PERSPECTIVE

Mammoth ivory hunting in Siberia: economic, environmental and palaeontological considerations

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Abstract

Woolly mammoth (*Mammuthus primigenius*) tusks sell for a substantial price that proves to be an economic lifeline for many in the area of the Republic of Sakha, Russia. Ivory is extracted from permafrost through a variety of legal and illegal methods and sold abroad to China, western Europe and North America. The ivory trade revolves around three main dilemmas. The ethical balances the needs of people in Sakha with palaeontological, environmental and cultural preservation. The economic presents a struggling regional economy with an accessible and lucrative opportunity. The environment sees the ivory hunting practices decimate areas of protected tundra. This paper discusses these issues and seeks to look at the future of the mammoth ivory trade.

Keywords

Climate change; tundra; permafrost; Sakha (Yakutia); *Mammuthus primigenius*; ivory trade

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Abbreviation

CITES: Convention on International Trade in Endangered Species of Wild Fauna and Flora

Introduction

For the past three decades, the Siberian tundra has become the intersection of two unlikely worldwide struggles: the ivory trade and climate change. As global temperatures rise and summers become warmer, the permafrost begins to melt faster and more drastically than any other time in modern history. For three months, people in Russia's central Siberian territory of the Republic of Sakha (Yakutia) venture deep into the wilderness in search of woolly mammoth (*Mammuthus primigenius*) ivory. In the shadow of the former Soviet Union and the international ban on elephant ivory, they employ a variety of legal and illegal methods to extract and sell mammoth ivory that has been frozen in the Arctic tundra for at least 10 000 years. This 'ice-ivory' has become an economic lifeline in a region where opportunities are sparse. It comes with ethical, environmental and economic costs. This paper seeks to explore this trade largely through a review of existing published literature, websites judged to be reliable and correspondence with palaeontologist Dick Mol.

Historical overview

Ivory carving began in China during the Shang Dynasty, between 1600 and 1050 BCE. The practice flourished with the establishment of the Silk Road, an east–west trade route 2000 years ago, and became even more intricate and widespread under the Qing Dynasty between 1600 and 1911 (Larson 2023). Mammoth ivory was traded with China as early as the 10th century (Laufer 1925), not only through intermediaries but also through direct contact with Chinese merchants and collectors and Siberians (Digby 1925; Pfizenmayer 1939). Mammoth ivory became a significant trade commodity in Siberia after Cossack warriors conquered the region in 1582 (Tolmachoff 1929). The practice of mammoth ivory carving within Sakha (Yakutia) is relatively new, beginning in the 18th century (Ivanova-Unarova & Alekseeva 2021). It remains a culturally and economically important practice locally (Argounova-Low 2023).

As the world became more interconnected, mammoth ivory trading increased. By the early 1600s, it had been sold as far west as London (Tolmachoff 1929). Yakutsk, the metropolitan centre of Sakha (Yakutia), became the main trading hub, as the sale of mammoth tusks grew throughout the 19th and 20th centuries (Tolmachoff 1929; Table 1). Following the Russian Civil War, mammoth bones and ivory became an important research topic for the new Soviet government, helping to cement territorial and intellectual control over Siberia (Arzyutov 2019). Under Soviet leadership between 1920 and 1990,

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Table 1 Mammoth ivory sold in Yakutsk throughout the 19th century and into the early part of the 20th century. Source: Tolmachoff (1929), table 1 therein.

Year	Weight sold annually (kg)
1800–1850	16 329
1887–1893	18 125–28 576
1894–97	23 840–28 440
1910	31 025
1913	26 126

ivory hunting subsided with the rise of economic possibilities provided by the timber and mining industries (Kedr. media 2023).

The fall of the Soviet Union in 1991 ended Soviet economic opportunities in Sakha (Yakutia), and local Sakha ventured back into the tundra to offset this loss. This came on the heels of the international ban on elephant ivory by CITES in 1989, leaving elephant ivory sellers and collectors looking for an alternative. Mammoth ivory quickly became a popular substitute, driving many to get their hands on mammoth as fast and easily as possible. Theft was one of the fastest ways to obtain mammoth ivory, and in December 2003, the research collection at Cerpolex/Mammuthus in Katanga, Russia, was burglarized (Dick Mol, pers. comm. 2024). Approximately 1020 kg of ivory was stolen, cut into smaller pieces, smuggled into Moscow and sold in the Far East (Mol 2008).

