

# TEMPORAL WILDLIFE CRIME TREND AND SOCIODEMOGRAPHIC ATTRIBUTES OF OFFENDERS IN ANNAPURNA CONSERVATION AREA, NEPAL

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**Received:** 5 June 2023 / **Accepted:** 2 February 2024

## Abstract

Pandey D., Shrestha P., Sharma D.K., Silwal T., Thapaliya A.: Temporal wildlife crime trend and sociodemographic attributes of offenders in Annapurna Conservation Area, Nepal. *Ekológia (Bratislava)*, Vol. 43, No. 1, p. 112–119, 2024.

Wildlife crime has emerged as one of the most crucial threats to biodiversity conservation and is particularly severe in south and southeast Asia. Addressing the ever-increasing challenges of wildlife crime in Nepal requires strategies informed by rigorous analysis of spatiotemporal patterns of wildlife crime. However, little do we know about the nature and trends of wildlife crimes in Nepal. Retrieving the information on the registered wildlife crime cases of Annapurna Conservation Area (ACA) from the Annapurna Conservation Area Liaison Office (ACALO) and Kaski District Court, this study assessed the temporal trend and spatial pattern of wildlife crime in the ACA from 1994 to 2019. Additionally, this study assessed the sociodemographic characteristics of the people convicted in wildlife crime cases. A total of 48 cases of crimes were registered over the last 25 years among which the majority of the cases were of poaching and wildlife trophies transportation (89.6%) mainly from Kaski district (60%). For those cases, a total of 132 people were convicted (65% from local villages and 35% from outside the ACA). About 68% of the convicted perpetrators were from Janajati ethnicity with poor economic conditions. These inferences emphasize the necessity of understanding the severity and pattern of the crime to prevent it by synthesizing and implementing conservation programs such as educating targeted groups and providing alternative sources of income.

*Key words:* wildlife, spatial pattern, trend, socioeconomic attributes.

## Introduction

Wildlife trade is the illegal hunting and/or sale or exchange of physical products produced by and/or derived from wild species including skins, medicinal ingredients, and food that may provide an income for economically poor people and generates considerable revenue nationally (Roe et al., 2002; Nijman, 2010; Wyler, Sheikh, 2013; Ble, 2008; Suiseeya, 2017; Wong, 2019). Illegal wildlife trade (IWT) is among the leading causes of rapid wildlife species decline globally (McMurry, 2008), which is flourishing in South Asia due to the highest expanding demand for wildlife body parts in oriental countries (Nijman, 2010; Stoner, Peruvushina, 2013) despite the national and international efforts to combat illegal trades (McLellan et al., 2014; Cooney et al., 2017; Wong, 2019; Paudel et al., 2020). Many aspects of sociodemography such as the level of education, source of income, and motive to get free food are some of the reasons people get into the trade business (Shao et al., 2021; Ni et al., 2022). Also, the high returns with low risks of detection and punishment have made the illegal wildlife trade attractive to criminals (Cooney et al.,

2017). Increasing demand for wildlife products and increasingly ruthless means of supplying them have led to critical species depletion worldwide (Aryal, 2003) and opportunities for criminals to turn profits along the supply chain (Blundell, Mascia, 2005). Although some offenders are linked directly or indirectly with legitimate trade networks, there is increasing evidence that more organized crime elements engage in lucrative areas of illegal wildlife trade (Stoner et al., 2013).

Wildlife crime has a very long history in Nepal, which can be traced as early as the Lichhavi Period (496–480 AD). However, it was noticed only during the Rana regime (1846–1950) when poachers began to hunt rhinoceros and sell its horn in the then British-India market (Paudel, 2012). During that period, wildlife was transported as gifts to India and England. Apart from wild trophies, wild animals were hunted for traditional purposes and their parts were used in certain rituals, medicine, weapons, and small-scale businesses (McLellan et al., 2014). Although Nepal joined the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in 1975, there is enough evidence to prove that little effort has been made by

Nepalese authorities to curb IWT in the country. There is a well-connected nexus for smuggling these commodities linking Nepal with China and India (Aryal et al., 2011). Further, Nepal's porous border and its extensive international airline connections have made it an easy-flow area (Paudel, 2012). A report on the facts and issues on poaching of mega species and illegal trade of their parts in Nepal was done by Transparency International Nepal in October 2009 in which key factors in poaching and illegal trade in wildlife ranged from local groups/individuals to national level. The trade of wildlife body parts and live animals in Nepal mostly exists at an international level rather than at a local level (Holden et al., 2018).

