

RESEARCH ARTICLE

An integrated historical study on human–tiger interactions in China

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Abstract

Tigers (*Panthera tigris*), as apex predators, play a crucial role in maintaining ecological functions within their ecosystems. Human–wildlife conflicts, particularly human–tiger conflicts (HTCs), have been a prevalent and severe issue in tiger-range countries from ancient times to the present day, with various regional characteristics. This article discusses human–tiger interactions in China, including different types of HTCs throughout history and the various measures implemented to promote human–tiger coexistence. Employing a historiographic approach, this study is based on case studies. It relies on historical documentation as its primary source, using methods such as literature analysis, digital humanities techniques, and field investigations. The results reveal various forms of direct negative human–tiger interactions, ranging from mild to intense HTCs, as well as other interactions such as tiger trade, medicinal use of tiger parts, and tiger habitat loss and fragmentation due to deforestation and urbanization, all of which have led to reductions in tiger populations. Meanwhile, the study also identifies different conceptions and measures for human–tiger coexistence amidst conflicts, including animal protection and tiger worship in China's history, and modern conservation efforts such as the inclusion of tigers on protection lists, bans on tiger medicine and trade, and the establishment of nature reserves and national parks to protect tiger habitats.

KEYWORDS

China, historical study, human–tiger coexistence, human–tiger conflict (HTC), human–tiger interaction

Plain language summary

Tigers are important for maintaining ecological balance within their ecosystems as top predators in the food chain. Human–wildlife conflicts, including conflicts between humans and tigers, have been a global issue for centuries. This paper explores both negative human–tiger conflict (HTCs) and positive (coexistence) human–tiger interactions across different periods in China's history. The research employs a historiographic approach, using case studies based on historical documentation, literature analysis, digital humanities techniques, and field investigations. It identifies both mild and intense direct negative interactions, such as tiger hunting and tiger attacks, and indirect interactions, including medical use, tiger trade, and habitat loss, all of which have led to population declines. Concurrently, the article also highlights positive conceptions and measures for human–tiger

Zhihong Cao, Yu Li, and Saud uz Zafar contributed equally to this study.

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coexistence amidst conflicts, such as animal protection and tiger worship in China's history, alongside modern measures like trade bans, the establishment of conservation principles, and habitat preservation through nature reserves and national parks. This comprehensive study underscores the importance of understanding historical dynamics and implementing effective conservation strategies to reduce human–tiger conflicts and ensure the sustainability of tiger populations.

1 | INTRODUCTION

Humans and wildlife interact in complex ways, encompassing both positive and negative interactions, including different forms of conflict and coexistence (Nyhus, 2016). The dynamic nature of human societies, marked by unprecedented population growth and technological development, has led to profound changes in the nature and characteristics of human–wildlife interactions over time. Historical analyses of how these relationships have evolved are crucial for understanding how to protect threatened wildlife and promote harmonious human–wildlife coexistence.

As the largest terrestrial carnivores and apex predators in the food chain, tigers (*Panthera tigris*) play a crucial role in maintaining biodiversity within their ecosystems, and they interact with humans in complex ways. Throughout history, human–tiger conflicts (HTCs) have been a prevalent issue across the species' range. Fundamental forms of HTCs include the predation of livestock and attacks on people by tigers, which often lead to retaliatory killing and a pervasive fear of tigers. HTCs are highly variable, exhibiting distinct features across different regions and countries. For example, in Nepal, human fatalities and livestock depredation remain the primary manifestations of HTC (Dahal et al., 2020). In India, the increasing human and livestock population around tiger reserves frequently results in HTCs, reflecting heightened competition for living space and resources between humans and tigers (Chouksey & Singh, 2018). Beyond these direct HTCs, tiger range countries are facing severe environmental challenges and degradation of tiger populations due to human population growth, rapid economic expansion, urbanization, massive infrastructural development, and climate change. The overarching challenge of tiger conservation, and biodiversity conservation in general, is that there is insufficient societal demand for the protection of wild tigers in natural landscapes (Seidensticker, 2010). Negative human–tiger interactions, such as retaliatory killings, tiger trade (Villalva & Moracho, 2019), and habitat loss and fragmentation, have made survival increasingly difficult for tigers, causing their numbers to decline rapidly. Currently, the global tiger population is estimated to range from 3726 to 5578 individuals, distributed across 10 countries. Tigers of different subspecies are listed as endangered or critically endangered (CR) (Goodrich et al., 2022).

Practitioner points

- To promote harmony between humans and tigers in China, it is essential to analyze and understand their historical relationships to create effective conservation strategies and patterns of conflict and coexistence.
- Strict legislative actions and measures addressing direct and indirect negative interactions, such as habitat loss and the illegal trade of tigers and their products, should be implemented continuously to safeguard tiger populations and their habitats from further decline.
- Community engagement and cultural understanding are vital for tiger conservation. It is essential to collaborate with local people, respect their traditions regarding tigers, and raise awareness among them for sustainable coexistence. Along with that, International communication and cooperation are crucial for establishing ecological corridors for tiger survival.

China has historically been an important part of the tiger's range. Four subspecies of tiger used to occur in China: Bengal tigers (*P. tigris tigris*), Indochinese tigers (*P. tigris corbetti*), Amur tigers (*P. tigris altaica*), and South China tigers (*P. tigris amoyensis*). Currently, the first three subspecies still exist in the wild and in zoos/parks, while South China tigers only survive in captivity (Jinfeng et al., 2022; Li et al., 2023). In the past, tigers were widely distributed throughout China. As one of the ancient totemic animals, tigers symbolized power, bravery, and protection against evil. They were also thought to bring blessings. Tigers have always been closely intertwined with the development of Chinese history and culture, and tiger culture is an indispensable element of modern Chinese culture (Zhihong, 2010). HTCs have occurred throughout Chinese history, varying in severity due to different factors (Xingliang, 2009). However, with diminishing habitats and deteriorating living conditions of tigers, the expansion of the tiger product trade and medicinal use, and the development of agriculture, industry, and urbanization, the relationship between humans and tigers has become increasingly tense.

As of July 2022, the estimated number of wild tigers in China was just 73, accounting for only 1.3%–1.9% of the global population (China Biodiversity Conservation and Green Development Foundation, 2022). All tiger subspecies in China are classified as CR (Ministry of Ecology and Environment of the People's Republic of China, 2023).

Countries and regions worldwide have implemented various measures to conserve tigers. In China, these measures include banning the medicinal use and trade of tigers, promoting alternative medicinal substitutes, prohibiting the hunting of tigers, and establishing natural reserves and national parks. Due to the low population of tigers, direct HTC, such as tigers attacking humans and humans killing tigers in retaliation, have become rare in China. Consequently, tiger habitat management and conservation have become the major focus for ensuring human–tiger coexistence in the country.

This study examines the history of human–tiger interactions in China from a long-term perspective. Using historiography approaches, we analyze human–tiger conflicts and the measures taken to ensure human–tiger coexistence throughout history up to the present day. By improving our understanding of past human–tiger interactions, we can explore more effective ways to protect this species from extinction and preserve ecological balances in tiger ecosystems.

2 | STUDY PERIODS AND REGIONS

This research spans a long-term perspective from the Prehistoric era to the present day. This approach allows us to estimate tigers' overall population trends and geographical distribution while facilitating a macroscopic understanding of the changes in human–tiger interactions over different periods.

The geographical scope of this research covers the entire territory of China. However, given the vast land area, significant regional variations, uneven development levels, and the characteristics of historical documentation, this study primarily focuses on Northeast China (comprising Heilongjiang, Jilin, and Liaoning provinces), Xinjiang, Fujian, Jiangxi, and Southern Shaanxi.

3 | MATERIALS AND METHODS

3.1 | Materials

The research materials primarily consist of archaeological data, including tiger fossils and bones, historical tiger records, gazetteers, and tiger reports.