In 2006, the Chinese government declared that ivory carving was an "intangible cultural heritage" (Ruoyao et al. 2018). Carved ivory remains a status symbol throughout China—the bigger, more extravagant and more expensive the carving is, the higher its status value. When the Chinese government banned the sale of elephant ivory in 2018, the market shifted towards mammoth ivory from Siberia.

It is estimated that there are approximately 10 million mammoths frozen in the permafrost, compared to 350 000 African elephants (*Loxodonta* spp.; Weiss 2019). Mammoth ivory is completely legal to buy and sell. Proponents of mammoth ivory boast that it is a sustainable alternative to elephant poaching. Others see the picture as more complicated, with potential negative consequences for elephants (Farah & Boyce 2019).

Physical, financial and legal risks

Monthly incomes in Sakha (Yakutia) rarely exceed 500 USD, whereas a single mammoth tusk can sell for more than 30 000 USD (Pilcher 2019). Many people in Sakha depend on the mammoth ivory trade for survival. While buying and selling mammoth ivory is legal, the methods used to extract this resource from the permafrost are largely illegal. Ivory is a high-risk, high-reward resource as poorer hunters often take out bank loans to finance hunting trips that can only be repaid if they are fortunate enough to find a tusk (Chapple 2017). Legal mammoth ivory hunting closely mirrors the methods of the last three centuries. According to Russian law, only tusks that have come to the surface naturally are allowed to be collected (Kean 2022). The non-invasive means of ivory hunting generally include boating along Siberian rivers looking for naturally exposed ivory or, in the case of some wealthier operations, scuba diving. In the murky waters, divers comb the ground with their hands, hoping to feel a tusk. These divers can make up to five dives per day, which can last an hour or more, in 10°C water (Arctic Russia 2023). Becoming a legal ivory hunter is an arduous process, as prospective hunters are faced with daunting legalities to navigate. For example, obtaining proper certification requires the hunter to register the plot of land they wish to search, purchase a special license and acquire 24 separate certifications from various authorities, with the whole process costing approximately 50 000 RUB (Sergeeva 2023) or about 500 USD. This is equal to the standard Sakha (Yakutia) monthly wage. Those that manage to get through the legal process to become licensed hunters then have to endure the long wait times of Russian governmental entities processing their tusks, certifying their authenticity and selling them. The wait times are extended by the bureaucratic lack of clarity regarding whether mammoth ivory is to be considered an animal product or a natural resource under the law (Ivanova 2019). According to one licensed dealer, Chinese customers are turning to the illegal trade because of the Russian government slowing down the sales (Weiss 2019). "We suffer big losses," he says. "Almost two tonnes of legally mined material were taken from me for inspection. A year-and-a-half has passed and the tusks are still being examined" (Weiss 2019). The immense effort it takes to acquire all the necessary certifications and licenses, the 50 000 RUB price tag, the need for scuba gear and other specialized equipment and the long waits make legal mammoth ivory hunting less attractive than illegal hunting for most people.

The process of monitoring ivory hunters falls to environmental protection officers and the local police force, who are spread thin monitoring vast areas of tundra (Chapple 2016). The lack of clear cut-division between legal and illegal activities, as well as the challenges in enforcing the law, means there is relatively little to stop licensed hunters from engaging in illegal mining operations. Illegal hunters venture deep into the tundra, oftentimes to legally protected wilderness areas, where they blast away permafrost soil with fire hoses and water

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pumps, hoping to expose tusks. Among the many dangers posed by these activities are the collapse of unstable tunnels, crashes during speedboat journeys to and from harvesting sites, and rival gangs vying for territory (Chapple 2017). Approximately half of all the exported ivory in 2019 was obtained illegally through the process of hydraulic mining. Those that do find ivory illegally often move it through the black market, where they sell at lower costs to middlemen who profit by selling the tusks onward to Chinese distributors.

In 2019, the Russian government banned the exportation of mammoth tusks over 3 m in length (Weiss 2019) on the grounds of their historical and cultural importance. Illegal hunters ignore the ban, as larger tusks are more profitable for them.