Widely recognized for its collaboratively managed community forests, Nepal also has strong enforcement-based responses to the IWT of charismatic species (McLean, Straede, 2003; Paudel et al., 2020). This includes nearly 7,000 military personnel monitoring protected areas, automatic cameras to monitor wildlife, and a wave of operations by the Central Investigation Bureau and Wildlife Crime Control Bureaus. Nepalese law also stipulates high prison sentences and fines for people convicted of IWT offenses, and recently increased sanctions for involvement in illegal international trade. In some cases, enforcement has even involved extralegal violence in the name of conservation (Warren, Baker, 2019). These investments demonstrate Nepal's commitment to criminal justice responses to wildlife crime, yet ongoing incidences of domestic and international IWT demonstrate failings in their effectiveness (Puri et al., 2020). Despite the fact that punishment plays a significant role in the entire strategy, conservation also depends on preventing infractions from occurring in the first place (Paudel et al., 2020).

Nepal is one of the resource centers for illegal wildlife trade either by serving the wildlife resources or by connecting the trade route (Yi-Ming et al., 2000; McLellan et al., 2014). Yi-Ming et al. (2000) have shown that 10% of the species used in Tibetan medicine are supplied by Nepal and India. In that sense, Nepal is facing a persistent challenge in combating wildlife crime, despite the enforcement of conservation-based activities across the country and successful seizures and arrests related to the illegal trade of wildlife (Paudel, 2012; DNPWC, 2014). Wildlife criminals are more in the protected area districts rather than in non-protected area districts and positively correlate with the abundance of the species (Paudel, 2012; Paudyal et al., 2018). People living both inside and outside the Annapurna Conservation Area (ACA) are involved in the illegal poaching and trading of wildlife in local as well as international markets (Aryal, Subedi, 2011). The Beni–Jomsom–Korala highway, which is being upgraded to create a direct linkage with China, further threatens the wildlife population in ACA. Little information is available on the illegal wildlife trade of some charismatic species. Studies exploring the general trend of wildlife trade including every sort of species and spatial hotspots of trade are still lacking (Paudel, 2012). If this trend continues in the coming days, it will have further serious issues in wildlife conservation (Kahler, Gore, 2012). Therefore, it is important to investigate the status and trend of wildlife crime and wildlife poaching in ACA. Using secondary sources of long-term data and combining them with field data, this study is expected to provide a robust understanding of the issue. This study is an attempt to understand the nature of illegal wildlife trade in ACA, providing baseline information based on the cases registered.

## Material and methods

### Study area

ACA is the largest protected area (7,629 square km) of Nepal located in the Himalayas of mid-western Nepal (28°47'N 83°58'E) at an elevation ranging from 1,000–8,000 m a.s.l. (Fig. 1). ACA's rich biological diversity owes much to its location, the intersection of the two major bioregions between the east and west Himalayas. It is a treasure house for 1,352 species of flowering plants, 128 mammals, 518 birds, 40 reptiles, and 23 amphibians with 22 different forest types (including the world's largest Rhododendron forest) with 1,140 plant species (Baral, 2018; Baral et al., 2019). It covers 15 rural municipalities (RMs) of Kaski, Lamjung, Myagdi, Manang, and Mustang districts (Baral, 2018) and is home to 10 distinct ethnic groups who belong to mainly two wider cultural traditions, Indo-Aryan or Tibeto-Burman (Baral et al., 2019). The people of the region are highly dependent for their livelihoods on natural resources, particularly native forests, and a majority of them are involved in tourism activities. The conservation area is managed by an autonomous, nongovernmental organization, the National Trust for Nature Conservation (NTNC).

### Data collection

This study was based on both qualitative and quantitative data and information obtained from the archival source. Data on the cases filled and declared were collected from the Annapurna Conservation Area Liaison Office (ACALO), Kaski. The Kaski district court also visited for information on the cases declared at ACALO and appealed to the court.

The individual cases file ( $N = 48$ ) that contains detailed information from the initial state to the final declaration was collected and reviewed. Fine and imprisonment sentences in the final declaration were considered in the cases appealed to a higher court. Biophysical information of the seizures, location, date, species, crime, and socioeconomic attributes of the convicted perpetrators such as age, sex, occupation, motivation, purpose, and origin district (permanent address) was collected in the individual sheet and organized into the relational database in the Microsoft Excel 2013.

In cases declared by the court but the information is missing in ACALO, Kaski district court was visited. Most importantly, information on the fine and imprisonment sentences was compiled. Altogether, 8 cases were reviewed, and filled in the information sheet compiled from ACALO.

### Data compilation and analysis

#### *Spatial information of the cases registered*

For the location of the seizure, the earlier location of the village development committee (VDC) was converted into the new location in administrative units i.e., RM based on the Nepal Gazette dated April 3, 2017. The incident intensity map was prepared based on the origin of the cases. ArcMap 10.2.1 (ESRI, Redlands, USA) was used for mapping.

