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Cover: Digital illustration of Smooth-coated Otter *Lutrogale perspicillata* by Dupati Poojitha. Reference from the picture taken by Rana & Sugandhi.

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ARTICLE

Identification of wildlife crime hotspots in Punjab, India via kernel density estimation analysis

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Abstract: Punjab is a predominantly agrarian state and among the least forested in India. It remains underrepresented in w ildlife crime research. This study documents thirty-two wildlife crime incidents affecting thousands of wild animals compiled from media sources and official enforcement and organisational records between 2019 and 2024. Several of the affected species are listed under Schedule I of the Wildlife (Protection) Act, 1972 (amended in 2022). Recorded crimes involved leopards, tigers, sambars, wild boar, Tibetan antelopes, freshwater turtles, and marine species. Exploitation methods included the use of firearms, trained dogs, snares, illegal trade, and smuggling of wildlife derivatives such as Shahtoosh shawls, corals, and lizard oil. Kernel Density Estimation analysis identified extreme-intensity hotspots (Class 5) covering approximately 509 km² (~1.0% of the state's geographical area), while areas classified under Classes 2–5 collectively covered approximately 30% of the state area.

Keywords: Crime spatial analysis, derivatives trade, exploitation, illegal hunting, illegal wildlife trade, illicit supply chains, landscape metrics, spatial analysis, smuggling routes, transnational organised crime, wildlife trafficking, wildlife seizures.

Hindi: पंजाब मुख्य रूप से एक कृषि प्रधान राज्य है और भारत के सबसे कम वन क्षेत्र वाले राज्यों में से एक है। यह वन्यजीव अपराध संबंधी अध्ययनों में अब तक कम प्रतिनिधित्व वाला क्षेत्र रहा है।. इस अध्ययन में 2019 से 2024 के दौरान मीडिया स्रोतों, आधिकारिक प्रवर्तन अभिलेखों तथा संस्थागत रिकॉर्ड से संकलित वन्यजीव अपराध की 32 घटनाओं का दस्तावेजीकरण किया गया है, जिनका प्रभाव हजारों जंगली जानवरों पर पड़ा।. प्रभावित प्रजातियों में से कई को वन्यजीव (संरक्षण) अधिनियम, 1972 (2022 में संशोधित) की अनुसूची-I के अंतर्गत सूचीबद्ध किया गया है। दर्ज अपराधों में तेंदुआ, बाघ, सांभर, जंगली सूअर, तिब्बती मृग, मीठे पानी के कछुए तथा समुद्री प्रजातियाँ शामिल थीं।. शोषण के तरीकों में बंदूकों का उपयोग, प्रशिक्षित शिकारी कुत्ते, फंदे, अवैध व्यापार तथा शहतूश शॉल, मूंगा (कोरल) और छिपकली के तेल जैसी वन्यजीव उत्पादों की तस्करी शामिल थी।. कर्नेल डेंसिटी एस्टिमेशन (KDE) विश्लेषण ने अत्यधिक तीव्रता वाले हॉटस्पॉट (क्लास 5) की पहचान की, जो लगभग 509 वर्ग किमी (राज्य के कुल क्षेत्रफल का ~1.0%) में फैले हुए हैं, जबकि लगभग 30% राज्य क्षेत्र क्लास 2–5 के अंतर्गत आता है।

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Author details: Navdeep Sood is a wildlife ecologist with field experience focusing on human–wildlife interactions, urban wildlife, community interfaces, riparian ecosystems and GIS. His work highlights wildlife patterns near riparian reserves in agrarian systems, particularly along the Beas Conservation Reserve, and contributes to understanding underrepresented conservation challenges in Punjab. He is professionally associated with Bharat Sanchar Nigam Limited (BSNL) and contributes to wildlife research alongside his professional role. Dr.Rohan Kumar holds a PhD from the Indian Institute of Technology (IIT) Roorkee and is an Associate Professor in the Department of Space Research, School of Chemical Engineering and Physical Sciences, Lovely Professional University, Punjab. His research focuses on landslide susceptibility assessment, spatial analysis, remote sensing, Space Research and interdisciplinary applications.

Author contributions: NS: Conceptualization, data collection, analysis, interpretation of results and manuscript preparation. RK: Technical and methodological support and manuscript enhancement.

INTRODUCTION

Wildlife crime involves a diverse array of actors, species, and commodities driven by multiple factors; its impacts vary across environmental, social, economic, and governance dimensions (United Nations Office on Drugs and Crime 2024). This is a fast-growing industry (Gore et al. 2019; Hughes 2021) operated covertly by the offenders using corrupted channels (Milner-Gulland & Leader-Williams 2019; 't Sas-Rolfes et al. 2019), therefore, reliable information on species involved is difficult to obtain. Wildlife exploitation affects thousands of species across terrestrial and marine taxa (Milner-Gulland 2018; Fukushima et al. 2020), and illegal wildlife trade is described as the fourth largest transnational illicit trade after narcotics, arms and human trafficking (Warchol 2003; Zimmerman 2003; South & Wyatt 2011; 't Sas-Rolfes et al. 2019). It poses a significant threat to biodiversity (Rivalan et al. 2007; Veríssimo & Wan 2019; Hinsley et al. 2023) and is considered one of the world's most profitable illicit trade sectors by the International Criminal Police Organization (INTERPOL) (Masterson 2023).

