The tide of tiger poaching in India is rising! An investigation of the intertwined facts with a focus on conservation

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Abstract Poaching and illegal trafficking are major threats to biodiversity, especially when endangered felids are concerned. Tigers are iconic animals, and there is huge demand for their body parts both in the national and international illegal markets. India forms the largest tiger conservation unit in the world and poaching is at its peak even though there are stringent laws and strict enforcement. In the present study, we analytically estimated the tiger seizure cases in India from 2001–2021 using newspaper archives as the main source of data. The data was geo-referenced to understand the details of seizure, demand, and locality. We statistically correlated the seizure rate with the density of tigers, tiger reserves, and various other socio-economic factors. Our result shows that skin, claws, bones, and teeth have more demand, with nails and teeth being the most preferred in local markets. The bones, flesh, and other parts were mostly seized in the border states of the north and eastern states. The intensity of seizures is very high in the states of Maharashtra, Karnataka, Tamil Nadu, and Assam. From our analysis, we predict four trade routes for the export of the seized parts: the Nepal-Bhutan border, Assam border, the Brahmaputra, and the Mumbai port. This corresponds to the five tiger conservation blocks in India, and we observed the seizure rate is high near the Western Ghats region, which has not yet been noticed. Apart from the seizure, we are unconcerned with the seizure’s origin or the local trading routes. The study demonstrates the importance of identifying the source population using DNA methods and carefully enforcing the rules in area of poaching. We assert that current approaches are incapable of resolving the issue and that a more precise and effective forensic procedure capable of resolving the issue at the minute local level is critical for precisely tracing trade channels.

Keywords Wildlife seizure · Tiger dominated landscapes · Trade routes · Skin and claws · Panthera tigris

Introduction

The illegal trafficking of commercially valuable body parts of endangered animals has a well-developed international network. Such practises are of great concern in biodiversity-rich countries like India, because they negatively impact conservation efforts (Tensen, 2016). Despite strict laws and enforcement, enigmatic species such as the Bengal
tiger (*Panthera tigris*) face severe threats from trafficking (Nittu et al., 2021). The species has fewer than 4,981 individuals worldwide, with India accounting for a sizable portion of the population (Jhala et al., 2021). The species is well-known, and body parts are in high demand on the illegal international market. The tiger modulates the food web and extemporises natural resources as the top predator of the Indian forests (Mohan et al., 2021). The Indian government is taking every possible step to increase the population in natural habitats and enforce stringent laws to prevent poaching. India, China, Russia, and other tiger-ranging countries jointly launched the Global Tiger Recovery Programme to increase tiger populations in their natural habitats (Joshi et al., 2016). As a result, tiger-roaming countries enacted strict legislation to protect the species from extinction. Even though strict rules are in place, illegal trafficking in the body parts of this elusive ionic species is common in illegal markets.

In the last two decades, the global wild tiger population has shrunk by half (Morgan et al., 2021). Because of the increased demand for body parts, they are highly vulnerable to poaching (Nowell, 2010; Stoner et al., 2016). The various enforcement agencies seized 2,359 tiger parts globally between 2000 and 2018 (Morgan et al., 2021; Wong & Krishnaswamy, 2019). China is the largest consumer of this endangered wild felid’s body parts and byproducts (Coals et al., 2020; Jiao et al., 2021). The illegal products from other tiger-ranging countries make their way to China via an international trading network. Trafficked tiger products are primarily used as decorative materials or as an ingredient in Chinese traditional medicines (Shepherd et al., 2020; van Uhm, 2020; Wong, 2019, 2020) and the production of wine (Coals et al., 2020; Wong, 2016). Skin, claws, and teeth are part of fashion items, home decor, jewellery, holy materials, and the symbol of bravery. Flesh, blood, bones, fats, and genitalia are all used as ingredients in traditional medicines, tonics, and treatments for various ailments (Ellis, 2013; Gratwicke et al., 2008; Karmacharya et al., 2018; Mainka & Mills, 1995; Moyle, 2009; Nowell, 2000; Wong, 2016). When tiger bone gets boiled, it transforms into an adhesive known as tiger bone glue, an ingredient of traditional medicines in many countries (Davis et al., 2020; Drury, 2011; Nowell, 2010; Stoner et al., 2016). The intensity of tiger part smuggling is proportional to the market demand and people’s incorrect perceptions. According to reports, the tiger is being bred in captivity in China to meet public demand (Coals et al., 2020; Wang et al., 2019).