The severity of wildlife crime on the basis of the National Park and Wildlife Conservation Act 1973 (NPWCA, 1973)

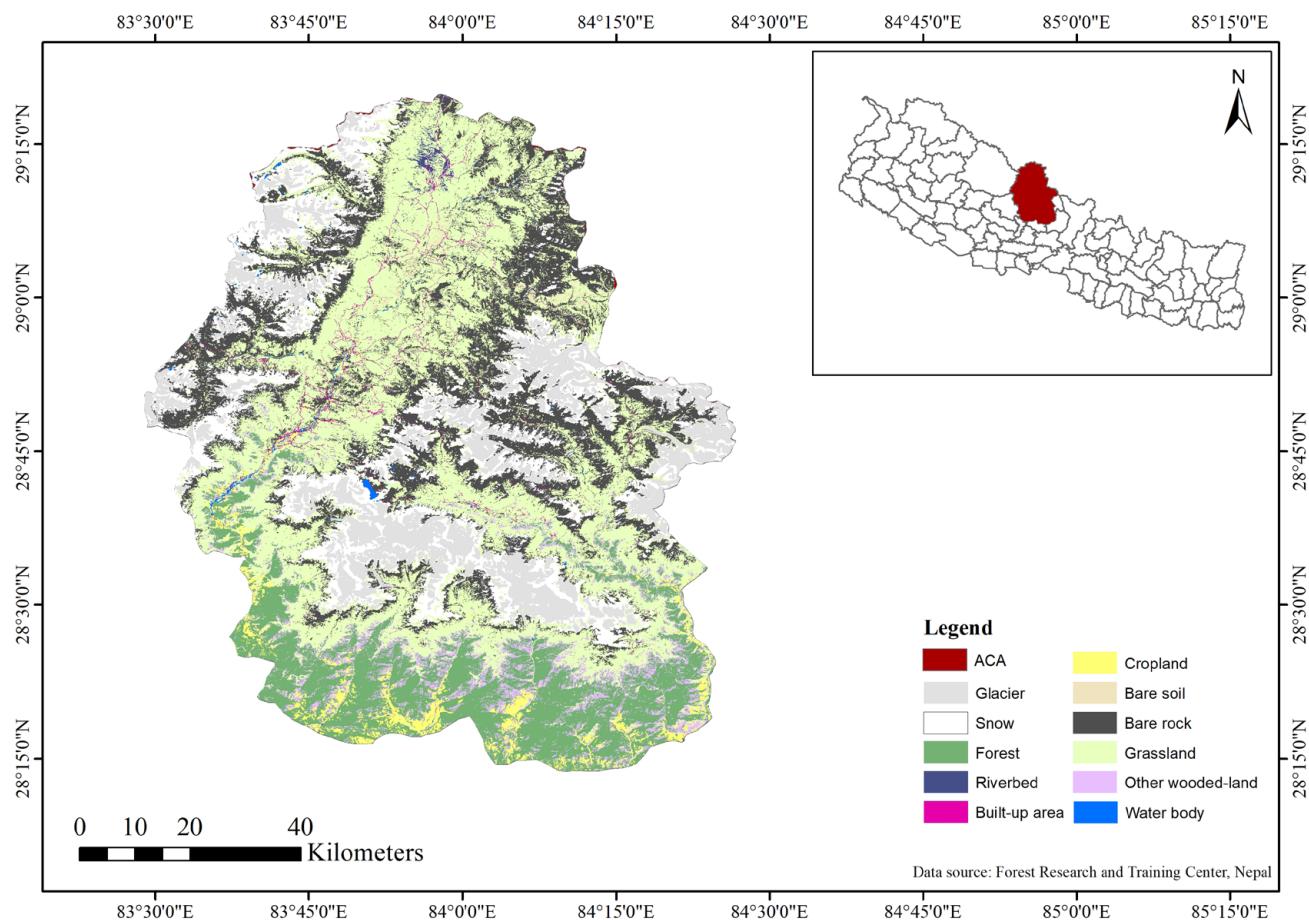


Fig. 1. Map of the study site.