Palaeontological and environmental impacts

Hydraulic mining for ivory destroys palaeontological remains that are not of monetary value to the hunters, along with the palaeontological context of such remains. Searching for and extracting mammoth tusks exposes the bones and carcasses of a variety of ice age mammals, such as ancient bison and rhinoceros. These are usually simply discarded, as are mammoth remains that lack tusks. The 2020 discovery of a nearly perfectly preserved *Homotherium* cub by ivory hunters on the banks of the Badyarikha River highlights the uniqueness of specimens that can be lost (Lopatin et al. 2024).

Hydraulic mining results in silt and mud entering nearby waterways, overloading them with runoff. One journalistic investigation found that ivory hunters decided that it was no longer worth bringing their fishing poles to the extraction sites as the fish had moved out of the area (Chapple 2017). The damage to these waterways and the impacts on fish likely disrupt the larger local ecosystem.

Beyond runoff and local environmental pollution is the potential contribution of permafrost melt to climate change. The top cubic metre of permafrost contains 50 kg of organic carbon that, once thawed, decomposes and releases greenhouse gases (Schuur 2016). This is about five times more carbon per cubic metre than is stored in a similar area of non-permafrost soil (Schuur 2016). Methane, which has a far greater climatic warming potential than carbon dioxide, is also released as permafrost thaws (Schuur 2016). Ivory hunters often melt tunnels that are a few dozen metres deep, releasing gases stored in soil of the tunnelled area and also destabilizing the surrounding permafrost, hastening the thaw of these adjacent soils and thus the release of more greenhouse gases (Weiss 2019).

Even in the absence of mammoth ivory extraction, increased rainfall and snow-melt from rising Arctic temperatures are degrading permafrost (Czerniawska & Chlachula 2020; Chu 2021). The greater rainfall causes more flooding across all four seasons, exacerbating the erosion of permafrost cliff faces, exposing more tusks than ever before (Wang et al. 2021). This, coupled with rising summer temperatures and longer summer months, allows hunters to spend more time in the tundra (NOAA 2024).

In the international market, elephant ivory may be bought and sold as if it were mammoth ivory. The extent to which the legal trade in mammoth ivory masks the illegal trade in elephant ivory and thereby indirectly fosters the illegal hunting of elephants is another important environmental issue (e.g., Price 2022; Cox & Hauser 2023).

Recent trends

In 2021, the Wildlife Justice Commission published a 19-page report thoroughly exploring the wildlife trade on Chinese e-commerce websites. Through the course of their research, they found 4297 advertisements identified on seven online retailer sites selling wildlife products. Of the identified advertisements, 73% were for mammoth ivory. This included products ranging from small carvings to full tusks (Fig. 1). Pendants and other items of jewellery were the most common items sold on these websites, allowing the average Chinese citizen to have his or her own piece of ivory (Wildlife Justice Commission 2021). This is backed up by a survey published by GlobeScan Incorporated and the World Wildlife Fund showing that 56% of ivory pieces bought in China were purchased for friends, family or business associates (GlobeScan 2021). My review of European and North American online retailers selling Siberian ivory turned up approximately six stores in North America and 10 in Europe. Like the Chinese sites, jewellery was the most common listing across these sites. Full tusks were the second most common, followed by offcuts and fragments for personal art use. These numbers do not include sites selling mammoth ivory originating in Alaska or the North Sea, which do not directly contribute to the demand for Siberian ivory but play a role in it.

Since the early 2010s, the Russian government and local authorities in Sakha (Yakutia) have become more involved in the legalization and regulation of the mammoth ivory trade. At the end of 2022, there were 731 licenses issued for underground mining operations, belonging to 113 users (Arctic Russia 2023). There has been an upward trend over the last decade, with 71 licenses issued in 2015 and 431 issued in 2017 (Ferris

