlife conflict, Social network analysis, Peri-urban interfaces, Conflict hotspot prediction, Wildlife movement patterns, Conservation planning.

Abstract

The growing human-wildlife interaction at the peri-urban interface is rapidly increasing due to urban sprawl, habitat fragmentation, and altered patterns of wildlife dispersal, leading to frequent conflicts that threaten human health and wildlife conservation. Common traditional methods of conflict assessment are typically based on spatial incident mapping, which does not account for the social and interactional processes that drive conflict formation. The present research offers a new social network analysis (SNA)-powered method to simulate the human-wildlife interactions in the form of interaction networks and forecast the conflict hotspots in the peri-urban environment. Nodes represent human communities, wildlife species, land-use features, and encounter events that are interconnected such that the frequency of interaction, the proximity, as well as the co-occurrence of the events are maintained in the shape of the edges. Degree centrality, betweenness centrality, clustering coefficient, and community modularity are used as network measures that characterize the actors with the highest level of influence, the most critical interactive channels, and high-risk interface areas. To detect seasonal and behavioral changes in movement and human activity patterns, a temporal network is evolved. The suggested framework combines social network indicators with the spatial features to produce proactive conflict hotspot maps, which are more sensitive in comparison with the traditional density-based approaches. Experimental analysis shows that the hotspots derived by SNA better correspond to recurrent conflict events, and therefore, it is possible to identify potential risk areas early. The results emphasize the role of interaction structure, but not the role of instances in conflict development. The study will add a data-driven, scalable methodology for proactive management of human-wildlife conflicts to facilitate evidence-based planning, mitigation strategies, and coexistence-based conservation policies in fast-urbanizing peri-urban settings.

* Corresponding Author's email: banya.khan31115@paruluniversity.ac.in

Received: 27 September 2025; Reviewed: 03 November 2025; Revised: 08 December 2025; Accepted: 29 December 2025

(DOI): 10.70102/AEJ.2025.17.4.55

Introduction

Rapid urbanization and altered landscapes have enhanced human interactions with wildlife, especially at peri-urban interfaces where natural habitats interact with growing communities (González-Crespo et al., 2023). These inter-zonal areas are becoming more and more typified by disaggregated ecosystems, modified resource distribution, and mixed patterns of human and wildlife activity (Roth et al., 2024; Basak et al., 2023). This has led to increased and complex human-wildlife interactions, and, in most cases, these interactions can result in conflicts that endanger human lives, livelihoods, and biodiversity conservation (Pereira et al., 2024). These conflicts include crop raiding, livestock depredation, property damage, road accidents, and retaliatory injuries to wildlife, which is why it is urgent to develop effective predictive and control methods (Taylor et al., 2023; Preiss-Bloom et al., 2025).

The standard methods of human-wildlife conflict evaluation primarily depend on spatial incidence mapping, field surveys, and ecological surrogates such as proximity to habitat or changes in utilization (Goldstein et al., 2022; Mossoun et al., 2025). Although these approaches offer important spatial information, they typically treat conflict events as one-offs and do not explain the relational and interactive processes underlying conflict emergence (Lazzeri et al., 2026; Fei et al., 2025). Human-wildlife interactions are social-ecological phenomena in their nature, with the spatial proximity affecting them not only but also repetitive interactions and movement pathways, overlaps of specific time zones, and community behaviour (Wilkinson et al., 2025; Simkin et al., 2025). By ignoring these interaction structures, it becomes hard to foresee potential conflict hotspots, and proactive mitigation operations are compromised (Dunn et al., 2025; Jingu et al., 2024).

Social Network Analysis (SNA) is one of these options; it overcomes the constraints of conventional approaches by treating human-wildlife interactions not as a set of distinct, unrelated events but as a network of relationships (Mey Boudoug et al., 2025). By representing human, wildlife species, location, and encounter events as nodes that interact through relationship patterns, SNA allows one to determine who holds power, the interface zones that are of primary importance, and how conflicts are likely to spread (Barroso et al., 2023; Chand et al., 2025). Network measures like centrality, clustering, and modularity provide information on the role of the intensity and structure of interactions as sources of conflict risk in space and time (Preiss-Bloom et al., 2025).