Historical tiger records were collected and organized from several literature sources, including official history books, political and literary works, encyclopedism reference books, novels, poetry

collections, tablet inscriptions, and medical books. These sources were accessed in both paper and electronic formats. Electronic literature sources include: (1) *Hanji Quanwen Jiansuo Xitong* 汉籍全文检索系统 (Chinese Historical Literatures Full-text Retrieval System, fourth edition), (2) *Wenyuan ge Siku Quanshu (Electronic Edition)* 文渊阁四库全书电子版 (Complete Library of the Four Branches), and (3) *Zhonghua Yidian* 中华医典 (Encyclopedia Database of Chinese Traditional Medical Books, 5th edition).

For gazetteers, the main sources were the *Zhongguo Fangzhi Congshu* 中国方志丛书 (Gazetteers of China) and the *Zhongguo Difangzhi Jicheng* 中国地方志集成 (Compilation of China's Gazetteers). In addition to these sources, we visited libraries in certain regions to access local chronicles not included in the aforementioned series. A total of 221,500 words of tiger-related records were obtained for this research from these gazetteers' chronicles.

Details about these major materials information can be found in the Supporting Information.

3.2 | Approaches and methods

This integrative research is based on case studies. Hence, the study is founded on a comprehensive analysis of regional case studies used to analyze human–tiger interactions throughout China's history and to categorize human–tiger coexistence measures from past to present. The research methodology involves a combination of literature analyses, digital humanities (DH) methods, and field investigations. Regarding literature analysis, the first step was to collect records about tigers from Chinese historical documents. These records were then processed and digitized to establish databases with different topics for analysis. Field investigations supplemented the analysis of historical literature, allowing direct observation of geographical conditions and current scenarios of HTCs. Further details about the methodologies employed in this study are provided in the Supporting Information S1.

4 | RESULTS AND DISCUSSION

4.1 | Different types of human–tiger interactions from China's history

In China's history, negative human–tiger interactions can be divided into two categories: direct and indirect interactions (Table 1).

These human–tiger negative interactions are derived from several case studies spanning different eras and regions, using the materials and approaches outlined above.

Direct interactions refer to encounters between humans and tigers, resulting in tiger attacks on

TABLE 1 Direct and indirect forms of negative human–tiger interaction from China’s history.

Category	Habitat	Event	Encounter intentionality	Reason/Purpose	Result
Human–tiger negative interactions	Direct interactions	Nonoverlapping	Hunting of tigers	Entertainment; soldier training; official selection	Killing of tigers
		Human–tiger encounters during people’s occasional farm work in mountain areas; passing by forests, and so on	Unintended	For safety and self-protection	Human–tiger fighting killing of tigers killing of people
	Overlapping	Attacks by tigers	Intended	For food and prey	Killing of livestock and people
		Hunting and killing of tigers	Intended, planned/organized	By people, military, or government	Killing of tigers
		Trade of tiger parts	Intended	For money/health/entertainment/authority	Killing of tigers
	Indirect interactions (hidden, invisible)	Either	Intended	For health	
		Tiger medicinal usage	Intended		
		Deforestation, modernization, industrialization, urbanization	Intended	For people’s development	Tiger habitat fragmentation and/or loss tiger population reduction and decline

humans and/or livestock and humans retaliating by hunting/killing tigers in return, often as an act of revenge. Such scenarios can differ; encounters were often unintended when people and tigers lived in separate areas (nonoverlapping habitats). For safety and self-protection, both people and tigers would fight each other. In some cases, tiger hunting was merely a form of entertainment. However, when human and tiger habitats overlapped, tigers tended to attack people or livestock, leading to intentional encounters. These included government-sanctioned killings when attacks became intense, causing drastic drops in tiger populations.

Indirect negative interactions occurred during both habitat overlap and nonoverlap periods. These included interactions for health purposes and profit from tiger medicine and trade. This demand for tiger parts led to additional tiger hunting/killing. Tiger habitat loss and fragmentation resulting from modernization, urbanization, and industrialization also led to indirect negative interactions.

In different historical periods, each type of interaction had different scenarios and varied in intensity. Specific events, their reasons, and results are discussed below.

4.1.1 | Tiger hunting for entertainment, soldier training, and official selection

Hunting has been an integral part of human culture since the early days of our species. In prehistoric times, people hunted wild animals for safety and sustenance, with tigers among the targets. As societies and economies developed, tiger hunting evolved beyond necessity into a form of entertainment, a means for soldier training, and a method for selecting martial officials. The fierceness and difficulty in capturing tigers made them ideal for these purposes. Capturing and killing tigers became a recruitment test for soldiers and officials. With advancements in science and technology, hunting tools improved, making tiger hunts easier and less risky. These developments increased the number of hunts and significantly impacted tiger populations.

In the ancient Chinese chronicle *Zuo Zhuan* 左传 (1999), different seasonal hunting activities are mentioned as follows: “Spring hunting (春蒐 chūn sōu) is to search for nonegg-laying and nonpregnant birds and animals; Summer hunting (夏苗 xià miáo) targets birds and animals that harm crops. Autumn hunting (秋狝 qiū xiǎn) is conducted in harmony with the autumn atmosphere of solemnity. Winter Hunting (冬狩 dōng shòu) refers to hunting various birds and animals that are fully grown and can be indiscriminately encircled and hunted. All of these activities took place during the agricultural downtime” (*Zuo Zhuan*, 718 BCE). These descriptions demonstrate that people at that time were aware of ecological processes in their hunting activities,

including an explicit mention of human–wildlife conflicts in the form of crop raiding. It also indicates that organized hunting activities had a military exercise nature, serving not only as a means of hunting but also as training exercises. These activities, especially among emperors or tribal leaders, were designed to reduce fear and promote quick decision-making during sudden, uncontrolled attacks by enemies.

King Wu of the Zhou Dynasty (11th century BCE) was deemed a “tiger-hunting hero.” According to records, King Wu hunted 22 tigers and many other animals (Yi Zhou Shu 逸周书, 1999). Later, King Mu of the Zhou Dynasty was also recorded to have hunted a tiger in Hulao Pass (also known as Tiger Cage Pass, named after this tiger hunting event) in Central China's Henan Province (Guo, 1989).

During the sixth to fifth century BCE, King Zhuang of Chu State sought talented individuals through hunting, with tigers as one of the targeted animals. He proclaimed that if someone could kill tigers and leopards with hazelwood, they were brave; if someone could wrestle with rhinoceroses barehanded, they were strong; and if, after the hunt, someone could fairly distribute the spoils to everyone, they were virtuous. By employing this method, King Zhuang successfully recruited various talents (Yuanjun, 1979).

Some dynasties founded by nomadic tribes, such as the Khitan-led Liao Dynasty (90–1125 CE) and the Jurchen-led Jin Dynasty (1115–1234 CE) in northeast China, excelled at hunting. Their rulers preserved the tradition of hunting as a means to demonstrate their martial spirit. It is recorded that Emperor Xingzong of Liao encountered three tigers during a hunting expedition and captured them with his dogs in 1024 CE (Tuotuo, 1974). Similarly, Emperor Zhangzong of Jin shot a tiger with a bow and arrows while hunting in the Qiu mountains (Tuotuo, 1975).

In the Qing Dynasty, tiger hunting served as a way for emperors to train and cultivate military skills among the Eight Banners leaders and soldiers. Royal tiger hunting by the Qing emperors was an activity carried out to display their martial prowess and heroic demeanor. One of the most notable emperors known for tiger hunting was Emperor Kangxi (康熙). During Emperor Kangxi's journey to Shengjing (present-day Mukden or Shengyang) in his 20th year (1681 CE), he hunted multiple tigers he encountered along the way. According to incomplete statistics, Emperor Kangxi personally hunted and killed approximately 135 Amur tigers in the northeastern region between 1662 and 1719 CE (Shizun, 2005), which was a huge number for that era.