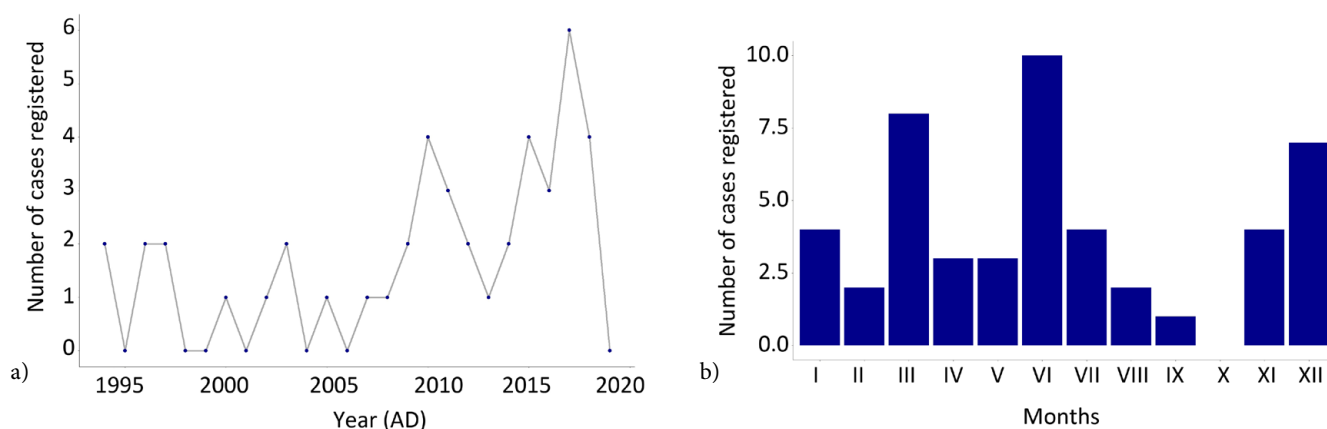


Fig. 2. The trend of registered wildlife crime cases in ACA (1994–2019); a) yearly trend, b) month-wise trend.

was categorized into major, moderate, and minor. The crime committed with the intention of hunting, trapping, or killing the IUCN-listed and First Schedule animals was categorized as a major crime, whereas the same of Second Schedule

animals was categorized as a moderate crime. Similarly, the crime of transportation and hunting, trapping, and killing of animals listed in the Third Schedule was categorized as a minor crime.

### Illegally traded wildlife species identification

Illegally traded and poached wildlife species were identified and the table was prepared by sorting information on wildlife crime cases. Scientific names of the species were identified by reviewing literature and books based on local names. The photographs and park staff were also considered for the correct identification of evidence.

The latest version of the IUCN red list of threatened species was followed for assessing the global conservation status of wildlife species (IUCN, 2022). Database on the checklist of CITES (CITES, 2022) maintained by the United Nations Environment Program-World Conservation Monitoring Center was followed to assess CITES Appendices of the species. Similarly, the national protection level of the wildlife species was assessed based on the existing National Parks and Wildlife Conservation Act, 1973 of the Nepal Government (Ghimire et al., 2020; Puri et al., 2020).

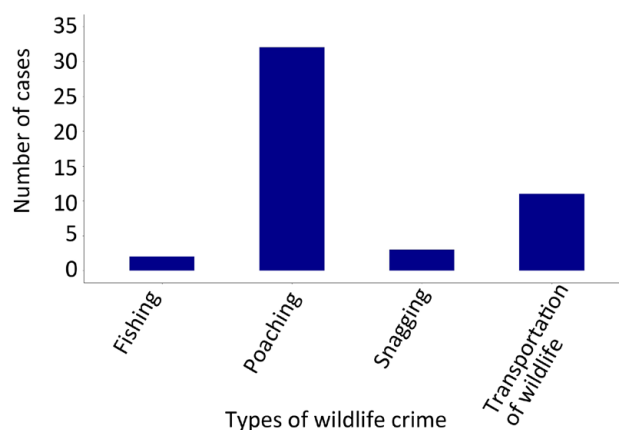


Fig. 3. Categorization of the wildlife crime cases in ACA (1994-2019).