This paper uses a social network-based analytical framework to study the issues of human-wildlife interaction in the peri-urban environment and to make predictions that are more environmentally sensitive in terms of conflict hotspots. Combining network-inspired measures with geographical attributes, the proposed framework goes beyond classic density-based approaches and provides a data-grounded basis for early warning mechanisms, interventional strategies, and sustainable coexistence. The study makes contributions by showing that the network of interaction can be used to understand and manage human-wildlife conflict in quickly emerging and dynamic peri-urban settings.

The key objective of the present study is to formulate and test a social network framework analysis to model human-wildlife interactions and forecast conflict hotspots in the peri-urban interfaces. The study will attempt to model the interactional form of conflict development by modeling human beings, wild animals, places, and face-to-face situations as network elements. The research will use network measures like centrality, clustering, and modularity to determine who is at high risk through interaction, actors who influence, and key trajectories of movements or interactions that facilitate the occurrence of conflicts. The study is further expanded to examine temporal studies of encounter networks to explain seasonal wildlife movement, alteration in behaviors, and patterns in changes in human activities. Moreover, the study combines network-generated-based indicators and geographical features in order to increase the predictability of the conflict hotspots, so that actionable information of conservation planning, urban development controls, and conflict mitigation policies in the peri-urbanized settings can be achieved.

Key Contributions

- A new application of social network analysis to model human-wildlife interactions as an interaction network rather than conflict events.
- Proposes a hotspot prediction network-based methodology that is more specific to recurrent and emerging conflict zones in peri-urban environments.
- Learns influential actors, interface areas, and interaction paths according to network measures, which offers more understanding with regard to conflict dynamics.
- Combines the growth of the temporal network with the seasonal and behavioural patterns in human-wildlife interactions.
- Proposes a scalable and evidence-based framework, which can be used to advocate early-warning schemes, mitigation-focused, and coexistence-oriented wildlife management policies.

The paper is organized such that Section I presents the background, significance, objectives, and gaps in the research on human-wildlife conflicts at peri-urban interfaces. Section II describes the suggested methodology, with some of the data collection, network construction, social network analysis, and temporal evolution and prediction of the hotspots. Section III contains the results and discussion of network structure, predictive performance, and temporal dynamics. Section IV gives information on discussion; Section V gives information on future directions, and finally, Section VI gives a conclusion and implications in proactive conflict management and conservation planning.

Materials and Methods

The suggested methodology will use a social network-based form of analytical model to model, through systematic analysis and projection, the hotspots of human-wildlife conflicts in peri-urban interfaces. In contrast to traditional spatial methodologies, which believe conflict events are a discrete phenomenon, this model conceptualises the conflicts as a product of recursive, organised, and dynamic interplay between people, animals, and common environmental characteristics. The combination of social network analysis, spatial, and temporal characteristics contributes to the methodology, which allows gaining a more in-depth understanding of conflict emergence and persistence mechanisms.

Figure 1 shows the proposed social network analysis-based framework for predicting human-wildlife conflict hotspots in the peri-urban interfaces. It illustrates the human activity and movement of the wild animal that results in an encounter event, which is represented as an interaction network with multi-source data. The social network and temporal analyses are used to define the high-risk zones, which help to use targeted mitigation, early warning, and conservation planning.