In early modern times, Westerners also participated in tiger hunting in China's Xinjiang region. For example, in 1885, Russian military explorer Nikolay Mikhailovich Przhevalsky (Никола́й Миха́йлович Пржева́льский) visited Lop Nor for the second time and documented the local hunting customs of the

Lop people, including various methods of tiger hunting. During his stay in the village of New Abu Dar, he participated in multiple local tiger hunting activities and once witnessed a tiger “running away without any injuries” (Przhevalsky, 1879, Chinese translation 1999).

4.1.2 | Mild HTC: Tiger attack and tiger killing due to occasional encounters

Encounters between humans and tigers were generally rare in China, mostly due to differences in habitat preferences. However, such encounters did occur when a tiger entered human-inhabited areas, causing disturbances to people's lives and resulting in mild forms of HTC. For example, in 1363, during the Yuan Dynasty, a tiger entered the downtown area of Lianjiang County. The following year, a tiger was captured in Fuzhou Prefecture, and in 1511, during the Ming Dynasty, a tiger unexpectedly climbed onto residents' houses and was shot by an official with a bow and arrows in the same prefecture (Jingxi et al., 1751).

Conversely, when people occasionally passed through forests or entered forested areas for production activities, encounters with tigers also led to HTCs. For example, in 1193, during the Southern Song Dynasty, a female villager was collecting bamboo shoots when she was attacked and eaten by a tiger on Shigu Mountain in Gutian County, Fujian (Mai, 2006). Another person named Lin Detai killed a tiger when he encountered one passing through a forest before the year 1496 during the Ming Dynasty in Yongchun County (Qiaosong et al., 1927).

4.1.3 | Intense HTCs: Violent tiger attacks and tiger killing due to habitat overlap

As human agricultural and industrial activities developed and populations expanded into China's mountainous regions, where tigers and their habitats were more prevalent, the overlap of human and tiger habitats increased. This overlap intensified competition for land and resources, compressing the tigers' habitats and leading to more frequent and intense HTCs. These conflicts became especially pronounced during the later periods of China's history, from the Ming and Qing dynasties (1368–1912 CE) onward.

Southern Shaanxi (including the cities of Hanzhong, Ankang, and Shangluo) is a vast mountainous region that transitions from the northern subtropical zone to the warm temperate zone. It is bordered by the Qinling Mountains in the north (with an average altitude of approximately 2000–3500 m) and the Bashan Mountains in the south (with an average altitude of approximately 2000–2500 m). This region, characterized by dense forests and numerous rivers, serves as the transitional zone between northern

and southern China. The mild and humid climate provides excellent natural conditions for the survival of various animals, including tigers.

Southern Shaanxi's unique natural environment and abundant resources have historically attracted people seeking land for expansion or refuge from wars. The development of Southern Shaanxi can be categorized into five stages (Liangxue, 1998). Before the Ming Dynasty (1368–1644 AD), the development activities were primarily limited to basic crop cultivation in river valleys, basins, and low mountainous areas by local indigenous residents. The activities were sporadic and limited in breadth and depth, with minimal impact on the local ecological environment. Under such development conditions, the habitat of tigers remained relatively undisturbed, tiger numbers were relatively abundant, and HTC only occurred occasionally.

During the Ming and Qing dynasties (1368–1912 CE), Southern Shaanxi became one of the core areas for both official and unofficial migration, with Hubei, Hunan, Fujian, and Guangdong as the main sources of immigrants. This influx led to extensive land reclamation and profound changes in the region's mode of production. The immigrants engaged in agricultural cultivation and participated in industries such as coal mining, gold mining, charcoal burning, papermaking, and tea production. They gradually expanded their activities from the river valleys and plains to the low hills, then to the middle mountains, and finally to the high mountains and gorges. For decades, forests were cleared and burned, and the landscape of mountains and rivers was significantly altered (Zhiyi, 1842). This intensive development led to severe environmental changes and the destruction and loss of tiger habitats.

In the 55 gazetteers of Southern Shaanxi, two tablet inscriptions, as well as four related series and anthologies, a total of 83 tiger records were collected. Among these, 74 were from the Ming and Qing periods, and nine were traced back to previous dynasties. Of the 74 records, 31 were related to HTCs, including 11 mild conflicts and 20 intense ones. According to these records, tiger attacks occurred quite frequently during the mid-to-late Ming Dynasty and the mid-Qing Dynasty, mainly coinciding with peak periods of local development. In addition, there were instances where tigers appeared in groups to attack local people, extending their attacking range and causing severe injuries that threatened the daily lives of residents. Therefore, government officials began to offer substantial rewards for tiger hunting/killing. Of the 31 HTC records, 15 provided detailed descriptions, and nine involved government-organized tiger hunting efforts. Such hunting efforts were the main approach to preventing tiger attacks and mitigating the threat posed by tigers to local communities.

Tiger attacks were particularly severe in the mountainous areas of Xixiang County. During the Wanli reign (1573–1620) of the Ming Dynasty, a

group of tigers began by preying on cattle and sheep in open land, then targeted pigs and dogs in villages, and eventually escalated to attacking and injuring people both day and night. Later, in 1712, during the Qing Dynasty, the tiger menace resurfaced, surpassing all previous instances. This time, tigers not only roamed the outskirts but also entered the city at midnight, harming people and causing livestock losses (Bingran, 1813).

In response, Prefect Wang Mu organized government-led tiger hunts, offering a reward of 100 strings of money for each tiger killed to the professional tiger hunters recruited for the task. These professional hunters were familiar with the tigers' paths and various tiger-hunting tools, including bows and arrows, hidden arrows, and spears. Their efforts proved successful, as it was recorded that "From 1713 to 1715, 64 tigers were killed and others were wounded as well" (Tinghuai, 1828).

Compared to individual tiger hunting, these government-led tiger eradication efforts were more effective in addressing the immediate threat posed by tigers and resulted in a rapid decline in the local tiger population. For example, numerous records indicate that "tiger attacks happened quite often during the Qianlong Emperor's reign (1736–1795). However, it is rare to see any tiger recently (1926) due to the cultivated wasteland expansion" (Zhonghuang, 1926).

4.1.4 | Indirect negative interactions: Tiger habitat loss due to modernization and industrialization

The Amur tiger, which occurs in Northeast China, the Russian Far East, and the Korean Peninsula, has historically coexisted with humans since the Paleolithic Age. This area, which includes the Chinese provinces of Heilongjiang, Jilin, and Liaoning, covers an area of approximately one million square kilometers. It features high mountains, dense virgin forests, abundant rainfall, and rich biodiversity, providing an excellent habitat for the Amur tigers (Excavation Team of Gezidong Site, 1975; Guoqin, 1989; Jiang, 1975, 1982; Jianzhong et al., 1981; Joint Jin-Niu-Shan Excavation Team, 1976; Chinese Archaeology Society, 1997a, 1997b; Xinxue et al., 1984; Xueshi & Guanfu, 1973; Zhenhong, 1981; Zhenhong et al., 1980; Zhenhong et al., 1985; Zhuowei et al., 2003; Zhuchen, 1947).

During ancient times, Northeast China was mostly inhabited by minority ethnic groups with nomadic lifestyles centered around hunting and gathering. Occasionally, agricultural regimes took control of these areas, but continuous agricultural production was not implemented. Thus, before the mid-19th century, except for some forest loss in the western and southern parts of Liaoning Province and the middle and lower reaches of the Yalu River, most of the region was still covered by dense virgin forests, with the overall forest coverage rate exceeding 70%

(Zhongwen et al., 2009). As the birthplace of the Qing rulers, the northeast region was protected as a preserved area through a policy of isolation that forbade people from different areas from moving in for farming or hunting. This policy helped maintain the integrity of the forests and the wildlife they supported. In the early years of the Qianlong reign (1735–1795), it was recorded that tigers were found “in all the mountains of the Northeast” (Qinding Shengjing Tongzhi, 1965).