The handling and trade of tiger parts became illegal in India with the implementation of the Wildlife Protection Act in 1972, followed by the documentation of cases in the 1980s. Southern Indian states recorded the maximum tiger smuggling cases as they have a viable tiger population. Unlawful trafficking grew into an extensive network that included Bengal, Madhya Pradesh, Andhra Pradesh, Uttar Pradesh, Bihar, Maharashtra, and Karnataka (Ellis, 2013; Palita, 2007). The dealers take advantage of the tribal people’s economic conditions and hunt the tiger (Ellis, 2013). Many tribal hamlets are within reserves, and tribes have extensive knowledge of animal movement and handling. Because strict enforcement may be challenging to implement in a scheduled tribal hamlet, poachers take advantage of this. The Indian scenario is unclear regarding the severity of tiger poaching and the origins of trade routes. The majority of the literature on tiger trade and poaching implements the India-China-Nepal trade route and the intensity of seizures in states bordering China and Nepal (Karmacharya et al., 2018; Sharma et al., 2014). They also forecast a trade route through Ladakh, Tibet, Laos, and Bhutan (Wong, 2016), with China as the primary consumer. Domestic demand or the starting point of the trade route was not the focus of any research, and studies mainly focused on recognising and improving tiger habitats and populations.

**Objectives**

It is unknown from which part of India the poaching of tiger parts constantly occurs, but the Maharashtra-Madhya Pradesh belt may be the major poaching site (Gopal et al., 2010; Wright, 2010). Though strict enforcement can control poaching to some extent, the aspects of poaching motivation by locals need to be thoroughly investigated. There are limitations to conducting such a study because protected area managers, locals, and tribal dwellers in the forests may not cooperate. The seizure data records may not be an accurate figure, but they are a random sample of the actual figure. As a result, the issue can be addressed on a broad scale, assuming the state as a whole and
the various sociological factors. The current study aims to assess the intensity and prevalence of poaching based on secondary seizure data. The study intends to investigate the impact of demographic, economic, and sociological factors on poaching intensity in a state. We also attempted to extrapolate ecological factors related to tiger demography to predict potential tiger poaching areas.

**Review of literature**

Zoogeographers such as Newbigin (1913) drew attention to animal geographies, which led to the development of cultural animal geographies that placed a priority on space and spatial distributions (Bennett, 1960). Later on, animal geographies faded away and resurfaced with the work of Anderson (1997), Wolch and Emel (1995), Elder et al. (1998), and Wilbert (2000). Many animal geographers advanced arguments demonstrating how animals and the networks in which they are entangled leave imprints on specific locations, regions, and landscapes over time, sparking research on animals and place (Anderson, 1995; Davies, 2000; Emel et al., 2002; Gruffudd, 2000; Ufkes, 1995; Yarwood & Evans, 2000). The essays by Emel and Urbanik (2010) drew attention to the physical and conceptual dimensions of human-animal relationships. Urbanik’s (2012) concepts attracted widespread notice for their numerous connections between geography and human-animal relations. She emphasised the importance of establishing techniques, pointing out that doing so will enable us to get closer to animals. This was followed by a body of writing (see Buller, 2014) arguing that "animals are no longer the sole domain of the sciences." Hovorka (2017) emphasised the global diversity of human perspectives, placements, and interactions with animals, as well as the global diversity of animal circumstances, experiences, and lives. Animal research in geography could benefit from "further expansion into human–environment geographies, physical geographies, and geomatics in order to leverage hybridity as a concept and practise" (Hovorka, 2017). Hovorka (2019) states that "examining the breadth and complexity of these power relations is critical given that we live in a multispecies world and continue to seek ways to de-center "the human" in “theory and practise."