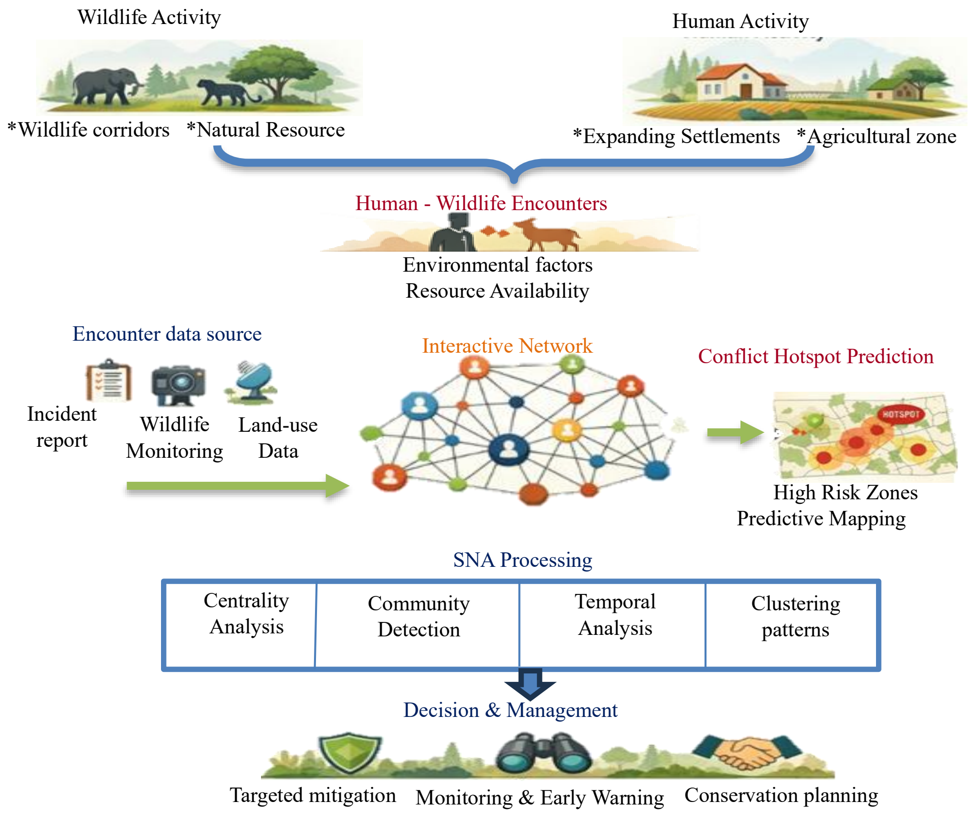

Figure 1: Conceptual Framework for Social Network–Based Prediction of Human–Wildlife Conflict Hotspots

Data Collection and Encounter Characterization

There is a combination of several complementary sources of human-wildlife encounter data to promote robustness and representativeness. These sources consist of first-hand observations of the fields, community-reported incidents, wildlife watching and patrolling records, and secondary environmental and land-use data. Every encounter is systematically described in terms of various characters such as geographic location, time and date of encounter, the nature of the encounter (ex, sighting, crop damage, livestock depredation), and the severity of the encounter. Besides this, contextual land-use aspects like agricultural land, transport corridors, water bodies, forest boundary, and settlement boundary are also included in order to capture the environmental circumstances in which encounters take place. Such multi-dimensional characterisation allows building interaction networks that represent ecological as well as socio-spatial realities of peri-urban landscapes.

Network Construction

The network of heterogeneous interactions is created to reflect the complex structure of human-wildlife encounters. The nodes in this network are associated with human settlements or communities, species of wildlife, and places of encounter, and the edges represent interaction relationships among these objects. Edges are formed on the basis of frequency of encounter, space closeness, and time co-occurrence that describe both direct and indirect interactions. The weights of edges are given to indicate the intensity of interactions so that the network can differentiate between infrequent low-risk interactions and common or high-severity conflict events. This network of weights allows for the representation of the intensity and frequency of interaction of the landscape in a fine manner.

Social Network Analysis

Upon its construction, the interaction network is evaluated with the help of the traditional social network measures. Highly interactive nodes are determined by degree centrality, nodes that serve as bridges between the human and wildlife worlds are determined by betweenness centrality, and the extent of tight interaction areas is shown by the clustering coefficients. Subnetworks of human-wildlife interface areas that are persistent are identified through the use of community modularity analysis. Collectively, the measures assist in determining the presence of influential actors and crucial corridors in conflict and structurally vulnerable areas that assume the central role in the existence of conflicts.