The modernization of Northeast China began in the late 19th and early 20th centuries, influenced by Russia and Japan. In 1860, Imperial Russia forced the Qing government to sign the Sino-Russian Treaty of Beijing, which marked the intervention and influence of external powers in the region, driving the subsequent modernization process. In 1898, Russia leased the territories of Port Arthur and Dalian from China and began constructing ports and railroads. In 1897, Russia began the construction of the Chinese Eastern Railway, which traversed the most densely forested areas of Northeast China. Russian settlements and logging operations were established along the railway line, extensively exploiting China's forestry resources. “By 1915, there were 22 Russian forest stations along the Chinese Eastern Railway, occupying an area of approximately 19,700,000 hectares” (Zhongwen et al., 2009). The primary function of the Chinese Eastern Railway was initially to transport timber, serving as a major transportation route for Russia's exploitation of Northeast China's forest resources. After the depletion of timber resources along the Chinese Eastern Railway, Russia built the South Manchuria Railway and dozens of forest railways, intensifying this exploitation of China's forest resources.

In 1905, following Japan's victory in the Russo-Japanese War, it acquired Russian interests in Northeast China through the Treaty of Portsmouth. Japan began promoting modernization and colonial rule in the region, developing industries, mining, and transportation infrastructure while engaging in the exploitative industrial development of its coal, iron, timber, and other natural resources. After 1931, Japan occupied Northeast China, established the puppet state of Manchukuo, and intensified colonial rule. Japan felled large amounts of timber for military installations and transported significant quantities of high-quality timber back to Japan. During Japan's colonial rule in Northeast China (1931–1945), approximately 100 million cubic meters of timber were plundered and transported to Japan (Zhongwen et al., 2009).

The Russian and Japanese indiscriminately exploited and deforested Northeast China, causing irreversible damage to its forests. Mountainous regions were severely fragmented, threatening tigers' survival in the region. By the early 20th century, the presence of Amur tigers in Liaoning Province had already become scarce. It is recorded that “the tiger is rarely seen” (Xijue & Mingshu, 1930), suggesting a significant decline in the Amur tiger population (Yu et al., 2009).

4.1.5 | Usage of tiger parts in traditional Chinese medicine (TCM)

In TCM, almost every part of the tiger's body is believed to have unique medicinal properties. These parts include tiger bones, fat, meat, blood, stomach, gallbladder, kidney, skin, eyes, whiskers, brain, claws, teeth, nose, feces, and tail, all of which are used as medicinal ingredients with different therapeutic effects. For example, historically, it was believed that a tiger's tail could treat various skin diseases, tiger bile could treat children's spasms, tiger whiskers could relieve headaches, and tiger brain could treat laziness and acne (Shenwei, 1108; Shen, n.d.). Among the tigers' organs and body parts, bones were considered to have the highest medicinal value.

The use of tiger bones as medicine can be traced back over 1000 years. According to the *Shiliao Bencao* 食疗本草 (Materia Medica of Food Therapy, written in 713–741 AD), “Tiger bones: boil them into a bath decoction to dispel wind pain, toxins, and swelling due to bone-joint disorders. Soak them in vinegar and apply to the knees to alleviate foot pain and swelling. The shinbone is the most effective. The decoction can also be used for bathing newborns, expelling evil qi (vital energy), treating ulcers, scabies, epilepsy, demonic possession, and ensuring healthy growth.” Therefore, “The hunter is likely to get it (tiger) and sell it at the highest market price. Its skin can be used as a mattress, and its bones can be made into medicinal wine, which is most effective in treating back and leg pain and other ailments” (Weiqing et al., 1935).

In the *Zhonghua Yidian* 中华医典 (5th edition) (a large-scale electronic compendium of ancient Chinese medical texts), there are 2996 pieces of medicinal information about tiger products and 2884 prescriptions involving tiger parts. Through comprehensive analysis, we found that the earliest recorded literature on the medicinal value of tiger products in China can be traced back to the pharmacological work *Mingyi Bielu* 名医别录 (Records of Famous Physicians) from the end of the Han Dynasty (Before 220 CE [Figure 1]). By the Han Dynasty, people already had a basic understanding of the medicinal value and therapeutic uses of certain tiger parts. According to the available literature, the use of tiger-based prescriptions first appeared during the Eastern Han Dynasty (25–220 CE) and no later than the Eastern Jin Dynasty (317–420 CE). The number of prescriptions increased rapidly during the Jin 晋 (265–420 CE), Southern and Northern Dynasties (420–589 CE), and Tang Dynasty (618–907 CE), and reached its first peak in the Song Dynasty (960–1279 CE). During the Jin 金 (1115–1234 CE) and Yuan Dynasties (1271–1368 CE), the number of prescriptions dropped significantly, but prescription numbers experienced another peak during the Ming Dynasty (1368–1644 CE), making it the period with the highest number of recorded tiger-base prescriptions in history. Although there was a slight decrease during the Qing Dynasty (1636–1912 CE), the number

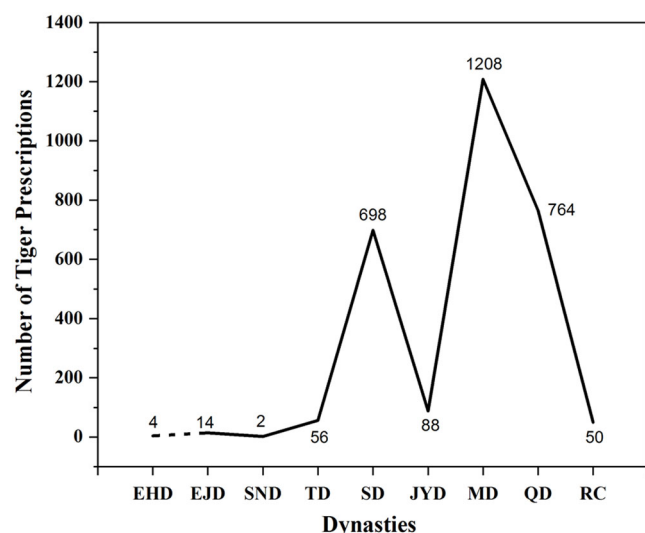


FIGURE 1 “Number of tiger prescriptions” over various “dynasties.” EHD, Eastern Han Dynasty (25–220 CE); EJD, Eastern Jin Dynasty (317–420 CE); SND, Southern and Northern Dynasty (420–589 CE); TD, Tang Dynasty (618–907 CE); SD, Song Dynasty (960–1279 CE); JYD, Jin (1115–1234 CE) and Yuan (1271–1368 CE) Dynasties; MD, Ming Dynasty (1368–1644 CE); QD, Qing Dynasty (1636–1912 CE); RC, Republic of China (1912–1949 CE). Reproduced with permission. Copyright 2021. *Journal of Dialectics of Nature*.

of tiger-based prescriptions remained higher than that of the Song Dynasty. In the Republican era (1912–1949 CE), the number of tiger-based prescriptions decreased to a level nearly equivalent to that of the Tang Dynasty. Traditional Chinese medicine's utilization of tiger products for over 2000 years has been based on the hunting and killing of tigers, actions which undoubtedly have had a very negative impact on tiger populations.

4.1.6 | Tiger trade and hunting

Tigers, as a resource with multiple utilitarian values, have been highly regarded throughout history due to their uniqueness and scarcity. Thus, interest in tigers and their parts has been common among ordinary people, the nobility, and elite rulers alike in tiger-range countries. This widespread fascination led to tigers and tiger parts becoming trade commodities.