Researchers frequently rely on indirect evidence, such as media-reported incidents or seizure records, to infer patterns of illegal hunting, trade, and trafficking (Rosen & Smith 2010; Athreya et al. 2015). This evidence can have biases, making it hard to discern trends across countries with varying reporting capacities (Underwood et al. 2013). Less charismatic species are often underrepresented, while species of high public interest dominate reports (Chawla et al. 2020). In India, substantial illegal trade involves common or widely distributed species harvested for wild meat, traditional medicine, religious rituals and the exotic-pet market, yet these species receive comparatively little scientific attention (Rana & Kumar 2023). Media-based studies, therefore, provide a valuable tool for documenting overlooked wildlife-crime patterns, as demonstrated for jackals (Chawla et al. 2020), leopards (Athreya et al. 2015), and other carnivores in human-modified landscapes (Akash et al. 2025).

Velho et al. (2012) conducted a comprehensive review in India and reported an absence of documented hunting, poaching, bushmeat, or wildlife trade crimes in Punjab at that time, highlighting a critical data gap. Chawla et al. (2020) later documented a single wildlife crime incident in Punjab involving jackals in 2018. A decadal shift, however, reveals the emergence of multiple wildlife crime records, indicating a substantial increase in both occurrence and reporting. The present study, which compiles data from 2019–2024, shows that even a relatively modest dataset of 32 reported incidents corresponds to several thousands of wild animals being affected. These findings underscore the tip-of-the-iceberg nature of the documented cases (United Nations Office on Drugs and Crime 2016), as many incidents likely remain unreported, reflecting a far more extensive and complex reality of wildlife crime.

Following established media-report based research (Athreya et al. 2015; Chawla et al. 2020; Akash et al. 2025), this study compiles reported wildlife-crime incidents from 2019–2024 and uses kernel density estimation (KDE) to quantify crime areas of the state, providing the first systematic overview for Punjab. Globally, geospatial analysis and KDE have been widely applied in wildlife research (Hart & Zandbergen 2014; Fleming et al. 2015; Chamling & Bera 2020; Gore et al. 2022; Graves et al. 2022; Sood et al. 2025) and were employed in the present study to identify spatial patterns of hotspot mapping and quantification of areas most affected by illegal wildlife activities.

Study Area

The study area (Figure 1) is an agrarian state located in Punjab, northwestern India. It has a forest cover of < 3.6% of its geographical area, of which 0.02% is very dense forest (Forest Survey of India 2023). The state's fertile plains are connected to the biodiverse Shivalik Range. The western boundary of Punjab is constrained by a fully fenced international border with Pakistan which restricts wildlife movement. There are several Ramsar-designated wetlands that serve as critical wintering and staging grounds for migratory waterbirds and as important habitats for resident waterbird assemblages (Delany et al. 2006). Negligible forest cover, proximity to the hills in the north and the east, presence of wetlands and rivers flowing from the Shivaliks, fertile plains, major urban centres such as Jalandhar, Chandigarh, Ludhiana, and Amritsar scattered across central plains and the fenced border in the west create an environment conducive to the urban wildlife and scope for intense human-wildlife interactions (Sood et al. 2025). The state remains poorly represented in scientific literature on wildlife crime, hence media reports provide an essential information source for documenting such incidents.

MATERIALS AND METHODS

This study applied a systematic, multilingual media-reports search methodology adapted from Athreya et

al. (2015), Chawla et al. (2020) and Akash et al. (2025) to document wildlife-crime incidents in Punjab between March 2019 and July 2024. This period was selected because reliable, continuous, and verifiable wildlife-crime records from Punjab became consistently available from March 2019 onwards, enabling the compilation of a complete dataset without temporal gaps. Data were compiled from authenticated English, Hindi, and Punjabi media reports sourced from major newspapers with robust digital archives (Supplementary Table S1) supplemented by incidents and wildlife derivative seizure records from Punjab extracted from government, reputed non-government organisation and enforcement websites including the Wildlife Crime Control Bureau (WCCB), TRAFFIC India and the Wildlife Trust of India (WTI).