There are thirteen tiger range countries in the world: India, China, Indonesia, Myanmar, Bangladesh, Vietnam, Russia, Malaysia, Thailand, Nepal, Cambodia, Bhutan, and Lao PDR (Kumar, 2021). However, India, Western China, Southern Asia, and some regions of Russia currently hold the majority of the world’s tiger population, with India holding the majority of the wild tiger population (Karanth et al., 2017; Knoka et al., 2018; Kumar et al., 2019). According to the most recent census, India has 2,967 tigers, up from 1706 in 2010. (Jhala et al, 2020; Jhala et al., 2021). India, as a primary tiger habitat, also has the highest number of tiger seizures worldwide (Kumar et al., 2019; Wong & Krishnaswamy, 2019). The plight of Indian tigers began in the late nineteenth century with the widespread use of modern weapons (Sharma et al., 2014). Despite strict legislation such as the WPA 1972 and its 2006 tiger amendment, poaching incidents occur in India (Bijoy, 2011). Between 1994 and 2003, the Environmental Investigation Agency (EIA) reported 684 cases of tiger poaching and seizure (Banks & Newman, 2004). According to WPSI’s online reports (http://www.wpsi-india.org/), India lost 1,110 tigers between 1994 and 2016. According to another report by Wong and Krishnasamy (2019), 369 tiger seizures occurred in India between 2000 and 2018, which is more than any other tiger range country. Tiger skin, teeth, claws, meat, genitals, fat, and even bones are poached for traditional medicines (Ellis, 2013; Gratwicke et al., 2008; Kitpipit et al., 2012; Mainka & Mills, 1995; Moyle, 2009). Body parts such as eyeballs, tails, and whiskers are also used in medicine (Mills & Jackson, 1994). The majority of tiger part trafficking is done to meet Chinese demand (Gill, 2014). According to Paudel et al. (2020), the main illegal trade route for tiger body parts is across the Indo-Chinese border. When tiger parts were scarce, leopards replaced the scarcity in the market (Niraj et al., 2012). According to Sethi et al. (2019), between 2012 and 2016, 650 leopards were poached in India, putting both endangered felids in grave danger. Many online reports speculated that tiger poaching peaked (up to 151%) during the COVID-19 lockdowns (see the information in the Times of India, the Print, etc.). There haven’t been any studies that have looked at how tiger poaching affects the environment and how it affects the people who do it.
Methodology

Data collection of the tiger confiscations.

Because seizures are often talked about in print and online media, newspapers are a great source of information, and archives are easy to find. We used the archives of major English and regional language newspapers and search engines like Google and Bing. We gathered this data over the last 20 years (2001–2021). Before 2001, information was scarce and was challenging to obtain. We also gathered information from the WPSI’s website (wpsi-india.org), which contains a consolidated report of Indian law enforcement agencies. To learn more about law enforcement, we referred the Wildlife Crime Control Bureau website (wccb.gov.in). After a thorough examination, we ignored repeated data of the same incidents from different newspapers to avoid repetitions. We consolidated every piece of data into an excel sheet with the details of date, place, and state, seizure details, and convicts (if interested, readers can obtain it by sending an email to the corresponding author). As the data given on the WPSI website differs from our data, we ignored the data prior to 2010 in our primary statistical analysis. The WPSI data is a year-to-year figure, and we cannot use it to analyse state-wise trends, geo-referencing, or other seizure details. We converted the year-wise WPSI data (2010–2019) to a logarithmic value and compared it (Chi-square analysis) with the logarithm of the data we obtained to rule out the trend difference.