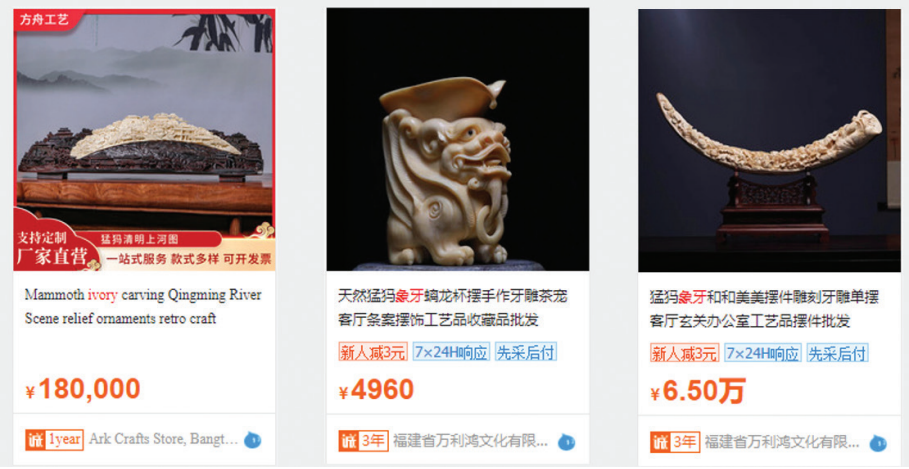

Figure 1 Carved mammoth ivory figures on a Chinese e-commerce platform (1688.com). The images were captured by the author in March 2024 using search strings that were suggested in a report (1921) published by the Wildlife Justice Commission.

2020). Estimates on the percentage of ivory hunters who are licensed vary, ranging from approximately 50 to 70%. This rising trend is in part due to efforts to grant special status to indigenous Siberian communities who rely on this trade. In April 2021, a programme of state support for traditional economic activities of indigenous small-numbered peoples of the Russian Federation, implemented in the Arctic Zone of the Russian Federation, was approved by the Russian government (Ministry of Foreign Affairs of the Russian Federation 2023). This programme contains provisions that give special status to indigenous populations in the Arctic, granting them wider access to and use of natural resources and economic opportunities. The programme allows for the annual training of indigenous people to educate them on traditional economic activities like "processing of agricultural products, manufacturing of craftwork and folk arts articles, including articles made of mammoth ivory" and "establishing of regulation of gathering of paleontological remains (mammoth fauna) by indigenous small-numbered peoples" (Ministry of Foreign Affairs of the Russian Federation 2023). If successful, this programme will encourage more sustainable practices of collecting and working mammoth ivory and would improve the chances that palaeontological finds are brought to the attention of scientists.

The middlemen that facilitate the black-market trade are also being targeted. Nestled into the *Catalogue of investment projects of Sakha Republic (Yakutia)*, alongside plans for a bridge, four-star hotel and waste recycling plant are the potential future plans for mammoth ivory (InvestYakutia n.d.). InvestYakutia, an agency that encourages investment in and the promotion of goods from the Sakha Republic, seeks to create a 'one-stop-shop' that processes tusks, reducing bureaucratic procedures and facilitating international trade. According to InvestYakutia (n.d.), a 200 000 USD investment in the ivory trade in Sakha (Yakutia) would industrialize it: 100 tonnes of ivory would be extracted annually, netting 3.3 billion RUB (53 million USD; InvestYakutia n.d.). This plan would circumvent black-market middlemen and localize tusk processing within Sakha (Yakutia), putting hunters one step closer to the final sale of their acquisition and potentially giving them a greater return on their investment. While it is unclear who is being asked to make this investment or who would actually benefit, it is, on the face of it, a promising step forward to localizing the ivory trade.

As the process of legalizing the trade in Russia progresses and becomes more regulated, the international market for Siberian ivory shows signs of change. Even as the exportation of ivory grows every year, a study by GlobeScan Incorporated and the World Wildlife Fund concludes that the interest in ivory in its biggest market, China, may be waning. In a study conducted between 2017 and 2021, self-reported data from Chinese ivory buyers showed a decrease in the intent to buy ivory. In 2021, 88% of surveyed people said they would not purchase ivory compared to 57% in 2017 (GlobeScan 2021). As the best mammoth ivory is typically exported to China, this recent trend may benefit local carvers in Sakha (Yakutia) by giving them access to more and better-quality ivory with which they can create finer pieces (see Argounova-Low 2023).

Conclusion

The driving force behind the ivory trade is the demand for unique conversation pieces, long considered status

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symbols in China and the West. With limited economic opportunities, Sakha resort to illegal mammoth ivory hunting, risking life and limb to support themselves and their families. As one mammoth ivory hunter acknowledged, "I know it's bad, but what can I do? No work, lots of kids" (Chapple 2016). All this is to the detriment of the environment, as well as the rich palaeontological record of Siberia. In recent years, the trade shows positive trends that may better the situation of those involved.

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