



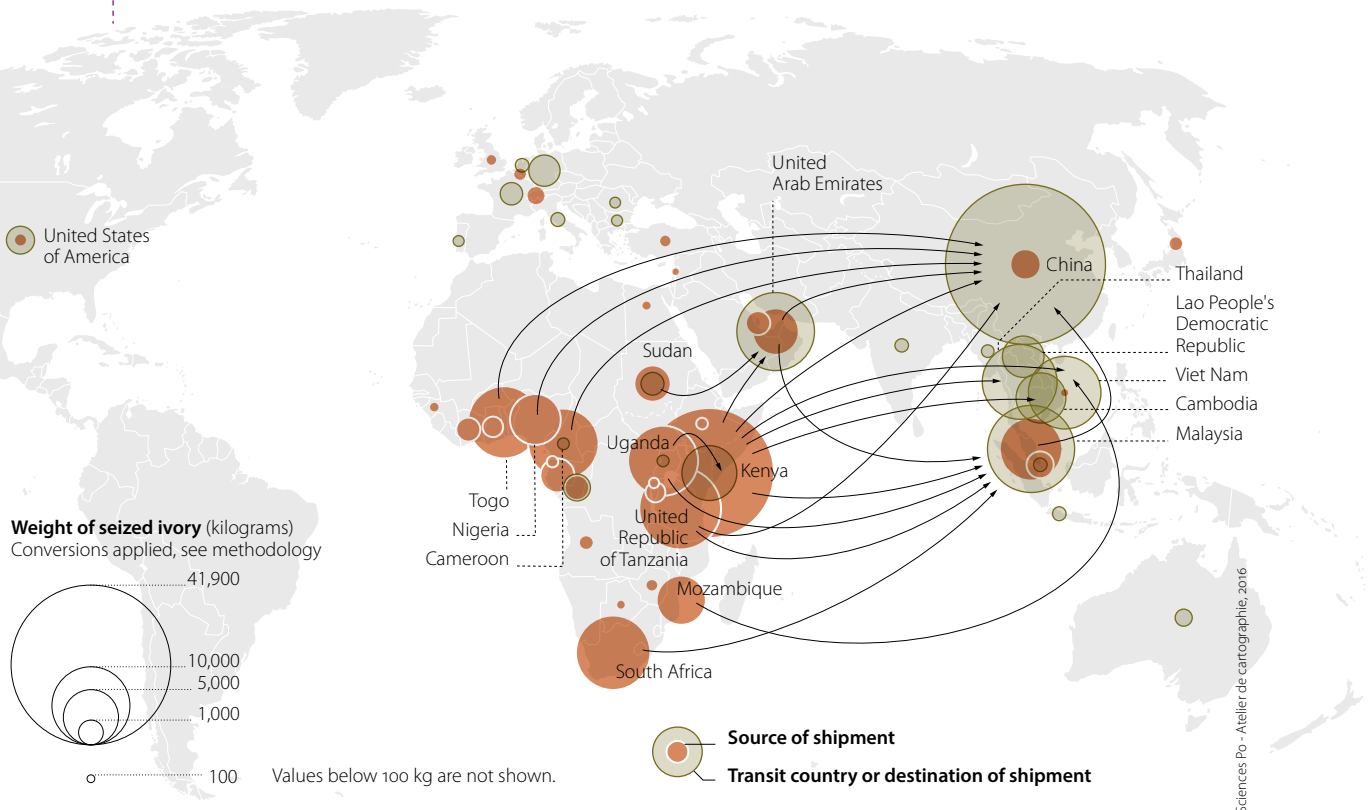
ART, DÉCOR, AND JEWELLERY

Case study: African elephant ivory

WILDLIFE PRODUCTS AS ASSETS

4

Map 1 Main flows of raw ivory seizures (kg), 2007-2014



Source: World WISE

Note: The boundaries shown on this map do not imply official endorsement or acceptance by the United Nations. Dashed lines represent undetermined boundaries. The dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties. A dispute exists between the Governments of Argentina and the United Kingdom of Great Britain and Northern Ireland concerning sovereignty over the Falkland Islands (Malvinas). The final boundary between the Republic of the Sudan and the Republic of South Sudan has not yet been determined.