During media data collection, a mixed Boolean OR–AND search strategy was employed, wherein each report was required to contain at least one from the six keywords 'wildlife', 'crime', 'killed', 'poaching', 'smuggling', 'bushmeat', along with the word 'Punjab'. To reduce omission of species not explicitly described under general offence-related terms (e.g., birds, reptiles, turtles), additional searches were conducted using species-specific terms identified during the initial screening process. Additionally, all retrieved reports and records were constrained to fall within the predefined temporal window. Online searches were conducted using Google Search with same keyword combinations in English, Hindi, and Gurmukhi (Punjabi) and conducted in incognito mode to minimize algorithmic personalization bias. Government and organisational sources were used for cross-verification of incidents and confirmation of seizure details and were not treated as independent primary records when corresponding media reports existed. Duplicate entries were consolidated based on matching date, species and locality identifiers to avoid double counting. Most Punjabi-language results were derivative of corresponding English or Hindi reports and did not provide additional primary information on wildlife crime. Only a single relevant, non-duplicated report was identified from Punjabi digital media (News18 Punjab). Data were compiled exclusively for all available

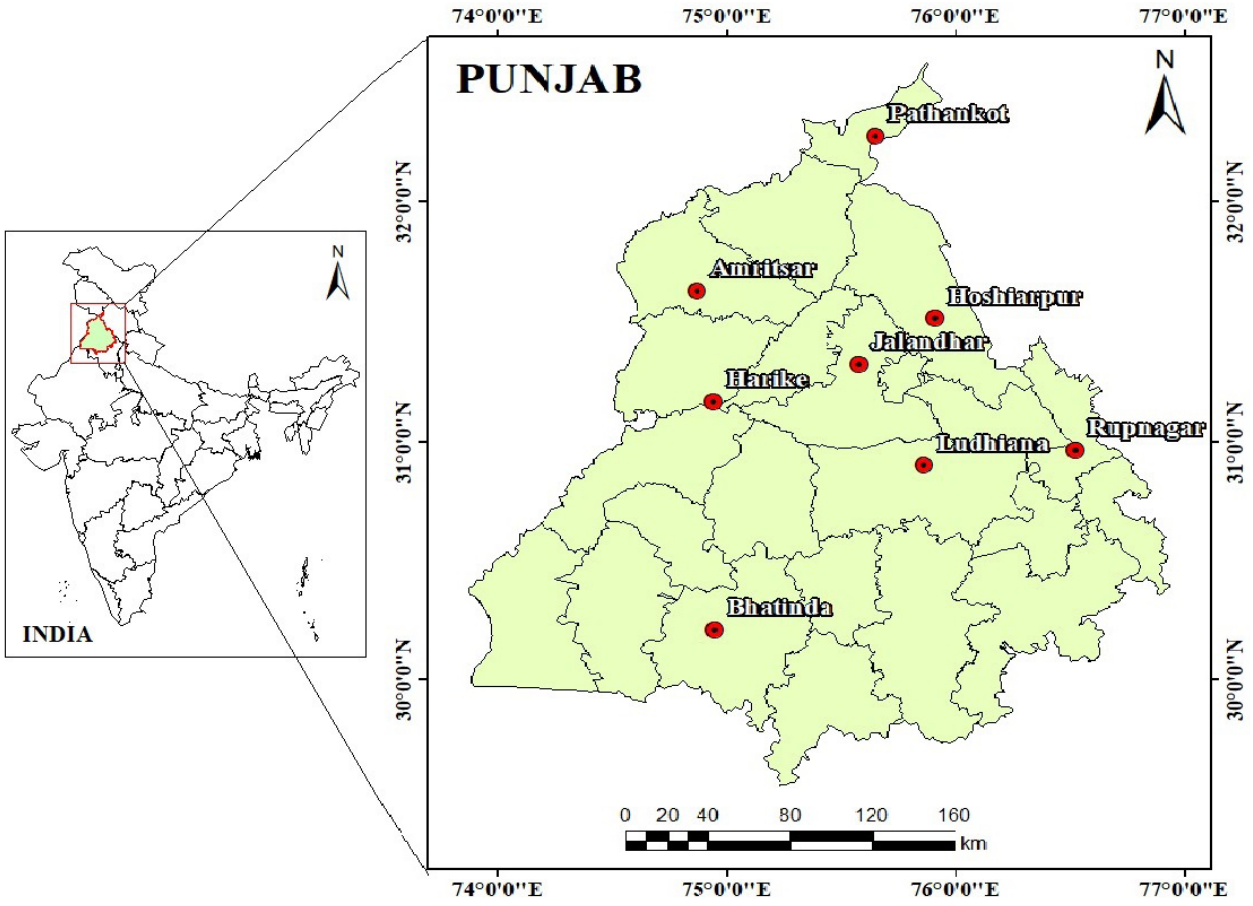

Figure 1. Study area map of Punjab.

wild animal species, with domesticated taxa expressly excluded from the dataset.

A total of 149 data records were retrieved which underwent a rigorous, multi-stage workflow consisting of relevance screening, duplicate consolidation and verification of species identity, locality, offence type and enforcement actions and n = 32 records were selected that fell into specified criteria. Only incidents specifying the location of the crime were retained for spatial analysis. Each validated incident area was georeferenced using latitude and longitude coordinates using Google maps, generating KML/KMZ files to map the points. The spatial data were then projected to UTM Zone 43N with all necessary conversions applied to ensure accurate area calculations.

Each incident was coded using an event-based framework derived from the above studies, species taxonomy, offence typology (poaching, illegal trade, trafficking, possession, conflict-driven killing), modus operandi, seizure characteristics and enforcement responses. Each incident was georeferenced and spatially mapped by assigning it to the smallest clearly identifiable administrative unit reported in the news or record source.