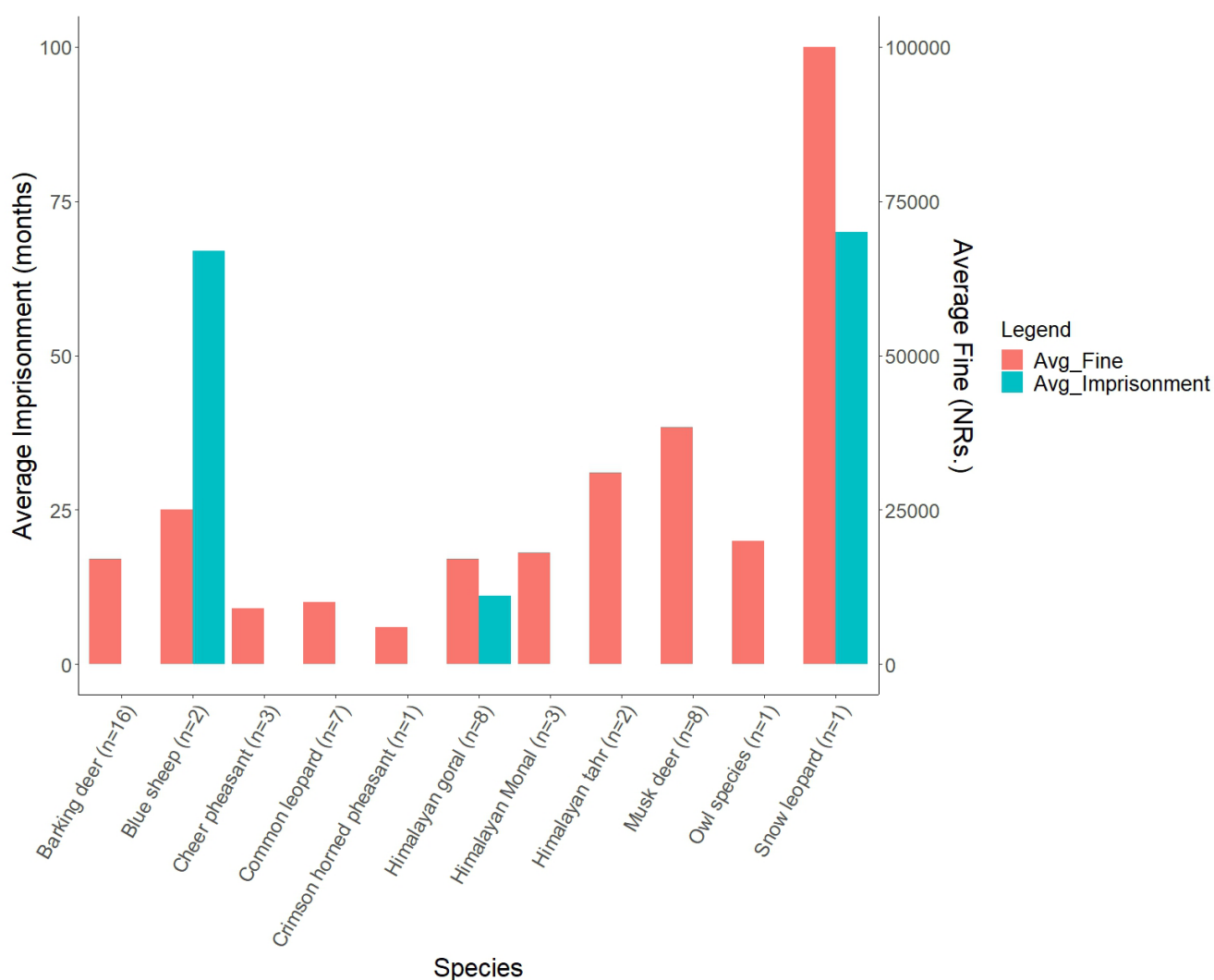
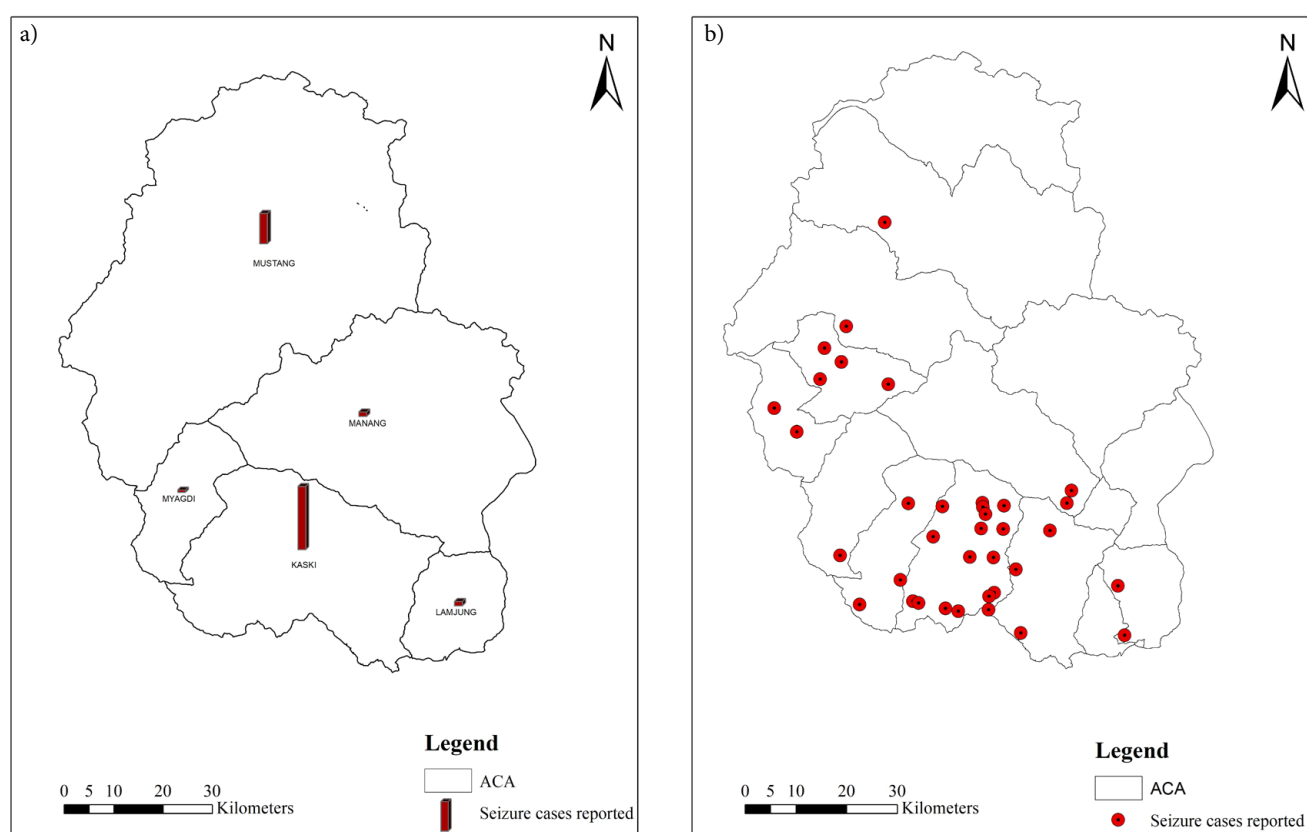


Fig. 4. Average fine and imprisonment sentenced to the convicted perpetrators of wildlife crime cases in ACA (1994-2019).