Some wildlife products have attained such status and scarcity that their value has become detached from any practical uses they had historically. Today, they have taken on a role as value stores, hedges against the vagaries of interest and exchange rates in emerging markets.¹ These materials may be fashioned into jewellery, décor items, or objects of art, with the craftsmanship serving as the vehicle for the precious goods to be conspicuously displayed. But just as the price of gold is not reliant on the state of the jewellery market, the value of certain wildlife products may be based more on what speculators will pay for them than on any real consumer demand.

The products that lend themselves well to this role tend to combine two

key factors: they are traditionally recognised as precious and their supply is inherently limited. In emerging markets, the cachet of traditional use can also provide a vehicle for the nouveau riche to display their cultural credentials.² For this reason, high value art objects make excellent gifts, especially for the upwardly mobile.³ Where these products are under strict international control, their possession may also serve to demonstrate the political connections of the owner. In other words, they convey prestige precisely because attaining them legally is difficult.

This chapter explores the possibility that ivory has become one of these assets. Even when there were many more elephants in the world, ivory was recognised as a precious

commodity, a medium of which high art was made. With growing market restrictions, this exclusivity has been enhanced. This sort of recognised inherent value is extremely valuable in a world of currency fluctuations and rapid economic change.

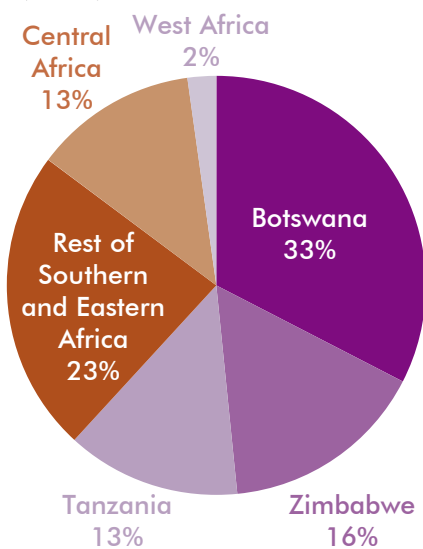
Evidence that raw ivory has become the object of speculation comes from several sources. Most broadly, it is difficult to reconcile what is known about supply with what is known about demand. No charted ivory retail market, licit or illicit, can explain the scale of poaching and trafficking that has taken place in recent years. This suggests there may be some additional reason, other than immediate use, to acquire ivory, and, as discussed below, speculation remains one possibility.



The raw ivory supply

There are about half a million elephants left in Africa (range 433,999 - 683,888),⁴ although there remains considerable uncertainty about their numbers.⁵ Based on the most recent estimates (2013), elephants range over 37 African countries, but over 60% of the known and probable populations reside in just three: Botswana, Zimbabwe and the United Republic of Tanzania. One-third appear to reside in northern Botswana alone. Estimates are only available for about half of the elephant range, however, and data are especially weak for the forest elephants of Central Africa.⁶

Fig. 1 Share of countries and regions in total African elephant population ("definite" and "probable") (count), 2013⁷



Source: IUCN/SSC/AFESG African Elephant Specialist Group

In addition to uncertainty about elephant numbers, it is also unclear how much ivory, on average, each elephant carries today.⁸ The yield figure most frequently used has been 1.8 tusks per elephant and about 5.5 kg per tusk.⁹ Since this is about 10kg of ivory per elephant, rough calculations can be made by simply adding a zero to the elephant population estimate. Thus, the ivory of all 500,000 African elephants in the wild today would weigh about 5 million kilograms, or 5,000 metric tons.

In addition to this total, stockpiles of tusks in source, transit, and destination countries exist, some held by governments and some in private hands. Ivory has gone missing from government stockpiles in the past.¹⁰ These stockpiles accrue due to a number of factors, including pre-convention purchases, natural elephant mortality, elephant population management, and seizures of contraband. If the natural mortality rate were about 3%,¹¹ which may be on the high side, then up to 150 tons of ivory could accumulate in these stocks annually, if it were all found.¹² While small in comparison to the total live ivory supply, leaks from these stocks could be a significant source of illicit trade.