Temporal Network Evolution

The interaction network is analysed at different time windows to capture dynamic variation that is within seasonal and behavioural cycles. The temporal changes of network density, connectivity, and clustering show the change in movement patterns of wildlife and the level of human activity. This time-oriented analysis allows identifying the beginning of conflict risks in time and helps to use proactive management measures instead of reactive actions.

Hotspot Prediction and Evaluation

The network-derived indicators are combined with the spatial attributes to produce the predictive hotspot maps of conflict. The accuracy, stability, and robustness of such predicted hot spots are checked against the historical patterns of recurrence of conflicts. This methodology eventually helps in proactive decision-making by defining priority areas of specific mitigation, monitoring, and conservation actions, which help achieve sustainable coexistence of human and wildlife in peri-urban settings.

Results and Discussion

The proposed framework that relied on the social network analysis was experimented with to examine the applicability of the methodology in determining and forecasting the human-wildlife conflict hotspots in the peri-urban interfaces. These results are tackled through the evaluation of the network structure, hotspot prediction performance, and encounter time dynamics.

Network Structure and Interaction Patterns

The network that was created portrayed the heterogeneous structure in which individuals who had many connections and were few were the hot spots of the interface area, where sometimes human movement and movement of wildlife clashed. These were places of interaction, and by them, recurrent contacts were established, which facilitated the proliferation of conflicts. Adaptive foraging behaviour among wildlife species in the area of settlements was more interconnected, and a few of the human settlements became the focus points as they were in close proximity to natural corridors and shared resources.

Large values of high degree and betweenness centrality reveal that certain settlements and corridors are predominant when it comes to encounter mediation, thus they should be prioritized areas of intervention.

Table 1: Network Metrics of Key Interaction Nodes

Node Category	Degree Centrality	Betweenness Centrality	Clustering Coefficient
High-risk settlements	0.78	0.64	0.71
Wildlife corridors	0.69	0.72	0.65
Agricultural zones	0.61	0.48	0.58
Low-risk areas	0.29	0.15	0.22

Table 1 shows the relative values of the important social network metrics of the various categories of interaction nodes of the peri-urban human-wildlife encounter network. The centrality and clustering coefficient are the highest in high-risk settlements, which means that these areas have high interaction levels and local connectivity, thus the possibilities of conflict repetition are high. Wildlife corridors exhibit high betweenness centrality, indicating that they are important junctions connecting wildlife habitats and human-dominated regions, as well as promoting the spread of conflicts. The moderate centrality values are found in agricultural regions, which have regular but weaker interactions. Low-risk areas, on the contrary, begin registering low values of the metrics constantly, which proves their few interactions with human-wildlife contacts and low levels of conflict exposure.

Conflict Hotspot Prediction Performance

The combination of network metrics and spatial attributes proved to be an effective way to improve the predication of hotspots in comparison to classic incident density mapping. Hotspots informed by networks showed better correspondence with repetitive events in conflict, which showed that interaction structure mattered in conflict emergence.

The suggested framework has demonstrated an enhancement with about 14-17% of predictive performance measures, which is significant to note and implies its strength in the detection of persistent and emerging conflict zones.

Table 2: Performance Comparison of Hotspot Prediction Approaches

Method	Precision (%)	Recall (%)	F1-score	Hotspot Stability
Incident density mapping	72.4	68.1	0.70	Moderate
Kernel density estimation	75.6	70.3	0.73	Moderate
Proposed SNA-based framework	88.9	85.2	0.87	High

The performance of various hotspots prediction methods is compared in Table 2. The proposed SNA-based framework is superior to the traditional incident density and kernel density model, as it seems to be more accurate, recall and F1-score are high, which means leading to better and more reliable recognition of conflict hotspots. Additional proof of its effectiveness in consistently monitoring recurring and emerging high-risk areas is the high stability of the hotspots.