**Table 1.** Conservation status of the seized species in ACA (1994-2019).

| Common name                | Scientific name              | Number | IUCN Red list   | CITES Appendices | Nationally protected |
|----------------------------|------------------------------|--------|-----------------|------------------|----------------------|
| <b>a. Mammals</b>          |                              |        |                 |                  |                      |
| Musk deer                  | <i>Moschus chrysogaster</i>  | 16     | Endangered      | II               | Yes                  |
| Common leopard             | <i>Panthera pardus</i>       | 30     | Vulnerable      | I                | No                   |
| Snow leopard               | <i>Panthera uncia</i>        | 2      | Vulnerable      | I                | Yes                  |
| Himalayan goral            | <i>Naemorhedus goral</i>     | 11     | Near threatened | I                | No                   |
| Himalayan tahr             | <i>Hemitragus jemlahicus</i> | 2      | Near threatened | NA               | No                   |
| Barking deer               | <i>Muntiacus vaginalis</i>   | 26     | Least concern   | NA               | No                   |
| Blue sheep                 | <i>Pseudois nayaaur</i>      | 3      | Least concern   | III              | No                   |
| <b>b. Birds</b>            |                              |        |                 |                  |                      |
| Impeyan pheasant           | <i>Lophophorus impejanus</i> | 4      | Least concern   | I                | Yes                  |
| Crimson horned pheasant    | <i>Tragopan satyra</i>       | 2      | Near threatened | III              | Yes                  |
| Cheer pheasant             | <i>Catreus wallichii</i>     | 3      | Vulnerable      | I                | Yes                  |
| Owl species                | Unidentified 1               | 1      |                 |                  | No                   |
| <b>c. Others</b>           | Unidentified 2               | 5      |                 |                  |                      |
| Grant Total<br>(a + b + c) |                              | 105    |                 |                  |                      |



**Fig. 5.** Spatial distribution of the wildlife crime cases in ACA (1994-2019). Source: Department of Survey, ACALO/MoFE.

### *Socioeconomic attributes of the convicted perpetrators*

Based on the sampling of the convicted perpetrators, different socioeconomic attributes of the people i.e. ethnic background, age,

sex, age group, the purpose of involvement in IWT, etc. were categorized and presented using descriptive statistics. Excel, 2013 (Microsoft, Redmond, USA) and IBM SPSS Statistics 22 (IBM, Armonk, USA) were used to analyze the descriptive data and present the result.

## Results

### Temporal trend of the registered wildlife crimes cases

A total of 48 cases were registered in the ACALO between the period 1994 and 2019. The month-wise trend shows the highest crime in the month of June followed by March and December. The highest number of cases ( $n = 6$ ) were registered in 2018. While the chart showed a fluctuation in wildlife crime cases, it has been in an inclined trend since 2014 (Fig. 2).

### Types of wildlife crime

Of the total 48 wildlife crime cases registered, 66.7% of the cases were related to poaching of the wildlife followed by the transportation of wildlife trophies for various purposes (22.9%). Similarly, 6.3% of the cases were related to fishing and 4.2% of the cases were related to snagging (Fig. 3).

### Average fine and prison sentence by species

Fines and imprisonment varied with the cases and the species. A maximum fine was sentenced for perpetrators related to the snow leopard (NRs 1,00,000). Similarly, higher imprisonment (70 months) and fine (NRs 38,437) were sentenced to the perpetrators related to musk deer. Only a fine was sentenced to the perpetrators related to the bird species, fishing, and some mammals i.e. common leopard, Himalayan tahr, barking deer, and snow leopard (Fig. 4).

### Conservation status of the species seized

Based on seizure and arrest records during the study period, 12 wildlife species were traded illegally in the ACA. Among them, 5 species were listed as nationally protected wildlife species while 8 species were listed in CITES (CITES, 2022). The scientific name of some species could not be identified because of lacking authentic evidence and they were mentioned in the wildlife crime cases just by their local names. Among the total seizure cases, the top 5 wildlife species were the common leopard, barking deer, musk deer, Himalayan goral, and Impeyan pheasant (Table 1).