In ancient times, when the commodity economy was not well developed, tiger trade was uncommon, and tiger products were mostly used as tributes, gifts, or for simple barter. Tiger skin was likely one of the earliest tiger products traded. Its stunning appearance, warmth, fine and thick fur, large size, and unique colors and patterns made it highly sought after for clothing, carpets, and decorations, signifying the prestige of the owners. Some rulers and upper-class individuals were willing to purchase tiger and leopard skins at high prices to display their privileged status.

Tiger skin was also used as tribute from minority ethnic tribes to China's central government to seek rewards or protection. In 49 CE, it was recorded that

the Wuhuan leader led a crowd to submit and pay tribute to the Eastern Han Dynasty, presenting tiger and leopard skins along with slaves, cows, horses, and bows. The Han emperor ordered a grand feast and bestowed precious treasures on Wuhuan as a reward (Ye, 1959). Such a tributary relationship was a form of trade involving the reciprocal exchange of valuable local products.

With the development of the commodity economy, tiger products began to circulate as commodities. For some ethnic groups in remote areas with low economic development, tiger skins served as an intermediary currency in the commodity trade. For example, during the Southern Qi Dynasty (479–502 CE), the Qiang tribe did not produce any metallic currency. Instead, tiger skins, being rare and precious, were highly valued and used as intermediaries for trade (Zixian, 1972).

Earlier, we described the demand for tiger products in traditional medicine (Figure 1). Due to their high demand in TCM, tiger bones became the most widely circulated tiger product. The tiger bone trade appeared as early as the Han Dynasty and became commodified during the Tang and Song dynasties. During the Yuan Dynasty, tax rates were imposed on tiger products, and during the Ming and Qing periods, tiger skins, bones, and other products circulated locally. For example, it is recorded that in 1537, during the Ming Dynasty, a tiger skin was valued at three silver coins (Luo, 1443). The Lop Nor people in Xinjiang hunted and sold the skins and bones of Tarim tigers, marketing them locally as well. During the Guangxu period, merchants from Shanxi, Shaanxi, and Gansu collected tiger bones and skins, which were then transported by land into Xinjiang province or sold to Qitai County towns (Changjixian Xiangtu Tuzhi, 1908). Sven Hedin once purchased two tiger skins in Xinjiang Lop Nor (Hedin, 1940).

The commodity economy of Northeast China began in early modern times, leading to the gradual commercialization of tiger products and the formation of a tiger product trade market. Hunters went into the mountains specifically to hunt tigers for profit. During the Guangxu reign of the Qing Dynasty, Sanxing County in Heilongjiang Province (now Yilan County) levied taxes based on the units of tiger bones and tiger skins (Guangxu Sanxing Xianzhi, 1890). During the Republican period, a large number of tiger products were marketed, even reaching international markets. In 1913 alone, 28 tigers were captured for their skins in Tongyuan County. These tiger skins were not for local consumption but were sent from Harbin to Beijing and Tianjin and then sold to agents of European stores (Chinese Eastern Railway Company, 1933). According to a 1927 record, the annual sales of tiger bone glue, a traditional Chinese medicine made by boiling and extracting gelatin from tiger bones, in Fengtian Province (now Liaoning Province), reached 355 kg (Shunan et al., 1934), indicating a significant market demand for tiger bone at that time.

4.2 | Historical and contemporary measures for human–tiger coexistence

Human–wildlife coexistence is an urgent global concern with profound implications for biodiversity conservation and sustainable development. Target 4 of the Kunming-Montreal Global Biodiversity Framework, agreed upon at the end of 2022 during COP 15, states: “Ensure urgent management actions, to [...] and effectively manage human–wildlife interactions to minimize human–wildlife conflicts for coexistence” (Conference of the Parties to the Convention on Biological Diversity, 2022).

To discuss human–tiger coexistence, it is essential to clarify the perspectives and contexts for the concept of “coexistence,” as it is currently used with various interpretations, such as a desirable state, a factual occurrence, or a conservation approach. In this paper, we refer to human–tiger coexistence as “a situation where people and wildlife can both survive and flourish in shared environments” (Gao, 2023).

Currently, the tiger population in China is relatively low, which is a consequence of direct and indirect human impacts on tigers, as previously discussed. Consequently, HTC in China are now infrequent, particularly direct forms of HTCs. In this section, we examine people's perceptions of tigers and measures to promote human–tiger coexistence in China from ancient times to the present. We explore how Chinese people historically coexisted with tigers amid conflicts, how the use of tiger parts in medicine and the tiger trade have been banned in modern times, and how China currently protects tiger habitats and wild populations.

4.2.1 | Animal protection perceptions and tiger worship in China's history

Despite HTCs and the hunting and persecution of tigers, ancient China also had a culture of tiger worship and a concept of legal animal protection. These concepts and laws influenced tiger protection to varying extents at different times and in different regions.

The concept of coexistence between humans and animals was present in ancient China. In the *Zhuangzi* 庄子 (a compilation of Classical Philosophical Daoism of Zhuangzi and his followers), it is stated: “Heaven and earth were born alongside me, and the 10,000 things and I are one” (*Zhuangzi*). This reflects the ancient Chinese conception of “promoting harmony between humanity and nature” (天人合一). Influenced by this belief, there has been a long-standing tradition of protecting animals throughout Chinese history despite the conflicts between humans and animals. The *Yi Zhou Shu* 逸周书 mentions that “In the mountains, trees are not felled out of season to promote their growth; in rivers and lakes, nets are not cast out of season to promote the growth of fish and turtles.

Birds' eggs and young animals are not taken, allowing the growth of birds and beasts. Hunting has its seasons, and no young sheep or pregnant sheep are killed. Calves do not pull carts, and colts do not run wild. The land retains its suitability, all things retain their innate characteristics, and the world follows its proper seasons.” This emphasizes the importance of “protecting and utilizing natural resources in season” (以时禁发) and protecting animals to maintain biodiversity. This regulation, issued in the 10th century BCE (from the record of *Yi Zhou Shu*, which is a compendium of Chinese historical documents about the Western Zhou period, ~1046–771 BCE), is regarded as one of the earliest forms of animal protection legislation.

During the Western Zhou Dynasty in the 11th century BCE, an environmental protection decree called *Fachongling* 伐崇令 was issued, which stated that animals should not be harmed. Violation of this prohibition was met with severe punishment, including the death penalty (Juanli & Jiang, 2020). By the time of the Qin and Han Dynasties (221 BCE–220 CE), the Chinese people had already recognized the contradiction between infinite human demands on nature and limited the regeneration capacity of natural resources. Consequently, more secure and detailed animal protection regulations were formulated, specifying which animal species could be hunted and the permissible times for hunting. Violations of these regulations were met with a variety of punishments.

In ancient China, HTCs were unavoidable due to the pressures of survival and the demands of rulers and emperors. In most cases, the management goal was to keep the intensity of these conflicts at tolerable levels for both people and wildlife. Hence, besides hunting and killing, there were other ways to resolve conflicts between humans and tigers.

One such approach was using virtuous governance to subdue tigers, derived from the culture of tiger worship. From prehistoric times, tigers were regarded as a symbol of authority and bravery, as evidenced by tiger totems from 4000 to 3000 BCE (Xuefei, 2018). From the Zhou Dynasty in the 11th century BCE, tigers were worshiped as one of the eight agriculture gods due to their ability to prey on wild boars (Qizhi, 2008). As the king of animals, tigers were believed to confront challenges and devour demons since the Han Dynasty of the first century (Liqi, 2010). Later, in the 10th and 11th centuries, Emperor Taizu of the Jin 金 Dynasty used a piece of tiger skin on his horse's back while hunting to symbolize his authority and bravery (Wenyn, 1986).