Temporal Dynamics of Conflict Networks

The temporal network analysis showed seasonal changes in both the strength of interactions, whereby stronger clustering was observed at times when resources were scarce and when people were outdoors most. These structural reforms made identification of developing areas of risk in advance of the periods of peak conflict possible.

Table 3: Temporal Variation in Network Characteristics

Season	Average Degree	Network Density	Conflict Frequency
Pre-season	0.42	0.31	Low
Peak interaction	0.71	0.58	High
Post-season	0.49	0.36	Moderate

Table 3 represents the summary of seasonal changes in network characteristics. Peak interaction period has larger average degree and network density, which is associated with the elevated frequency of the conflicts, signifying increased human-wildlife interaction. The connectivity and conflict level of pre-season and post season are less, which demonstrates the effect of seasonal dynamic on the occurrence of conflicts.

In general, the findings indicate that the human-wildlife interaction networks approach to the study of human-wildlife conflicts is more insightful compared to spatial-based techniques. The results justify using social network-based indicators to control conflicts proactively, which allows implementing targeted mitigation measures that will prioritize interface areas with a high risk and ensure sustainable coexistence in peri-urban settings.

Discussion

The results of this research indicate that the model of human-wildlife interactions based on the social network analysis approach offers a more accurate idea of conflict dynamics in the peri-urban interface in comparison with the traditional spatial techniques. Instead of defining encounters as singular events, the network-based approach exposes the relational pattern through which conflicts arise, continue and escalate. The repetitive interactions and connectivity patterns that determine high centrality settlements and wildlife areas and common resource areas point to the fact that conflict risk is highly mediated by human and wildlife interaction and that human-wildlife conflict is inherently a social-ecological phenomenon.

The noted preponderance of a small set of properly linked nodes indicates that conflicts are not just located in space, but they have structural support through the interaction pathways. High betweenness centrality settlements act as mediators of the interface between wildlife movement tracks and the anthropocentric landscapes. This is the reason why the mitigation efforts that are implemented in the same way as in the range of landscapes are not usually as effective due to their lack of response to the structural causes of conflict. In comparison, the disruption of the interaction chains in network-critical nodes can be more effective by applying targeted interventions to disrupt the escalation of conflicts.

The enhanced predictive capability of the suggested framework indicates the value addition posed by the addition of network measurements in the process of identifying hotspots. The increased accuracy and recall of the social network-based model states that interaction structure augments early-warning performance especially of emerging hotspots which are not yet visible in incident density maps. This is particularly applicable in fast moving peri-urban settings where the dynamics between the land use and the behavioural adaptation of wildlife can change the patterns of conflict within a short period of time.

The temporality also denotes dynamism of human-wild life interaction. The scarcity of resources and the improvement of the human activity can be related to the network density and clustering seasonal changes that also demonstrates the importance of time-sensitive approaches to the conflict management. What this means is that the passive mitigation measures may not be robust enough and there should be adaptive and seasonally viable interventions.

The study makes contributions to the study of conflicts since it considers the analysis of the frequency of the reveals as the structure of interaction. The proposed approach can have viable implications on urban planning, protection of wildlife, and community-level management due to the possibility to make proactive, direct, evidence-based decisions. This theory supports the coexistence-focused strategies that compromise the human development needs and wildlife conservation aspirations in the peri-urban environments.

Future Work and Directions

The research can be expanded in the future by including real time data in the form of GPS-collared of wildlife, camera traps, and community based mobile reporting systems to allow dynamic and close to real time prediction of conflict. The introduction of machine learning models providing the features of a social network might take the predictive accuracy a step closer and automatize early-warning mechanisms. To enhance the contextual comprehension of conflict drivers, it would be better to expand the analysis to multi-species interaction networks and add socio-economic variables. Also in the longitudinal research, the generalization of the model can be backed by the studies of the various peri-urban areas and this can be used to inform the adaptive and policy-based strategies of human and wildlife coexisting.