Poaching

Elephants are one of the few species for which good poaching data are available, although even these data highlight the difficulties of tracking the illegal harvesting of wild species. Elephants die of many causes, and many die in places where their carcasses will never be discovered. As a result, a simple count of the number of poaching incidents detected would be a misleading indicator of poaching levels. Instead, the CITES Secretariat assumes that poached elephants will be detected at an equal rate as those that died of other causes, and calculates the share of dead elephants detected by rangers that were illegally killed. This share is referred to as the Proportion of Illegally Killed Elephants, or PIKE for short. Based on population estimates, estimates of natural mortality, and the PIKE scores, the number of elephants poached can be estimated.

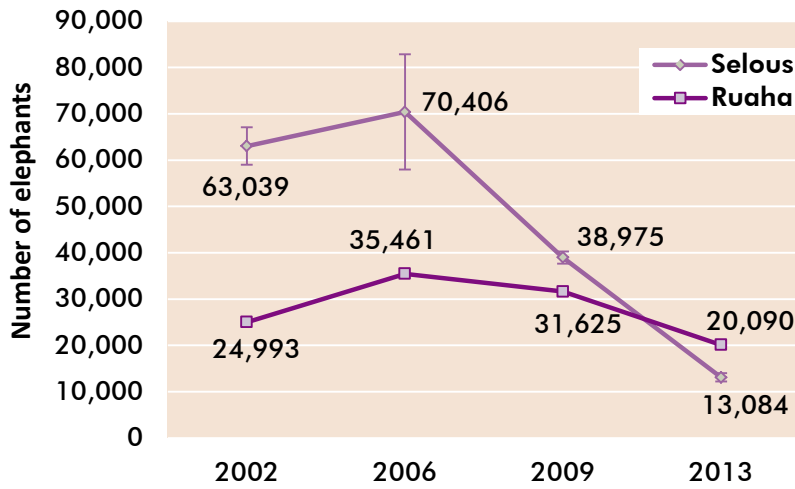
The PIKE score at about 60 designated sites is annually calculated by the CITES Monitoring the Illegal Killing of Elephants (MIKE) programme. In 2011, it was estimated that around 7% of Africa's elephants had been poached, with Central Africa, "...display[ing] the highest levels of elephant poaching in any subregion..."¹³ Since elephant

populations do not increase at rates much greater than 5% per annum, this suggests a net continental decline that year.¹⁴ Continental PIKE scores have declined since 2011,¹⁵ suggesting that it was the worst year for poaching.

The high PIKE scores in Central Africa are only one indicator of poaching incidence, however, and must be combined with population figures and natural mortality levels to estimate the numbers of elephants lost. Several sources of data suggest that Eastern Africa, and the United Republic of Tanzania in particular, has actually lost the most elephants in recent years. For example, based on elephant population surveys, the estimated probable number of elephants in the United Republic of Tanzania decreased from 136,753 in 2007 to 63,624 in 2013, a decline of over 50%, primarily resulting from losses in the Selous Game Reserve.¹⁶ Taking into account natural population growth during that time period, over 100,000 elephants appear to have been lost between 2007 and 2013.¹⁷ If so, the United Republic of Tanzania alone could have been the source of over 100 metric tons of illegal ivory annually for the past seven years.¹⁸

It is possible that the earlier surveys overestimated the number of elephants present, or that the current surveys have underestimated the number of elephants present, so the losses might not be as severe as they appear. But there are other sources of information that suggest the United Republic of Tanzania, and particularly the Selous and Ruaha reserves, has been targeted by poachers. Based on DNA samples taken from a number of large ivory seizures, it appears that the Selous Mikumi/Niassa Ecosystem (until 2013) and the Ruaha Rungwa Ecosystem (from 2013) have been two of the main sources of ivory trafficked internationally in recent years.¹⁹ As discussed below, most of the ivory tested from seizures made between 2009 and 2013 departed from Kenya (particularly Mombasa) and the United Republic of Tanzania.