To create spatial map and identify hotspots of wildlife crime, QGIS 3.40, a free and open-source Geographic Information System (GIS) software widely used for spatial analysis and mapping was used. Kernel Density Estimation (KDE) was applied to the georeferenced area points. KDE generates a continuous smooth density surface from discrete point locations, providing a realistic representation of spatial crime concentration patterns (Hart & Zandbergen 2014; Hu et al. 2018) unlike simple point-count methods.

A uniform 30 × 30 m raster grid was generated by clipping to the Punjab administrative boundary to create the analytical background surface. A quadratic kernel function was applied to the incident layer to produce a continuous density raster, which was subsequently classified into five intensity categories using the Natural Breaks (Jenks) algorithm for spatial prioritization. Bandwidth was determined using Silverman's rule of thumb as implemented in QGIS (Silverman 1986).

The cumulative distribution function (CDF), which quantifies the cumulative proportion of KDE (Chen 2017), was calculated as the cumulative proportion of raster cells relative to the total number of cells in the study area, enabling quantitative assessment of spatial concentration of wildlife crime. All calculations and CDF visualisations were completed in Microsoft Excel 365.

This integrated and replicable methodology combines media reported incidents, georeferencing, and spatial analysis to generate the first systematic spatial representation of reported wildlife crime incidents in Punjab.

RESULTS

A dataset compiled from various sources is presented in Supplementary Table S2, which forms the basis for the analyses presented in this study. Cumulative seizure quantities suggest that the number of wild animals impacted runs into several thousands, highlighting the substantial scale of wildlife crime in the region.

Kernel Density Estimation of wildlife crime incidents in Punjab

Wildlife crime incidents were mapped using KDE (Figure 2). The KDE output was subsequently classified into five intensity classes to quantify the proportion of area affected under wildlife crime.

The analysis based on raster cells and area coverage (Table 1) revealed that Class 1, depicted as background blue layer, covers 69.3% of the state area and represents no reported incidents across the majority of the state. Class 2, represents crime intensity between low-to-moderate, covers 19.7% of the state area, indicating small concentrations of illegal activity. Class 3, intermediate intensity, covers 7.1% of the total area. Class 4 shows elevated intensity in 2.9% of the state, forming a high-risk zone. Class 5, represents extreme intensity or the core hotspot and includes 508.9 km² (1.0% of the total state

Table 1. Spatial distribution and priority ranking of kernel density estimation classes for wildlife-crime hotspots in Punjab.

KDE Class	Hotspot Priority	Area (km²)	% of state area	Raster cell count
5	Priority 1 (Extreme hotspot)	508.9	1.0%	565,488
4	Priority 2 (High intensity)	1,465.8	2.9%	1,628,640
3	Priority 3 (Moderate intensity)	3,575.1	7.1%	3,972,372
2	Priority 4 (Low–moderate intensity)	9,908.4	19.7%	11,009,378
1	Priority 5 (Background / no incidents)	34,878.2	69.3%	38,753,577