In ancient China, tigers were also regarded as divine and auspicious creatures, embodying the moral principles of punishing evil and promoting good. The government viewed the appearance of tigers as a judgment on their governance. When tiger disturbances or attacks occurred, officials and the public considered them warnings of poor governance. Therefore, the government would adopt benevolent

or virtuous governance to stop these warnings and drive the tigers away. Officials would offer sacrifices and prayers to the Cheng Huang deity, regarded as the guardian god of the city, assisting local governance. Along with the sacrifices, they would write and recite tiger articles to request Cheng Huang's help in expelling the tigers. For instance, in 1666, following the tiger attacks in Qingshui County, Shi Runzhang, the local official, composed a tiger article appealing to Cheng Huang to expel the tigers (Yi & Sunyi, 1870). In northeast China, tigers were worshiped as local deities to prevent tiger attacks.

4.2.2 | Tigers' increasing legal protection

In the mid-20th century, global concerns began to rise regarding declining tiger populations due to habitat loss and hunting. Efforts were initiated to address these issues through national legislation in several tiger range countries. In 1975, tigers were included in Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). This listing prohibited international trade in tiger parts and products and has played a crucial role in curbing illegal poaching and trafficking. The early 1990s witnessed significant international attention and initiatives for tiger conservation, culminating in the establishment of the Global Tiger Initiative (GTI) in 2008. In 2010, the tiger range countries participated in the St. Petersburg Tiger Summit, which aimed to improve tiger habitats, strengthen antipoaching efforts, and enhance international collaborations for tiger conservation.

In 1950, the Central People's Government of China announced the *Methods for the Conservation of Rare Species* 稀有生物保护方法, marking the official start of wildlife protection in the People's Republic of China. Subsequently, related policies and regulations on forest protection, land resource utilization, hunting regulations, and relevant laws involving animal protection at the national level were enacted successively. These measures provided stronger prerequisites for tiger protection.

In 1959, the Ministry of Forestry of the People's Republic of China issued the *Directive on Proactive Implementation of Hunting Activities* 关于积极开展狩猎活动的指示, which had a contradictory approach to tiger conservation. The third article of this directive designated the Amur tiger as a rare and precious animal, prohibiting indiscriminate killing to prevent extinction, except for capturing some individuals for scientific research, exchange, and captive breeding in parks. Paradoxically, the first article encouraged hunters to eliminate harmful birds and animals that posed a threat to humans, livestock, and agricultural and forestry crops, including tigers (especially the South China tiger), bears, leopards, and wolves. As a result, the South China Tiger was not afforded any protection under this directive. In September 1962, the State Council listed the Amur tiger in the animal

protection list and established nature reserves through the *Directive on Proactive Protection and Rational Utilization of Wildlife Resources* 关于积极保护和合理利用野生动物资源的指示. In March 1977, the Ministry of Agriculture and Forestry designated the Amur tiger as a first-class protected animal at the national level and the South China tiger and Bengal tiger as second-class protected animals. In 1988, China promulgated the *Law of the People's Republic of China on the Protection of Wildlife* 中华人民共和国野生动物保护法, which classified all subspecies of tigers as national first-class protected animals, strictly prohibiting illegal hunting. This legislation has significantly contributed to safeguarding and restoring tiger populations, as well as protecting their natural habitats. The law establishes the principles, responsibilities, legal liabilities, and management measures for the protection of wildlife and its habitats. It covers matters related to the conservation, utilization, transportation, trade, destruction, harm, rescue, and damage of wildlife.

4.2.3 | Nature reserves and national park: Habitat protection for tigers

Ensuring sufficient living space and resources for tigers is an important measure to address HTC and ensure tiger conservation. The establishment of nature reserves and national parks is an effective way to protect tiger habitats and plays a crucial role in their survival and reproduction. At present, there are seven tiger-relevant nature reserves established in the regions where the four subspecies occur or used to occur in China. For Amur tigers, there are two reserves: (1) Hunchun Amur Tiger Nature Reserve (the first national-level reserve for Amur tigers, established in 2001) and (2) Heilongjiang Laoyeling National Nature Reserve; for South China Tigers: (3) Jiangxi Yihuang Chinese Tiger Provincial Nature Reserve, (4) Jiangxi Le'an Yushan Laohunao Nature Reserve, and (5) Zhejiang Fengyangshan and Baishanzu Nature Reserve; for Indochinese Tigers: (6) Fujian Longyan Meihua Mountain Nature Reserve; and for Bengal Tigers (7) Yarlung Zangbo Grand Canyon National Nature Reserve.

In 2013, the Third Plenary Session of the 18th Central Committee of the Communist Party of China proposed the establishment of a new national park system. In 2021, at the Leadership Summit of COP 15, Chinese President Xi Jinping announced the formal establishment of the first batch of five national parks, including the Northeast China Tiger and Leopard National Park. This park is located in the southern part of Laoyeling Mountain, at the junction of Jilin and Heilongjiang provinces (42°38'45"N to 44°18'36"N and 129°05'01"E to 131°18'52"E), covering an area of 1.4065 million hectares. It is the most populous, active, and important settlement and breeding area for tiger and leopard populations in Northeast China (National Forestry of China, 2017).

The establishment and improvement of nature reserves and national parks have led to the protection

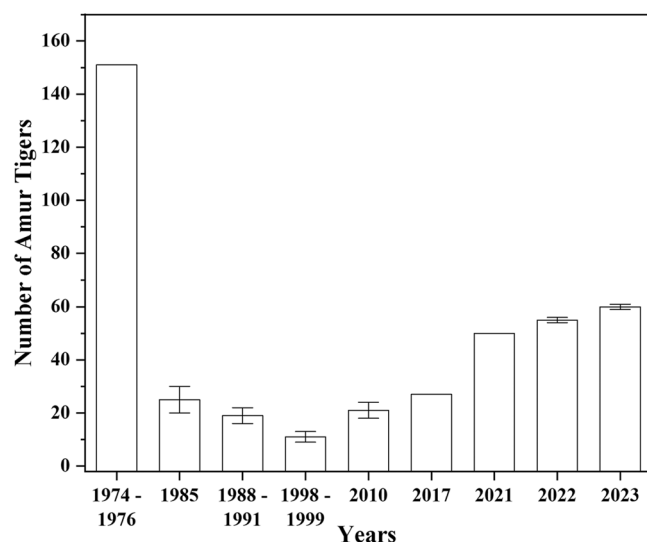


FIGURE 2 Number of Amur Tigers (*Panthera tigris ssp altaica*) during different years. Data Sources: 1974–1999: Xiaochen et al. (2000); 2010, 2017, 2023: Xinhua News Agency; 2022: China Biodiversity Conservation and Green Development Foundation (2022).

and restoration of tiger habitats, providing conditions for the return of the Amur tigers. In the 1970s, the population of Northeast Tigers was 151, but it sharply declined afterward. Since the establishment of the first Amur tiger nature reserve in 2001 and the subsequent establishment of the national park, the population of Amur tigers has shown some recovery (Figure 2).

4.2.4 | Prohibition of the tiger medicine trade and scientific alternatives

Apart from HTC and the trade of tiger products, the medicinal use of tiger parts poses a significant threat to their survival. On May 29, 1993, the State Council of the People's Republic of China issued a notice titled "Prohibition of Rhinoceros Horn and Tiger Bone Trade," which comprehensively banned the trade of rhinoceros horns and tiger bones. This notice prohibited the acquisition, utilization, import, and export of tiger bones and derived products. It also canceled the medicinal standards of tiger bones and removed them from the Chinese Pharmacopoeia. Furthermore, the use of formulations containing tiger bones was prohibited. This policy put an end to China's 1000-year history of using tiger bones in medicine and halted the trade of tiger products, allowing tigers to live and reproduce. Since the ban, efforts have been made to develop artificial alternatives to tiger-based medicines.