Collection of supporting data.

We got reports of the seizure case from states such as Andhra Pradesh, Arunachal Pradesh, Assam, Chhattisgarh, Delhi, Goa, Haryana, Jammu & Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Nagaland, Odisha, Tamil Nadu, Telangana, Uttar Pradesh, Uttarakhand and West Bengal. So, we further collected the data related to only the particular states. The secondary data we collected includes the following: total number of tiger reserves in India (ntca.gov.in), mortality rate across states (ntca.gov.in), percentage of forest cover per state (fsi.nic.in), details of tiger population and density (Jhala et al., 2020), total number of urban areas per state (mohua.gov.in), total area of tiger reserves (wiienvis.nic.in), total number of village areas per state (censusindia.gov.in), population status of each state as per 2011 census (censusindia.gov.in), literacy rate per state (mospi.nic.in), GSDP (Gross State Domestic Productivity) of each state (mospi.nic.in/data), and year wise GDP (Gross Domestic Productivity) of India (2001–2020) (mospi.nic.in). We provided the consolidated information as supplementary material ESM1 for reference.

Tiger increment rate and the Seizure rate analysis.

We calculated the total tiger increment in every state using the four NTCA tiger census reports (2006, 2010, 2014, and 2018). Similarly, we calculated the seizure rate as the ratio of the number of seizures reported to the number of years. We compared the annual seizure rate with the state-wise tiger mortality, annual tiger increment, number of tiger reserves, and tiger density by creating line and bar graphs (see supplementary data ESM2).

Statistical Analysis.

We analysed the data using the seizure as a sample of original poaching to determine the state-by-state prevalence and year-by-year trends. Using the ggplot2 (Valero-Mora, 2010) and hrbrthemes (github.com/hrbrmstr/hrbrthemes) packages, we examined the relationship between seizure rate and various ecological and socioeconomic variables in R studio (RStudio Team 2020).

Data geo referencing and mapping.

We obtained the latitude and longitude (geographical position in degrees and minutes) of the seizure using Google Maps for the data geo-referencing. We classified the primary data based on the seized parts, which included skin, bones (except the skull), claws (including nails), carcass (seizure of a dead specimen from a person/group), kill (a case in which a person/group killed the tiger with the intent of poaching), organs (any parts other than the skin and bones), teeth (including all types of teeth), skull (except bones), and whiskers. We categorised and plotted the data on the map of India using QGIS (Mileu & Queiros, 2018) to determine which tiger parts are most poached and their regional preference. We then
graded the states based on the intensity of poaching and created a heat map of India based on each state’s annual rate of poaching.

Results

The major seizure reports were during transit or attempts to hand over or sell to a third party. Only 13 of the total cases report the domestic sale of tiger parts. The majority of domestic cases involve the sale of paws, claws, and teeth. There have been reports of people attempting to sell tiger skin in the Kolkata market, and they have also tried to sell fake tiger skin and claws for a high price. The authorities seized the tiger paw, claw, and teeth from the perpetrator at the time of the fake skin seizure. The study shows that in the Indian market, most demand is for the claws and teeth, with less demand for the other parts. In most cases where the seizure occurred during handover, the convicts were primarily young, but their ages ranged from 24 to 60 years. The agencies typically apprehend tribes who have tiger parts in their possession. The punishment details from the Indian court are available on the Wildlife Crime Control Bureau website. The general information says that only 14 people were punished for seven years of imprisonment, amongst which only two were punished for possessing tiger body parts and the others for hunting. Our survey clearly shows there is a discrepancy among the data regarding tiger seizures and related offenses. When looking at individual cases from the newspaper archives, it appears that the articles (tiger parts) are even available in jewelry stores. According to the report, regular customers want the tiger nails and teeth fixed in their ornaments. Such incidents are more common in the Karnataka cities of Bangalore and Chamarajanagar. According to the Chamarajanagar report, people in this region have superstitious beliefs that if they hold tiger parts like a claw, it will bring them wealth and protect them from disease. The data also shows that most seizures occurred in private vehicles, with only a few occurring on public transportation. It is clear that once it reaches the edge of the forest, there is a network that distributes the items via multiple links, making it impossible for law enforcement to determine the end and beginning of the chain. However, the overall report indicates that the sample came from tiger reserves in India, and the poachers were mostly local forest dwellers.