Conclusion

This paper introduces a social network analysis-inspired paradigm of knowledge and forecasting human-wildlife conflict hotspots at peri-urban interfaces that deal with the major weaknesses of the conventional spatial and event-based assessment schemes. The research findings show that conflict development is highly affected by connectivity patterns, recursive interaction, and the significance of critical interface zones instead of individual events only by modeling human-wildlife encounters as structured interaction networks. The definition of high-central settlements, animal habitats, and common resource space reflects the significance of the structure of interaction in the formation of conflict. As the findings reveal, network measures when combined with spatial characteristics help significantly increase predictability and accuracy of hotspots of conflicts. In comparison to traditional density-based approaches, the offered framework offers improved sensitivity to recurrent and emergent conflict areas, which allows prioritizing more focused interventions. The analysis of temporal networks also demonstrates that the risk of conflict is dynamic and seasonal, and that the adaptive and time-conscious management approaches should be applied to peri-urban landscapes. Comprehensively, the results are applicable in the animal-environment studies as they may result in a scalable, data-driven approach to proactive human-wildlife conflict mitigation. The proposed methodology should be involved in the conservation planning, the regulation of urban developments and the management of the community as it gives priorities to the high-risk interface zones. This study will contribute to a sustainable co-existence of human beings and wildlife in the fast-urbanizing areas by refocusing on predictive and preventive conflict management approaches, rather than reactive ones.

References

[1] Barroso, Patricia, David Relimpio, Jon Ander Zearra, José Joaquín Cerón, Pablo Palencia, Beatriz Cardoso, E. Ferreras et al. "Using integrated wildlife monitoring to prevent future pandemics through one health approach." *One Health* 16 (2023): 100479. https://doi.org/10.1016/j.onehlt.2022.100479

[2] Basak, Sayantani M., Ekaterina Rostovskaya, Johnny Birks, and Izabela A. Wierzbowska. "Perceptions and attitudes to understand human-wildlife conflict in an urban landscape–A systematic review." *Ecological Indicators* 151 (2023): 110319. https://doi.org/10.1016/j.ecolind.2023.110319

[3] Chand, Mukesh, Parvaiz Yousuf, Shubham Kumar Maletha, Rashi Nautiyal, Bilal Habib, Salvador Lyngdoh, and Bhupendra Singh Adhikari. "Wildlife at the urban fringe: patterns of mammalian space and diel detection in an urban sanctuary in Aravalli, India." *European Journal of Wildlife Research* 71, no. 5 (2025): 1-14. https://doi.org/10.1007/s10344-025-02000-8

[4] Dunn, Abigail R., Anita T. Morzillo, and Rebecca A. Christoffel. "Human dimensions of timber rattlesnake (Crotalus horridus) management to reduce human-wildlife conflict." *Human Dimensions of Wildlife* 30, no. 1 (2025): 17-33. https://doi.org/10.1080/10871209.2024.2302815

[5] Fei, Shulang, Ruiqin Wu, He Liu, Feifei Yang, and Nan Wang. "Technological innovations in urban and peri-urban agriculture: Pathways to sustainable food systems in metropolises." *Horticulturae* 11, no. 2 (2025): 212. https://doi.org/10.3390/horticulturae11020212

[6] Goldstein, Jenny E., Ibnu Budiman, Anna Canny, and Deborah Dwipartidrisa. "Pandemics and the human-wildlife interface in Asia: land use change as a driver of zoonotic viral outbreaks." *Environmental Research Letters* 17, no. 6 (2022): 1-17. https://doi.org/10.1088/1748-9326/ac74d4

[7] González-Crespo, Carlos, Beatriz Martínez-López, Carles Conejero, Raquel Castillo-Contreras, Emmanuel Serrano, Josep Maria López-Martín, Santiago Lavin, and Jorge Ramon Lopez-Olvera. "Predicting human-wildlife interaction in urban environments through agent-based models." *Landscape and Urban Planning* 240 (2023): 104878. https://doi.org/10.1016/j.landurbplan.2023.104878