### Spatial distribution of the wildlife crime cases

The highest number of wildlife crime cases were reported from Kaski (60%) followed by Mustang (29%). Similarly, an equal number of cases ( $n = 2$ ) were reported from the Manang and Lamjung and a single case from the Myagdi (Fig. 5a). Among the total 15 RMs of ACA, Machhapuchre RM of Kaski district occupied the highest proportion of cases ( $n = 17$ ) followed by Gharapjong RM ( $n = 4$ ). Lomanthang, Dalome, Narphu, Chame, and Kolasathar RM had no cases registered in the study period (Fig. 5b). The location of the perpetrators' residence significantly impacted the magnitude of the crime committed ( $\chi^2 = 108.94$ ,  $df = 8$ ,  $p$ -value  $< 2.2e-16$ ).

### Socioeconomic attributes of the perpetrator

#### Age group of convicted perpetrator

Majority of the crime was committed by the age group under 25 years (27.27%), whereas the people aged 55 and above were

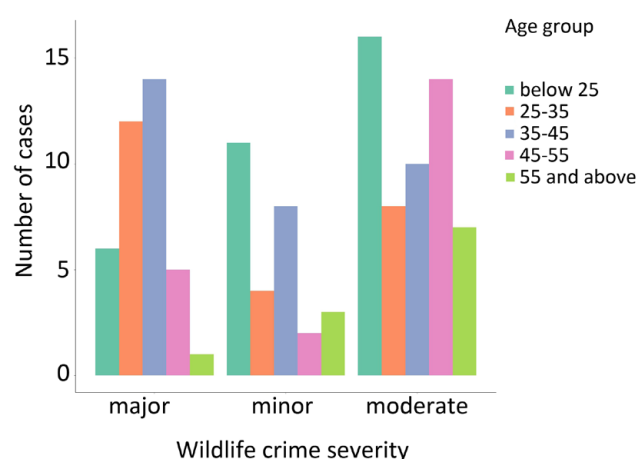


Fig. 6. Severity of wildlife crime and age group of perpetrator.

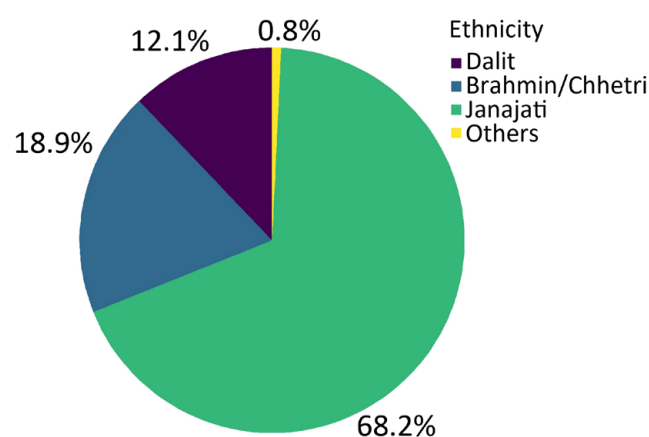


Fig. 7. The ethnic background of the convicted perpetrators involved in wildlife crime in ACA (1994-2019).

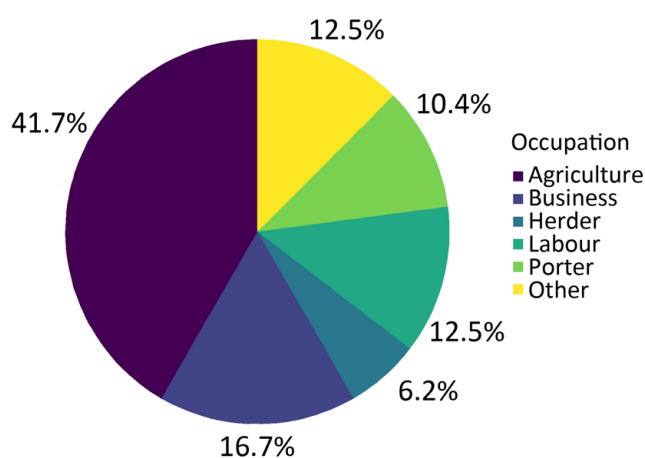
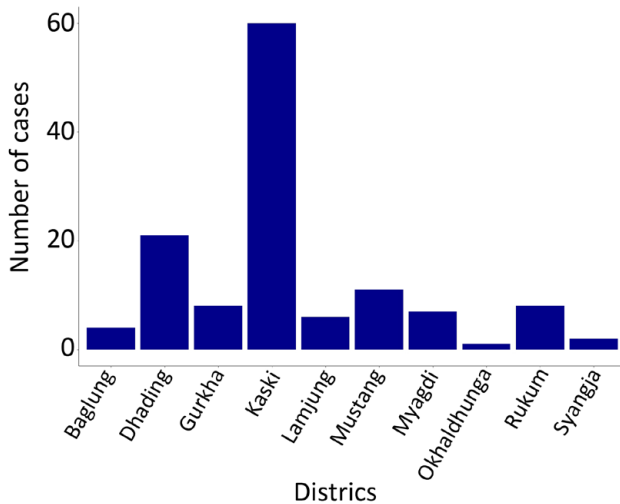


Fig. 8. Occupation of the convicted perpetrators involved in the wildlife crime in ACA (1994-2019).