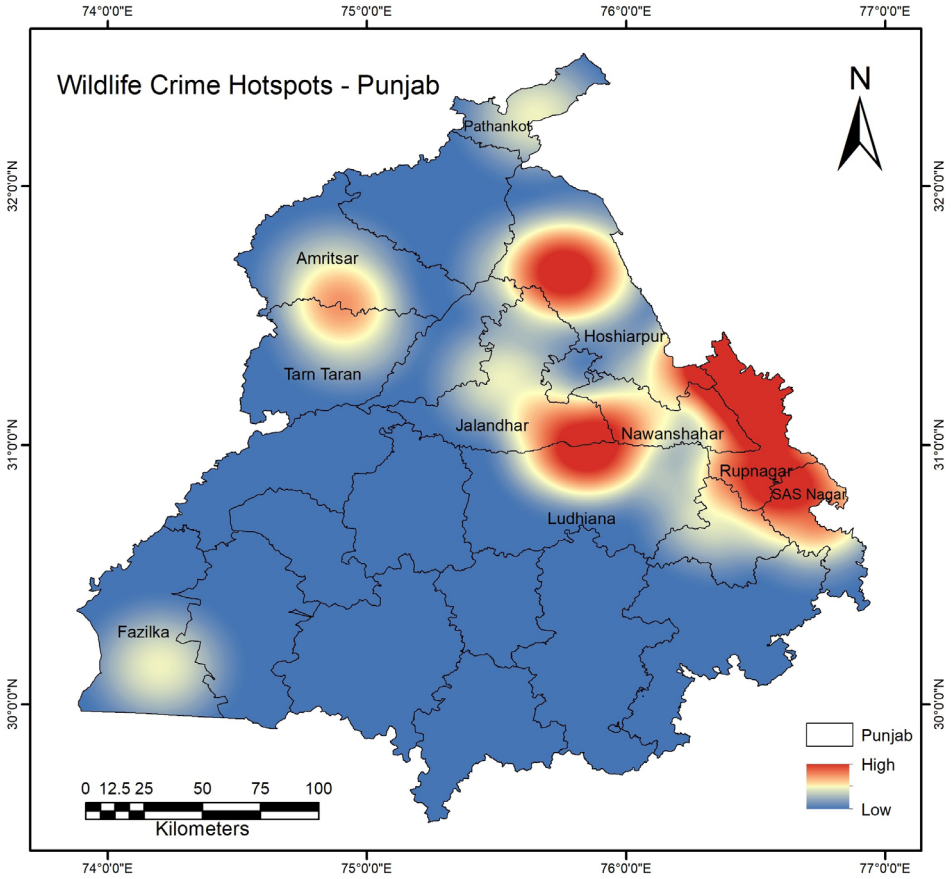

Figure 2. Kernel density estimation (KDE) map showing spatial clustering of reported wildlife crime incidents across Punjab (2019–2024).

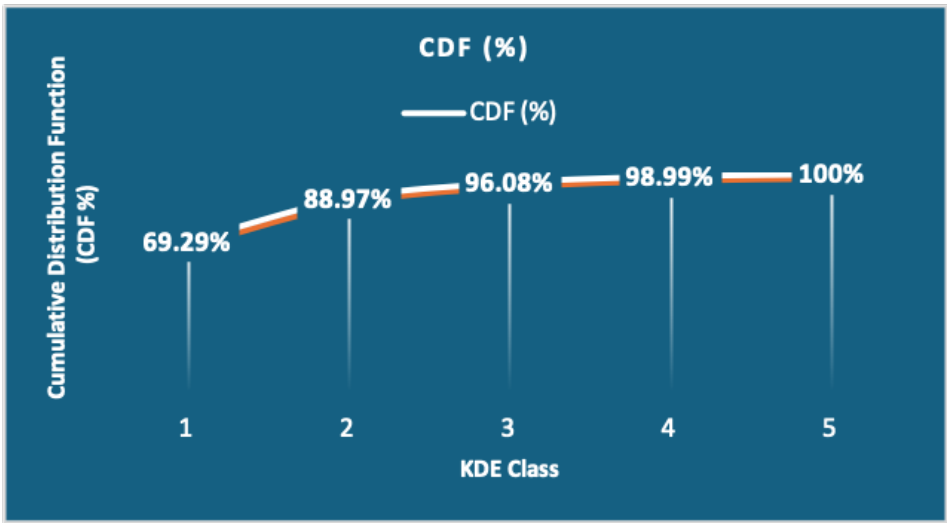

Figure 3. Cumulative distribution function of state area across wildlife-crime KDE classes.

area). Class 5 highlights areas of concentrated illegal wildlife activity.

The cumulative distribution function (CDF) (Figure 3) from KDE illustrates that a small fraction of cells (Classes 3–5, ~11.0% of total) accounts for the highest intensity zones, demonstrating that wildlife-crime is not uniformly distributed but highly clustered with pronounced hotspots. The KDE map shows these near

the Shivalik foothills and within the districts of Amritsar, Jalandhar, Rupnagar, Hoshiarpur, Ludhiana, Pathankot, SAS Nagar, and Fazilka. These results emphasize a multi-scalar hierarchy of risk, from extensive low-intensity backgrounds to compact but critically significant extreme hotspots.

DISCUSSION

This study presents a spatial analysis of reported wildlife crime incidents in Punjab between 2019 and 2024. Velho et al. (2012) reported an absence of wildlife crime data from Punjab, and Chawla et al. (2020) later identified only a single incident. The present analysis documents thirty-two incidents affecting multiple taxa, indicating that wildlife crime in Punjab is more diverse and spatially structured than previously recognized. Use of firearms, clutch-wire snares, trained hunting dogs, nets, and vehicles suggests a combination of opportunistic hunting and organized trafficking operations. The seizures of marine derivatives and tiger cubs supports the existence of structured supply chains.

KDE indicated that incidents were not evenly spread across Punjab. The quantified areas in the highest intensity class cover about 1% of the state (~509 km²). Classes of moderate to high intensity together account for nearly one-third of the total area. Higher densities were observed near the Shivalik foothills and within few districts only. These patterns suggest that ecological edges and transport connectivity may be associated with the observed clustering. The findings create a measurable spatial concentration of reported offences in a low-forest agrarian state. Although reporting bias cannot be excluded, the presence of high-intensity clusters suggests persistent localized activity.

Species Affected

Incidents involving leopards *Panthera pardus* included gunshot fatalities, limb mutilation (claw removal), snare capture and the killing of a 6–8 month old cub displaying gunshot wounds and bite marks with pursuit by hunting dogs. Two incidents involved the recovery of tiger *Panthera tigris* derivatives (skin and skeleton), and one documented a trafficked tiger cub in Punjab, a tiger's non-range state (Image 1). Tiger is classified as 'Endangered' (EN) under the IUCN Red List of Threatened Species (IUCN) and is listed in Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) Appendix I, which prohibits trade internationally. Firearms, trained dogs and metal snares correspond with established methods used against large carnivores in India and globally (Zielinski et al. 2006; Becker et al. 2013).