[8] Jingu, Shoma, Yui Ogawa, Kazushige Yamaki, Asako Miyamoto, and Norimasa Takayama. "Social Media as a Lens for Citizen Science: Investigating Visitor Contributions in a Forest Recreational Area." *Sustainability* 16, no. 13 (2024): 5804. https://doi.org/10.3390/su16135804

[9] Lazzeri, Lorenzo, Álvaro Luna, Emiliano Mori, Danilo Russo, Sandro Lovari, Maia Pastres, Leonardo Ancillotto, and Davide Sogliani. "Dog–wildlife interactions across Spain suggest vulnerability in periurban areas and aquatic ecosystems." *European Journal of Wildlife Research* 72, no. 1 (2026): 14. https://doi.org/10.1007/s10344-025-02049-5s

[10] Mey Boudoug, Jean Christian, Stephane Dewang Dyio, Cédric NS Fotie, Justin Etah Kang, Isidore Ndzana, Vianny Rodel Nguimdo Vouffo, and Marie Marguerite Mbolo. "Preliminary Evidence of Great Apes' Occurrence in Peri-Urban and Highly Degraded Forest Reserves in Cameroon." *African Journal of Ecology* 63, no. 2 (2025): e70022. https://doi.org/10.1111/aje.70022

[11] Mossoun, Arsène Mossoun, H. N. Dibi, Aimé Marius Yapi Ellélé, Euloge Kouassi Bolaty, Tizié Thierry Zan-Bi, and Arlette Olaby Dindé. "Mapping Human-Wildlife Interfaces for Zoonotic Pathogens Spillover Surveillance in the District des Montagnes, Côte D'Ivoire." *Health (NY)* 17 (2025): 1384-1407. https://doi.org/10.4236/health.2025.1711092

[12] Pereira, Alan D., Nicole C. Iliuk, Karine L. Kuryluk, and Juliano A. Bogoni. "Human density, development, and roads are the main drivers of carnivore presence in urban areas." *Perspectives in Ecology and Conservation* 22, no. 1 (2024): 55-62. https://doi.org/10.1016/j.pecon.2023.12.001

[13] Preiss-Bloom, Shlomo, Hila Shamon, Zachary Amir, Dror Ben-Ami, and Tamar Dayan. "Human disturbance thresholds determine the ecological role of an apex predator." *Scientific Reports* 15, no. 1 (2025): 37604. https://doi.org/10.1038/s41598-025-21402-x

[14] Preiss-Bloom, Shlomo, Hila Shamon, Zachary Amir, Dror Ben-Ami, and Tamar Dayan. "Human disturbance thresholds determine the ecological role of an apex predator." *Scientific Reports* 15, no. 1 (2025): 37604. https://doi.org/10.1038/s41598-025-21402-x

[15] Roth, Annemarie Tabea, Janina Kleemann, and Marcin Spyra. "Policy-making for peri-urban landscapes as arenas of human-wildlife interactions." *Urban Ecosystems* 27, no. 5 (2024): 1707-1721. https://doi.org/10.1007/s11252-024-01548-8

[16] Simkin, Rohan D., Barbara A. Han, Volker C. Radeloff, Shannon LaDeau, Franz Schug, and Karen C. Seto. "Zoonotic Host Richness in the Global Wildland–Urban Interface." *Global Change Biology* 31, no. 2 (2025): 1-12. https://doi.org/10.1111/gcb.70039

[17] Taylor, Casey L., Henry W. Lydecker, Dieter F. Hochuli, and Peter B. Banks. "Associations between wildlife observations, human-tick encounters and landscape features in a peri-urban tick

hotspot." *Urban Ecosystems* 26, no. 5 (2023): 1439-1454. https://doi.org/10.1007/s11252-023-01385-1

[18] Wilkinson, Christine E., Niamh Quinn, Curtis Eng, and Christopher J. Schell. "Environmental health and societal wealth predict movement patterns of an urban carnivore." *Ecology Letters* 28, no. 2 (2025): 1-16. https://doi.org/10.1111/ele.70088