The intensity of poaching.

The intensity of seizures is very high in Maharashtra, Karnataka, Tamil Nadu, and Assam (Fig. 1), indicating trade in this region or a poaching site. When analysing the points where the maximum seizure occurred, it is near a reserve, a country’s border, or an important international port. The intensity of seizure activity increased from Tamil Nadu through Karnataka-Maharashtra, an indication of the trade route. The former two states have a good number of tiger populations, which can be considered the origin of poaching. A similar track and trend can be seen from Odisha through West Bengal to Assam. Mumbai may be receiving tiger parts either from the Western Ghats or from the central India. Similarly, Assam can be another exit port to meet the requirements of China through the Tibetan or other border regions. We do not get ample data to study the demand, either in the internal domestic market or in the international market.

More demanded tiger parts.

The major seizure is the tiger skin when assessing India (Fig. 2) as a whole, followed by the other body parts like claws, bones, and teeth. The bone seizure is mainly happening in the north-eastern Indian border regions. Skin, claws, and teeth are the most frequently confiscated items in peninsular India, indicating a high demand for these parts. The figure also clearly shows that the seizure of tiger parts is closer to the tiger conservation blocks, demonstrating the origin of the seized parts. Our data depicts Maharashtra (particularly Mumbai) may be the primary destination for poached tiger parts. It is also clear that bone is a significant tiger part in high demand along the Nepal-China border. The Shivalik hills may be the source of tiger parts that have been taken to the borders of Nepal and Ladakh.

Analysis of Socio-economic and the demographic attributes.

We used tiger seizures as the function of poaching, and the correlation (r) shows that poaching correlates $(P_{0.05})$ more with tiger-related attributes than with
human socio-economic parameters (Fig. 3). The values show the number of tiger reserves, tiger population density, tiger mortality, and forest cover, which are all major factors correlated with poaching. As a result, it stands to reason that a state with these factors will have more poaching cases. Poaching is unaffected by factors such as low literacy rates, the number of villages in a state, urbanised areas, average gross state domestic product (GSDP), and even population density. Our analysis correlating the tiger loss and gain concerning poaching clearly shows a similar trend (Fig. 4). Hence, in regions where the tiger population is increasing, the intensity of poaching also increases. Similarly, tiger poaching shows an opposite trend of increment in some regions, where tiger loss is experienced. Gross domestic product (GDP) is a
Fig. 2  Geo-referenced tiger body part seizure from India
Fig. 3  Heat map showing the correlation between various attributes and seizure rate (A: Human population density, B: GSDP, C: Number of villages, D: Urban area, E: Percentage of literacy, F: Forest cover, Tiger picture: Tiger increment rate per annum, G: Tiger mortality, H: Tiger density, I: Number of tiger reserves, J: Seizure rate per annum, r: Pearson’s correlation coefficient).

Fig. 4  State wise annual seizure rate (y axis range 0.01-1) and tiger increment rate (y’ axis range -10 to 25)
commonly used measure of the economic activity of a country. For the past 20 years, the GDP showed a significantly correlated trend with seizure data (Fig. 5).

Discussion.

Market demand for seized products.