Ungulates such as Sambar *Rusa unicolor* featured repeatedly, including cases of firearm injury, limb removal, antler possession/trade and raw meat seizure. Barking Deer *Muntiacus muntjak* was also affected. These patterns mirror ungulate poaching elsewhere in India (Rana & Kumar 2023).

Wild Boar *Sus scrofa* was the most frequently recorded species. Incidents involved mass live capture, transport, meat extraction and mortality during illicit movement (e.g., 127 individuals: 32 dead, 95 rescued) possibly for meat (Ingram et al. 2021). Studies show that wild meat is exchanged through complex commercial networks involving multiple stages in the supply chain (Bennett et al. 2007), the trade of wild meat contributes significantly to species extinction (Ripple et al. 2016).

Seizures included marine items such as 69 gorgonian sea fans, 1.4 kg organ pipe coral, and 4.8 kg coral fragments, as well as 38 containers of bear bile, 137 'Hatha Jodi' items, Indian Spiny-tailed Lizard *Saara hardwickii* oil, and exotic parrots (Macaws). Hatha Jodi refers to the dried hemipenes of Indian monitor lizards (Bhattacharya & Koch 2018), specifically the Bengal Monitor *Varanus bengalensis* and Yellow Monitor *Varanus flavescens*. Under Wildlife (Protection) Act, 1972 (amended in 2022) and international regulations (CITES Appendices 2017), the penalties for killing these lizards or trading their body parts are comparable to those for tiger (D'Cruze et al. 2018). The seizure of marine taxa from inland Punjab is concerning, indicating long-distance trafficking networks and highly organised supply chains.

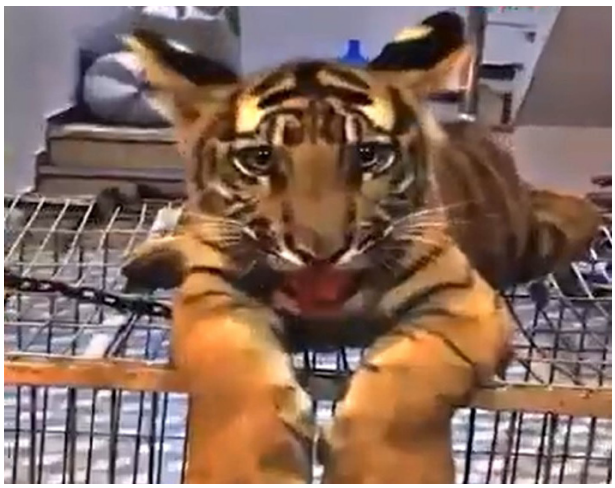

Image 1. Screenshot from a News18 Punjab report showing a recovered tiger cub involved in illegal wildlife trade. Credit: News18 Punjab.

Seizure of 210 Shahtoosh shawls implied the killing of over several hundred of Tibetan Antelopes. Shahtoosh trade is a derivative form of wildlife trade in which Tibetan Antelope *Pantholops hodgsonii*, locally called Chiru, are killed for their fine underfur, known as shahtoosh (Mallon & Jiang 2009). An estimated four Tibetan Antelopes are killed for every shahtoosh scarf, so 210 shawls represent roughly 840 animals (Gibbens 2019).

Parrots, peacocks, pheasants, raptors, and freshwater turtles were affected through poaching, illegal possession and trade. Birds are illegally traded all over the world (Matias et al. 2012; Alves et al. 2013; Rodewald et al. 2024) and studies make alarming claims that trade networks focused in Southeast Asia harvested nine million turtles (Miller et al. 2019)

Crime Methods and Trafficking Patterns

Crimes included firearms, shotguns, trained dogs, nets, clutch-wire snares, metal traps, daggers and transport vehicles indicate organised poaching networks. Clutch-wire snares used as efficient killing devices (Haq et al. 2023) were repeatedly recorded, reflecting opportunistic and targeted poaching. Several incidents involved transportation of wildlife or their derivatives. Tiger derivatives were transported by Punjab residents to southern India, wild boar were trafficked across state borders and marine wildlife derivatives were seized in Amritsar, a known transit hub for illegal wildlife trade (Wildlife Trust of India 2024). Shahtoosh shawls were moved through Amritsar and Pathankot. Attari, near Amritsar, Punjab, serves as a key land route for the illegal smuggling of wildlife products internationally (Pragatheesh et al. 2022).

Spatial Distribution of Incidents

Wildlife-crime incidents were concentrated in Shivalik-adjacent areas and within districts of Amritsar, Jalandhar, Rupnagar, Hoshiarpur, Ludhiana, Pathankot, SAS Nagar, and Tarn Taran. However, further field-based validation would be required to confirm causal drivers.

Limitations and Future Directions

This analysis is based on media reports and organizational records and is therefore subject to reporting and detection bias. Charismatic species may have received disproportionate media attention. The dataset reflects only reported incidents rather than true prevalence. Spatial analysis was limited to georeferenced cases only. Therefore, the results should be interpreted as a spatial baseline of reported wildlife crime rather than a comprehensive estimate of total occurrence.