5 | CONCLUSION

Throughout different historical periods in China, both negative (HTC) and positive (coexistence) human–tiger interactions have existed. The negative interactions can be divided into direct and

indirect, and there have been distinct phases of these negative interactions throughout China's complex and rich history. In ancient times, direct conflicts were mainly sporadic encounters between humans and tigers, which were relatively mild. During the Middle and Late Middle Ages, human habitats began to overlap with those of tigers, leading to an intensification of direct conflicts and state-sponsored tiger hunting activities, particularly during the Ming and Qing dynasties. In modern times, habitat fragmentation due to urbanization and modernization has become the main cause of tiger population declines in China. At the same time, the use of tiger products in traditional Chinese medicine and trade has perpetuated tiger hunting throughout history.

Despite the widespread distribution of HTCs, there has been a longstanding belief in the harmony between humans and nature, as well as the worship of the tiger. In certain regions and during specific periods, these beliefs have tempered HTCs and provided examples of human–tiger coexistence. Recently, the dissemination of scientific knowledge and the promotion of conservation principles have prompted the Chinese government to establish tiger conservation systems, create nature reserves and national parks to restore and protect tiger habitats, ban trade in tiger products, and promote human–tiger coexistence. As apex predators, tigers play a crucial role in maintaining biodiversity in their ecosystems. Due to their small and dispersed populations, tigers are no longer a significant threat to local communities in China. The current focus is on restoring tiger habitats and promoting the recovery of tiger populations to ensure ecological balance and biodiversity in their ecosystems.

AUTHOR CONTRIBUTIONS

Zhihong Cao: Conceptualization; data curation; formal analysis; funding acquisition; investigation; methodology; project administration; resources; software; supervision; validation; visualization; writing—original draft; writing—review and editing. **Yu Li:** Conceptualization; data curation; formal analysis; investigation; methodology; project administration; writing—original draft; writing—review and editing. **Saud uz Zafar:** Conceptualization; data curation; formal analysis; investigation; methodology; project administration; writing—original draft; writing—review and editing. **Yi Wang:** Data curation; project administration; resources; writing—review and editing. **Chuanping Nie:** Conceptualization; data curation; resources; writing—original draft; writing—review and editing.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author (Cao Zhihong). The data are not publicly available due to further research needs.

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REFERENCES

- Changjixian Xiangtu Tuzhi 昌吉县乡土图志. (Ed.) (1908) Center for China's borderland history and geography studies of Chinese Academy of Social Sciences. In: *Xinjiang Xiangtu Zhigao* 新疆乡土志稿 (1990). China National Microfilming Center for Library Resources, pp. 118–119, 125–126.
- China Biodiversity Conservation and Green Development Foundation. (2022) Preliminary investigation report on the current status of tigers in China. *BioGreen-Biodiversity Conservation and Green Development*, 1(8), 89–106.
- Chinese Archaeology Society. (1997a) *Yearbook of Chinese Archaeology 1994*. Cultural Relics Press, p. 6.
- Chinese Archaeology Society. (1997b) *Yearbook of Chinese Archaeology 1994*. Cultural Relics Press, p. 173.
- Chinese Eastern Railway Company. (1933) *Heilongjiang* 黑龙江. Shanghai Commercial Press, pp. 302–304.
- Chouksey, S. & Singh, S. (2018) Assessments on the impact of human-tiger conflict and community-based conservation in Bandhavgarh Tiger Reserve, Madhya Pradesh, India. *Journal of Threatened Taxa*, 10(7), 11844–11849.
- Conference of the Parties to the Convention on Biological Diversity. (2022) *Kunming-Montreal global biodiversity framework*.
- Dahal, S., Thanet, D.R. & Gautam D. (2020) Assessment of human-tiger conflict and its community based mitigation efforts in madi valley of Chitwan District, Nepal. *Journal of Forest and Natural Resource Management*, 2(1), 37–49.
- Excavation Team of Geizidong Site. (1975) Report of relic of paleolithic period in geizidong site, Liaoning. *Vertebrata Palasiatica*, 2, 122–136.
- Gao, Y. & Clark, S.G. (2023) An interdisciplinary conception of human-wildlife coexistence. *Journal for Nature Conservation*, 73, 126370.
- Goodrich, J., Wibisono, H., Miquelle, D., Lynam, A.J., Sanderson, E., Chapman, S. et al. (2022) *Panthera tigris*. The IUCN Red List of threatened species. <https://doi.org/10.2305/IUCN.UK.2022-1.RLTS.T15955A214862019.en>
- Guangxu Sanxing Xianzhi 光绪三姓县志. (1890) *Harbin: Heilongjiang Provincial Library's lithographic print edition, 1960*.
- Guo, P. (1989) *Tale of King Mu* 穆天子传 *Siku Congkan Chubian* 四库丛刊初编, vol. 5. Shanghai Bookstore.
- Guoqin, Q. (1989) Mammalian fauna of quaternary period in Northern China. In: Rukang, W. (Ed.) *Palaeoanthropology in China*. China Science Press, pp. 277–377.
- Hedin, S. (1940) *The Wandering Lake*. Xinjiang Renmin Press, p. p146.
- Jianzhong, S., Yuzhuo, W. & Jiang, P. (1981) A paleolithic site at Zhou-jia-you-fang in Yushu County Jilin Province. *Vertebrata Palasiatica*, 19(3), 281–291. Available from: <https://doi.org/10.19615/j.cnki.1000-3118.1981.03.013>
- Jinfeng, Z., Qingin, A., Huo, W., Ming, Zh., Yilin, L., Yanjun, X. et al. (2022) A preliminary report on tiger status in China. *BioGreen Biodiversity Conservation and Green Development*, 1(8), 89–106.
- Jingxi, X., Zengyu, L. & Tingshu, S. (1751) *Qianlong Fuzhou Fuzhi* 乾隆福州府志. Shanghai Bookstore & Shanghai Century Publishing (Group) Co. Ltd., p. 150.
- Joint Jin-Niu-Shan Excavation Team. (1976) Mammalian fauna of quaternary period in Jin-niu-shan of Yingkou, Jilin. *Vertebrata Palasiatica*, 2, 120–127.
- Juanli, C. & Jiang, S. (2020) *New compilation textbook of the animal protection law*. China University of Political Science and Law Press.
- Li, X.Y., Hu, W.Q., Wang, H.J. & Jiang, X.L. (2023) Tiger reappearance in Medog highlights the conservation values of the region for this apex predator. *Zoological Research*, 44(4), 747–749. Available from: <https://doi.org/10.24272/j.issn.2095-8137.2023.178>
- Liangxue, C. (1998) *Huguang immigration and the development of Southern Shaanxi* 湖广移民与陕南开发. Sanqin Publishing House.
- Liqi, W. (2010) *Fengsu Tongyi Jiaozhu* 风俗通义校注. Zhonghua Book Company.
- Luo, R. (1443) *Liaodong Zhi* 辽东志. Qing-era Lead Printing Edition.
- Mai, H. (2006) *Yijianzhi* 夷坚志. Zhonghua Book Company.
- Ministry of Ecology and Environment of the People's Republic of China, Chinese Academy of Sciences. (2023) *China's Red List of biodiversity: volume on vertebrates*. Government Announcement 2023, No.15, p. 2.
- National Forestry of China. (2017) *Overall plan for Northeast China Tiger and Leopard National Park*.
- Nikolay Przhevalsky From Kulja, Across the Tian Shan to Lop Nor. (1879) *Huang Jianmin*. Xinjiang Renmin Press, 1999. pp. 141–143, 232–237.
- Nyhus, P.J. (2016) Human-wildlife conflict and coexistence. *Annual Review of Environment and Resources*, 41, 143–171.
- Peng, J. (1975) Cave deposits of late pleistocene epoch in Antu, Jilin. *Vertebrata Palasiatica*, 3, 197–198.
- Peng, J. (1982) A fossil human tooth from Jilin Province. *Vertebrata Palasiatica*, 20(1), 65–70.
- Qiaosong, Z. (1927) *Minguo Yongchun Xianzhi* 民国永春县志. Zhonghua Book Company.
- Qinding Shengjing Tongzhi. (1965) 钦定盛京通志. In: Yushu, L. & Yunlong, S. (Eds.) *Zhongguo Bianjiang Congshu* 中国边疆丛书, 27. Wenhai Publishing House, pp. 1347–1352.
- Qizhi, Z. (2008) *Shisanjing Zhushu-Liji Zhengyi* 十三经注疏·礼记正义. Shanghai Classics Publishing House, p. 1071.
- Ruyu, Y. & Bingran, Z. (1813) *Hannan Xuxiu Junzhi* 汉南续修郡志 *Zhongguo Fangzhi Congshu*. Chengwen Co. Ltd.
- Seidensticker, J. (2010) Saving wild tigers: a case study in biodiversity loss and challenges to be met for recovery beyond 2010. *Integrative Zoology*, 5(4), 285–299.
- Shen, M. (2014) (713–741) *Shiliao Bencao* 食疗本草 (Materia Medica of Food Therapy). In: *Peiran Q. et al. proofed Zhonghua Yidian* 中华医典. Hunan: Electronic and Audio-visual Publishing House.
- Shenwei, T. (1108) Zhenglei Bencao 证类本草, *Wenyuan ge Siku Quanshu*.
- Shizun, Z. (2005) The distribution of amur tiger in the southern part of northeast China in the 21st year of the Kangxi Emperor's Reign. *Manchu Minority Research*, 2(96–100), 121.