**Fig. 9.** Origin of the convicted perpetrators involved in wildlife crime in ACA (1994-2019).

the least in committing the same (9.09%). Moreover, the major crimes were committed by people of age 25–45 in all categories. The chi-square test showed that there is a significant association between the age group of the perpetrator and the crime severity ( $\chi^2 = 17.032$ ,  $df = 8$ ,  $p$ -value = 0.02978) (Fig. 6).

#### *Ethnic group composition*

Majority of the convicted perpetrators of different wildlife crime cases were from the Janajati (68%) group followed by Brahmin/Chhetri (19%) and Dalit (12%). Other ethnic groups occupy a negligible proportion of the total perpetrators (1%) (Fig. 7).

#### *Occupation of the convicted perpetrator*

Perpetrators' occupation and their statistics of involvement in wildlife crime was categorized into the six groups from which the perpetrators from the agricultural background were convicted the most (42%) followed by various business work (includes trekkers and porters) and labor. Herders occupy around 6% of the total proportion of convicted perpetrators (Fig. 8).

#### *Origin of the convicted perpetrator*

District-wise statistics on the convicted perpetrator's origin show the proportion of the local (65%) and outsider perpetrators (35%) based on their permanent residential district. People from 10 districts of Nepal were recorded to be involved in the various wildlife crimes in ACA. Out of the total, Kaski district dominated with the highest number of people ( $n = 60$ ) followed by Dhading ( $n = 21$ ) and Mustang ( $n = 11$ ). People from Okhaldhunga were also recorded (Fig. 9).

### **Discussion**

The reason for the criminal cases being higher in the upper region in the month of June, an important time of the month for

farmers, may be due to the visit of people in the adjoining forest fields be it for agricultural tasks or for collection of Yarsagumba (*Cordyceps sinensis*) where they interact with the wildlife (Bhusal et al., 2019). Moreover, in the rainy season, poachers have a higher probability of locating wildlife and also may experience a sense of psychological safety as their footsteps produce less sound on wet ground as compared to the dry litter in summer (Velho et al., 2011; Wilfred, Maccoll, 2015). Previous data (GoN/MoFSC, 2014; Paudel et al., 2019) has shown that half of the convicted perpetrators were involved in the poaching of wildlife, which makes it a major challenge for wildlife conservation in Nepal.

According to a previous study (Puri et al., 2020), the incidence of cases related to the common leopard and deer species was higher in the ACA. This could be attributed to the common leopard's tendency to cause significant damage to livestock and humans (Gautam, 2016), as well as the high market demand for its skin (Paudel, 2012). Additionally, an abundance of deer species and the high consumption of their meat could explain the higher incidence of cases in the area. On the other hand, the cases related to the reptiles were not found, which could either be a non-occurrence of such cases or ignorance by the concerned body.

The wildlife perpetrators in ACA were of a wide range of age groups i.e. early teens to above 80. However, the majority of the overall crime was committed by people of the age group 25–45. Studies done in several countries (Dangol, 2015; Pires et al., 2016; Shao et al., 2021) have found the involvement of different age groups, but younger people were more likely to be involved as compared to older people. People below 30 are the most frustrated due to unemployment and poverty in rural areas, which is why they tend to get involved in criminal activities more often (Sharma, 2006; Dangol, 2015).

The tourist attractions of Mardi Himal (Machhapuchhre RM) and Annapurna Base Camp (Annapurna RM) are also becoming potential hotspots for wildlife crimes. The region around the transit point and the country borders are the most vulnerable places since the illegal trade market for wildlife parts and live animals is primarily focused on the international market (Dangol, 2015). The members of the Janajati ethnicity are more likely than other ethnic groups to commit crimes against wildlife due to their agricultural heritage and proximity to the forest and wild animals (Dangol, 2015; Paudel, 2012; Paudel et al., 2019; Ghimire et al., 2020; Puri et al., 2020). In contrast, since the area is a prime habitat for endangered wildlife species and the market value of wildlife trophies is significant, individuals from outside the ACA have been involved in such crimes as well (Aryal et al., 2011; Paudel et al., 2020; Puri et al., 2020). The Annapurna conservation area is close to Kathmandu via the Dhading district and is on the Prithvi highway, a route out of the country via the Terai region of Nepal, making trading even easier.

### **Conclusion**

Among 48 wildlife crime cases registered in the ACA between the years 1994 and 2019, a significant number of the cases were recorded on illegal poaching and transportation of wildlife trophies (89.6%), with Kaski district accounting for 60% of those crimes. The majority of the people convicted for those cases were majorly males of Janajati ethnicity from an agricultural background (42%).

The increasing trend of wildlife crime could be minimized by special attention to border/entry points and increased antipoaching efforts, especially in Kaski and Mustang districts. Also, the alternative livelihood opportunity provided for the local communities with poor socioeconomic conditions and high dependence on forest resources could aid in the reduction of wildlife crime.

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