CONCLUSION

This study presents the first geospatial assessment of reported wildlife crime incidents in Punjab between 2019 and 2024. Despite being predominantly agrarian with limited forest cover, the state exhibits measurable spatial clustering of wildlife crime, with extreme-intensity hotspots occupying approximately 1% of the geographical area. While the dataset likely represents only a subset of total occurrences, the findings establish a quantitative spatial baseline that may inform targeted monitoring, enforcement prioritization, and future research.

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Supplementary Table S1. Media and institutional sources used for data compilation.

Media / Institutional Source	Website
The Tribune	https://www.tribuneindia.com
Hindustan Times	https://www.hindustantimes.com
The Indian Express	https://indianexpress.com
The Times of India	https://timesofindia.indiatimes.com
Deccan Herald	https://www.deccanherald.com
Wildlife Trust of India (WTI)	https://www.wti.org.in
News18 Punjab (Video report)	https://www.youtube.com/watch?v=8JaPJmjsPtg&t=374s
Wildlife Crime Control Bureau (WCCB) Newsletter (Oct–Dec 2023, Issue 12)	https://wccb.gov.in/Content/Newsletter.aspx
TRAFFIC India	https://www.traffic.org
The Hindu	https://www.thehindu.com
Dainik Jagran	https://www.jagran.com
Dainik Bhaskar	https://www.bhaskar.com
The Tribune	https://www.tribuneindia.com

Supplementary Table S2. Documented wildlife crime incidents in Punjab (2019–2024).

	Date	Species	Incident Data – Remarks	Village/ City/ District in Punjab	Web Link
1	23-iii-2019	Sambar	Poaching, meat	Mullanpur Chandigarh	https://www.tribuneindia.com/news/archive/chandigarh/sambar-poaching-puts-wildlife-dept-on-alert-746838/
2	16-iv-2019	Turtles	11 numbers, Schedule 1 at par with Tigers, Lions	Chandigarh Colony Tanda Hoshiarpur	https://timesofindia.indiatimes.com/city/chandigarh/rare-turtle-seizure-adds-twist-to-poll-liquor-raid/articleshow/68897176.cms
3	17-xi-2019	Sambar	Skull found, Illegal trade of body parts	Village Purkhakhli Ropar	https://www.jagran.com/punjab/ropar-wild-life-department-recover-nine-horn-roopnagar-18649345.html
4	27-xii-2019	Sambar	Leg missing, bullet	Mand Chaunta Mattewara Ludhiana	https://indianexpress.com/article/india/ludhiana-another-sambar-deer-found-dead-this-time-without-limb-6187520/
5	12-ii-2021	Sambar	Shot by poachers	NFL Nangal	https://www.tribuneindia.com/news/punjab/sambar-found-dead-in-nangal-dam-reservoir-469598
6	08-vii-2022	Indian Spiny Tail Lizard	Oil smuggled to Punjab	Punjab	https://www.traffic.org/publications/reports/factsheet-on-indian-spiny-tailed-lizard-in-illegal-wildlife-trade/
7	08-vii-2022	Tiger Peacock Hawk Turtles Macaw	Racket poaching	Kishangarh Jalandhar Phillaur	Punjab News18 https://www.youtube.com/watch?v=8JaPJmjsPtg&t=374s
8	15-xi-2022	Wild Boar	60 numbers	Dholewal Ludhiana	https://www.hindustantimes.com/cities/chandigarh-news/ludhiana-resident-booked-for-possession-sale-of-wild-boars-101668462449940.html
9	16-xi-2022	Wild Boar	Meat, dagger, net	Village Thathalan	https://www.tribuneindia.com/news/jalandhar/4-poachers-held-for-hunting-wild-boar-451462
10	03-xii-2022	Sambar	Poaching, meat, weapons seized, 3 held	Village Sekhowal	https://www.tribuneindia.com/news/jalandhar/3-held-for-poaching-deer-weapons-seized-457151
11	15-xii-2022	Wild Boar	49 Alive, 6 Dead	Ludhiana	https://www.hindustantimes.com/cities/chandigarh-news/ludhiana-forest-department-bust-racket-involved-in-smuggling-wild-boars-101671127724727.html
12	29-xii-2022	Leopard cub 6–8 months	Gunshot wounds Ear chewed up confirming use of trained hunting dogs Mother, sibling missing	Nikku Nangal village	https://timesofindia.indiatimes.com/city/chandigarh/poachers-butcher-leopard-cub-in-punjab-mom-feared-dead/articleshow/96583497.cms