Tigers are constantly being poached for their body parts, and their demand in illegal markets is increasing. Wong and Krishnasamy (2019) reported that in India, tiger skin, bones, and claws were the most commonly seized items between 2000 and 2018. According to the current results, skin is the most traded or demanded part, followed by claws, bones, and teeth, corroborating previous observations. Other parts, such as paws, skulls, teeth, and whiskers, have a minor need in illegal markets and are in high demand in the Indian domestic market. Tiger skin is used in the decoration and manufacture of luxury furniture. Tiger bones are used in Asian traditional medicine to treat rheumatism (Ellis, 2013; Hitchens & Blakeslee, 2020; Moreto & Lemieux, 2015; Nowell, 2000; Still, 2003). Tiger bones are also used as bone wine in traditional Chinese medicine (Coals et al., 2020; Gratwicke et al., 2008). Tiger bone wine is available in the markets of China and Vietnam under brand names (Coals et al., 2020). Paws are used in black magic in some parts of India (Sethi et al., 2019). Tiger claws are primarily used in the creation of lockets, sculptures, religious items, and as medicine in traditional practise (Coals et al., 2020; Sharma et al., 2019). Because of the high demand for tiger claws, fake claws are manufactured for illegal marketing (Sharma et al., 2016), demonstrating the intensity of the demand for tiger claws. Tiger parts, such as skin, bones, claws, whiskers, canines, penises, and so on, are in demand in the market. Skidmore (2021), says that the demand for poached parts is different because people use different things for different purposes.

![Fig. 5 Correlation between GDP and seizure rate. GDP is significantly correlated with seizure rate (r = 0.8), the dotted lines show the trend line](image-url)
Seizure trends.

The seizure rate was showing a trend of increasing year-wise in India, which was correlated with the increased tiger density in various landscapes. It can also be argued that the increased seizure corresponds to the strict implementation of the Indian laws. We show that the seizure is more near the forested regions in India, where similar observations were reported in previous studies by Sharma et al. (2014). In the period of COVID-19 lockdown, there was a sharp increase in the number of seizures. Hence, it can be assumed that the major tiger habits in India are facing a huge tiger loss, which remains unaccounted. The efforts of the NTCA to broaden the number of tiger habitats in view of increasing the number of tigers are yielding good results (Jhala et al., 2020). Most of the seizures are based on information given to enforcement, and the convicts arrested are mostly tribes. The data clearly demonstrates that most seizures occur near the forest ranges and the arrested ones are tribes, when the tiger parts once handed over to the network are rarely seized. Other than the regions near reserves, the seizure mainly occurs near places of export. As per the analysis from 2000 to 2018 (Wong & Krishnasamy 2019), the highest rate of arrest for tiger smuggling is reported in India. From our observations, we predict four routes for the export of the seized parts: the Nepal border, Assam border, the Brahmaputra, and the Mumbai port. In most of the seizures, the end and start may only be traced, while the middle part of the network remains untraced. Once seized, the enforcement agencies do not make enough effort to find the track or origin of the sample.

Trade routes.

Land ways are majorly used in trafficking from India to China, with several routes passing through the states of Jammu (Upadhyay et al., 2007; Wong, 2016) and Kashmir (Upadhyay et al., 2007). Our analysis also shows that most of the tiger parts seizures occur during the time of transport via land roads. Smugglers may choose from a variety of nearby trade routes to avoid detection at border checkpoints. Most likely, traders in India will use road transportation to move tiger parts from one location to another. They may use water as a mode of transportation to transport the parts to other countries, as it is less dangerous than roads. Water, land, and air routes are used by the smugglers to trade the tiger parts to China (Moyle, 2009). The report of Oswell (2010) shows that tiger parts for China are easily traded through boats or roads. The Brahmaputra river may be the best way for traders from Assam and other nearby states to move their goods around. The river has a connection with the border of Tibet, an autonomous region of China. From China, tiger parts will flow to the neighbouring countries like Taiwan, Japan, and South Korea. Moreover, China acts as an intermediary distributor; they sell the items at a high rate to the neighbouring countries. Wong (2016) reported that smuggling routes pass through Ladakh between India and Tibet, which provides an opportunity for the Indian poachers to transport the tiger skin to the dealers in Shiquanhe (Western Tibet), which later reaches Lhasa and other regions of China through retailers. According to Paudel et al. (2020), tiger reserves such as Corbett, Udwan, and Katernighat are close to Nepal’s western border, and the regions of both India’s and Nepal’s western and northern borders offer more direct trade routes and borders between India and China. Our analysis is similar to this report in that seizure cases occurred in the Sivalik range of India, which is close to the Corbett, Pilibhit, and Dudhwa tiger reserves and has a direct trade route to Nepal. Another possible trade route is through the Ganga, Yamuna, and Brahmaputra rivers, which flow directly to Tibet and from there through land route to China.