- Shunan, W., Tingxie, W. & Yufu, J. (1934) *Fengtian Tongzhi* 奉天通志. Editorial Committee of Northeast China's Literature and History Series, 1983. pp. 2597–2598.
- Tinghuai, Z. (1828) *Daoguang Xixiang Xianzhi* 道光西乡县志 *Zhongguo Fangzhi Congshu*. Chengwen Co. Ltd.
- Tuotuo. (1974) *Liao Shi* 辽史. Zhonghua Book Company, p. 247.
- Tuotuo. (1975) *Jin Shi* 金史. Zhonghua Book Company, p. 2627.
- Villalva, P. & Moracho, E. (2019) Tiger trade threatens big cats worldwide. *Science*, 364, 743.
- Weiqing, L., Zhiyan, Z., Baoshu, L. & Zaiguan, Q. (1935) *Minguo Lianjiang Xianzhi* 民国连江县志 *Zhongguo Difangzhi Jicheng*. Shanghai Bookstore & Shanghai Century Publishing (Group) Co. Ltd, p. 150.
- Wenyan, C. (1986) *Dajin Guozhi jiaozheng* 大金国志校证. Zhonghua Book Company, p. 19.
- Xiaochen, Y., Jingsheng, L., Zongan, S., Dongjun, H. & Xinshengfang, X. (2000) Current situation and conservation management suggestions for tigers in China. *Quarterly of Forest By Product and Speciality in China*, 53(2), 36–38. Available from: <https://doi.org/10.13268/j.cnki.fbsic.2000.02.032>
- Xijue, H. & Mingshu, L. (1930) *Minguo Huanren Xianzhi* 民国桓仁县志. In: *Zhongguo Difangzhi Jicheng* 中国地方志集成. Shanghai Bookstore & Shanghai Century Publishing (Group) Co. Ltd., pp. 159–160.
- Xingliang, L. (2009) A study on tiger disaster and interrelated problems in Jiangxi during the Ming and Qing Dynasties. *Ancient and Modern Agriculture*, 80(2), 64–71.
- Xinxue, Z., Yufeng, S. & Jiamao, W. (1984) A new mammalian fauna found in Gulongshan, Dalian. *Vertebrata Palasiatica*, 2, 151–155.
- Xuefei, X.I.N. (2018) Tiger totem worship in hongshan culture. *Journal of Jilin Normal University (Humanities & Social Science Edition)*, 46(1), 50–57, 88.
- Xueshi, H. & Guanfu, Z. (1973) Cave deposits of late Pleistocene Epoch in Benxi, Liaoning. *Vertebrata Palasiatica*, 2, 211–214.
- Ye, F. (1959) *Hou Hanshu* 后汉书. Zhonghua Book Company, p. 2982.
- Yi, P. & Sunyi, Z. (1870) *Qingjiang Xianzhi* 清江县志 *Zhongguo Fangzhi Congshu*. Chengwen Co. Ltd., pp. 1505–1506.
- Yi Zhou Shu 逸周书. (1999) *Wenyuan ge Siku Quanshu (Electronic Edition)*. Shanghai Renmin Press & Dizhi Digital Co. Ltd.
- Yu, T., Jianguo, W., Xiaojun, K., Zhongwen, L., Tianming, W., Pu, M. et al. (2009) Spatiotemporal pattern and major causes of the Amur tiger population dynamics. *Biodiversity Science*, 17(3), 211–225.
- Yuanjun, L. (1979) *Shuoyuan Jinzhu Jinyi* 说苑今注今译. The Commercial Press (Taiwan), Ltd., p. 25.
- Zhenhong, Z., Bao ku, Z. & Likai, Z. (1980) The discovery of Fossil Mammals at Anping, Liaoning. *Vertebrata Palasiatica*, 2, 154–161.
- Zhenhong, Z. (1981) The human and the culture of the paleolithic period from liaoning district. *Vertebrata Palasiatica*, 2, 184–192.
- Zhenhong, Z., Renyi, F., Baofeng, C., Jingyu, L., Mingye, Z., Hongkuan, W. et al. (1985) A preliminary report on the excavation of paleolithic site at Xiaogushan of Haicheng, Liaoning province. *Acta Anthropologica Sinica*, 1, 70–79.
- Zhihong, C. (2010) Chapter 1: Chinese culture of tiger. In: Hong, Y. (Ed.) *Chinese national geography: walking with the tiger*. Encyclopedia of China Publishing House, pp. 4–52.
- Zhiyi, W. (1842) *Zhandao Chutian* 栈道出田 *He Zhongjian*. Dao Guang Liuba Tingzhi, from *Zhongguo Xibei Wenxian Congshu*. Lanzhou Classics Publishing House, p. 403.
- Zhonghuang, T. (1926) *Chongxiu Zhen'an Xianzhi* 重修镇安县志, photocopy version in the 15th year of Republic of China. In: Editorial Committee of the Northwest China Literature Series (1990). *Northwest China Literature Series: Rare Local Chronicles Literature of Northwest China*. Lanzhou Ancient Books Bookstore.
- Zhongwen, L., Jianguo, W., Xiaojun, K., Yu, T., Tianming, W., Pu, M. et al. (2009) Land use pattern and its dynamic changes in Amur tiger distribution region. *Chinese Journal of Applied Ecology*, 20(3), 713–724.
- Zhuchen, T. (1947) *Study on the problem of paleolithic period sites in Northeast China*. Annals of Committee of Shenyang Museum.
- Zhuowei, T., Saihong, L., Zerong, L. & Han, L. (2003) The Late Pleistocene Fauna from Dabusu of Qian'an in Jilin Province. *Vertebrata Palasiatica*, (2), 137–146.
- Zixian, X. (1972) *Book of Southern Qi* 南齐书, 59. Zhonghua Book Company.
- Zuo Zhuan 左传, Yingong wu nian·隐公五年. (1999) *Wenyuan ge Siku Quanshu (Electronic Edition)* 四库全书 (电子版). Shanghai Renmin Press & Dizhi Digital Co. Ltd.

SUPPORTING INFORMATION

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