	Date	Species	Incident Data – Remarks	Village/ City/ District in Punjab	Web Link
13	02-i-23	Leopard	5-yr old brutally gunned down shotgun Foreleg claw missing	Bala Chaur Anandpur Road	https://timesofindia.indiatimes.com/city/chandigarh/punjab-poachers-gun-down-dump-2nd-leopard-in-a-week/articleshow/96697278.cms
14	09-i-2023	Sambar	Antlers and uncooked meat	Ropar	https://www.tribuneindia.com/news/punjab/three-arrested-sambar-meat-seized-in-ropar-468686
15	14-i-23	Barking Deer Wild Boar	Firearms, VIPs involved	Ropar	https://indianexpress.com/article/cities/chandigarh/son-of-former-punjab-psc-member-3-others-held-for-poaching-8381506/
16	14-i-23	Leopard	2 numbers, hunters, bullets	Sabore, Nurpur Bedi	https://www.bhaskar.com/local/punjab/ropar/anandpur-sahib/news/fearless-poachers-hunted-two-leopards-in-a-week-post-mortem-of-leopard-found-in-village-sabor-130752745.html
17	14-i-23	Leopard	Feared dead	Nikku Nangal	https://timesofindia.indiatimes.com/city/chandigarh/poachers-butcher-leopard-cub-in-punjab-mom-feared-dead/articleshow/96583497.cms
18	22-ii-2023	Tiger skin and skeletons and another carnivore	People from Punjab, selling at Sathyamangalam	Arrested in Nilgiris-Accused from Punjab (This record was excluded from KDE analysis)	https://www.thehindu.com/news/national/tamil-nadu/poachers-from-north-india-who-hunted-tiger-in-nilgiris-brought-to-district-for-investigations/article66537066.ece
19	12-ii-2023	Female Leopard	Entangled in clutch-wire snare	Anandpur Sahib	https://www.tribuneindia.com/news/punjab/leopard-trapped-by-poachers-rescued-479171
20	06-iii-2023	Video	Poachers have free run, weapons, dogs	Village Dhalan Ropar	https://www.tribuneindia.com/news/punjab/jalandhar-poachers-have-free-run-485557
21	29-iv-2023	Wild Parrots	3 nabbed	Malukpura Canal Abohar	https://www.tribuneindia.com/news/punjab/3-poachers-nabbed-502890
22	12-v-23	Tibetan Antelope	210 numbers, joint operation by the Wildlife Crime Control Bureau (WCCB) and the Punjab Forest Department (1,400+ animals killed for 350+ Shawls)	Amritsar, Pathankot	https://www.wti.org.in/news/the-resurgence-of-the-shahtoosh-350-high-value-shawls-seized-from-northern-india/
23	01-vii-2023	Wild Boar	127 numbers 32 dead, 95 rescued	Neelon Ludhiana	https://indianexpress.com/article/cities/chandigarh/wild-boars-suffocate-to-death-animal-cruelty-ludhiana-police-rescue-operation-8695158/#:~:text=Animals%20were%20being%20smuggled%20into,accused%20arrested%2C%20released%20on%20bail.&text=Thirty%2Dtwo%20wild%20boars%20died,from%20Rajasthan%2C%20police%20Friday%20said
24	06-vii-2024	Pheasants	Shot, two arrested	Abohar	https://www.hindustantimes.com/cities/chandigarh-news/fatherson-duo-arrested-for-unlawful-killing-of-pheasants-in-abohar-wildlife-officials-take-action-101688660563015.html
25	01-ix-2023	Leopard	Carcass	Khad Bathlor	https://www.tribuneindia.com/news/punjab/leopard-found-dead-on-ropar-nurpur-bedi-road-in-punjab-540335
26	03-xii-2023	Leopard	Carcass, clutch wire	Majhot Balachaur	https://www.hindustantimes.com/cities/chandigarh-news/wilbuzz-nobody-killed-the-leopard-101701549753868.html
27	13-ii-2023	Leopard	Trapped by poachers, rescued	Anandpur Sahib	https://www.tribuneindia.com/news/punjab/leopard-trapped-by-poachers-rescued-479171/
28	26-xii-23	Deer	3 booked	Village Hajipur Garshankar Hoshiarpur	https://www.hindustantimes.com/cities/chandigarh-news/three-booked-for-poaching-deer-in-hoshiarpur-101703535641201.html
29	22-i-2024	Poaching and illegal fishing	Threat to migratory birds	Harike Tarn Taran, Ferozepur	https://www.tribuneindia.com/news/punjab/encroachment-illegal-fishing-hit-arrival-of-winged-visitors-at-harike-583430
30	08-v-24	Wild Boar	22 numbers and carcass	Village Jagatpura Mohali	https://www.tribuneindia.com/news/chandigarh/21-wild-boars-one-carcass-found-at-jagatpura-shed-619056
31	21-vi-2024	Wild Boar	Retaliatory actions	Hoshiarpur Dadiana Kalan Kandi Bet Lambran	https://www.tribuneindia.com/news/jalandhar/wild-boar-attack-on-crop-leaves-farmers-worried-632647/
32	05.vii.2024	137 hatha Jodi, 38 bear biles, 69 sea fans, 1.4 kg of organ pipe corals and 4.814 kg of gorgonian species corals.	Articles derived from animals listed under Schedule I of the Wildlife (Protection) Act, 1972	Amritsar	https://www.wti.org.in/news/the-dark-underbelly-of-amritsar-from-sacred-city-to-wildlife-smuggling-hub/

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