Western Ghats un-noticed.

There is a lot of trafficking going on in the Western Ghats and the tiger parts are being sent to the Mumbai port area. The Western Ghats being detected with high tiger confiscations, despite the fact that it is home to a large number of tiger reserves. The tiger protected areas of Western Ghats spotted in the tiger seizure analysis map are the Anamalai Tiger Reserve, Parambikulam Tiger Reserve, Mudhumalai Tiger Reserve, Nagarhole Tiger Reserve, Sathyamangalam Tiger Reserve, and Bandipur Tiger Reserve regions. However, no specific reports of tiger seizures were observed from the Nilgiri Hills. Another cluster of crimes was spotted in central India. More than 15 tiger reserves are in the central part of India, where Tadoba-Andhari, Melghat, Pench, Kanha, Bandhavgarh, and Indravati are major tiger habitats. The
states that cover the parts of the Brahmaputra River such as West Bengal, Assam, and Arunachal Pradesh, and the nearby areas with about nine tiger reserves is a major tiger smuggling site. Among them, Assam holds greater number of tiger seizure cases. According to the report by Wong and Krishnasamy (2019), the major affected tiger habitats are Bandipur, Nagarhole, Aanaimalai Tiger Reserve, Silent Valley, Kanha Tiger Reserve, Dongargarh-Dhaara, Malwenda forest complex, Bhandar, Sundarban Park, Pilibhit Tiger Reserve, and Valmiki Tiger Reserve. We also found the similar spotting places for tiger seizures on the map and are located near the major Tiger Reserves. This also provides strong evidence that the majority of crimes occur near tiger habitats, despite the fact that Indian laws are strict.

Future needs and conclusion.

Furthermore, the primary question for forest officials and wildlife forensic experts is where the seized tiger parts came from. Is it from the same state or imported from another country? There are currently no precise molecular techniques for determining the origin of seized tiger parts. Despite the fact that there are studies that suggest microsatellites and SNP-based profiles to identify the origin of seized samples (Kolipakkam et al., 2019; Natesh et al., 2017), no work has yet demonstrated a proper molecular marker to identify the reserve or meta-populations. Furthermore, it is highly unlikely that law enforcement will ever attempt to trace the geographical origin of the seized material. We say that it is very important to develop a better and more precise molecular forensic technique for the identification of tiger parts that have been seized. This helps to provide more strong and authentic evidence in court to punish the person who poached the tiger.

This necessitates the collaboration of various researchers from across the country in order to share and analyse data. Identification of high-risk poaching areas can only help to reduce the illegal trade by increasing vigilance in these areas. This will aid in determining the circumstances that justify the tribal and locals’ poaching the tiger. The situation can be handled by addressing the local poachers’ economic and educational status. India is a country that spends a significant amount of public money on tiger conservation; a portion of this money could be diverted to address this serious issue. We forget about the future threat of poaching because of the satisfactory increase in the number of individuals recorded in the most recent tiger census. According to our findings, authorities should be more careful about protecting tigers from poaching and illegal trafficking. If that doesn’t happen, many Indian tiger reserves will be like Sariska and Panna, which both had a lot of tigers killed.

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Code availability Not applicable.

Declarations

Conflicts of interest/Competing interests The authors declare that there is not financial and non-financial conflict of address between authors.

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