Fig. 2 Elephant populations in the Selous-Mikumi and Ruaha Rungwa ecosystems in Tanzania, as estimated by surveys, 2002-2013



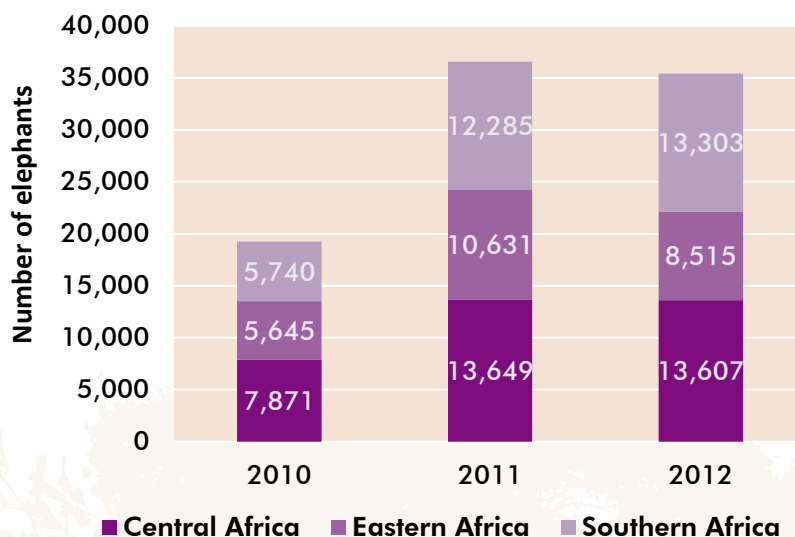
Source: Tanzanian Wildlife Research Institute 2013 (vertical lines represent 95% confidence intervals)

According to the DNA evidence, a second, but less well understood, source lies in Central Africa, at the juncture between Cameroon, the Republic of the Congo and Gabon. This area, known as the Tri-National Dja-Odzala-Minkébé (TRIDOM) trans-border forest, covers 178,000 km², or 10% of the Congo Basin rainforest, and includes 11 protected areas. The forest elephants that occur in this area are more difficult to survey than savanna elephants and, for this reason, the size of the population is

unclear. But poaching levels are high, and much of the ivory exported from West Africa appears to originate in this area.²⁰

Using the PIKE scores and assumed rates of natural mortality, it is possible to estimate the numbers of elephants poached. Using this method, it appears that poaching peaked in 2011 at around 37,000 elephants (Fig. 3),²¹ and that the ivory supply declined the next year, due to a reduction in both the accessible population and in poaching rates.

Fig. 3 Estimated number of elephants poached in Africa by subregion, 2010-2013



Source: Wittemyer et al 2014(model based method)²²

The people conducting this poaching cannot be described succinctly, as they range from opportunists to dedicated elephant hunters. For example, recent field research by UNODC in the Central African Republic has found at least three distinct groups who might target the remaining elephant population: local subsistence hunters; pastoralists from Sudan whose seasonal migration leads them through the region; and professional Sudanese poachers with a long lineage of dealing in ivory.²³

Beyond these categories, the “groups of experts” assembled to guide the United Nations Security Council in monitoring sanctions have emphasised the role of the security forces of several countries in poaching activities.²⁴ Media have also reported incidents where rangers, charged with protecting wildlife populations, were found to be active in poaching.²⁵

Although frequently alleged, the relationship between ivory poaching and insurgent groups is far less clear. While rebels commonly support themselves by extracting resources in the areas they control, most of the insurgent groups active today are operating in elephant-poor areas, depleted, in part, due to years of conflict (Fig. 4).²⁶

Without direct links to the destination markets, these groups likely would be paid the poacher’s rate for ivory, which, based on past research, is less than 10% the final retail price.²⁷ If insurgent poachers managed to kill all of the estimated 20,000 elephants in the countries where they are active, this would represent 4% of the African elephant population, and would earn them collectively between about US\$10 million and US\$40 million for that year. But these proceeds would need to be divided between the scores of armed groups active in these countries, and could never be collected again. Thus, at present, it is unlikely that poaching by armed groups in the areas they control threatens large numbers of elephants or constitutes a major source of threat finance.

Most of the ivory supply appears to be coming from countries at peace,



Fig. 4 Number of African elephants (“definite” and “probable” population estimates) in 11 countries with insurgency and 43 countries at peace²⁸



Source: For population data, the IUCN/SSC/AFESG African Elephant Specialist Group

such as the United Republic of Tanzania, as indicated by elephant population surveys, PIKE scores, the seizure records, and DNA evidence. If these data sources correctly portray the extent of the population decline, then the losses from reserves such as Selous and Ruaha were immense and it seems likely that corruption played a key role.

Trafficking

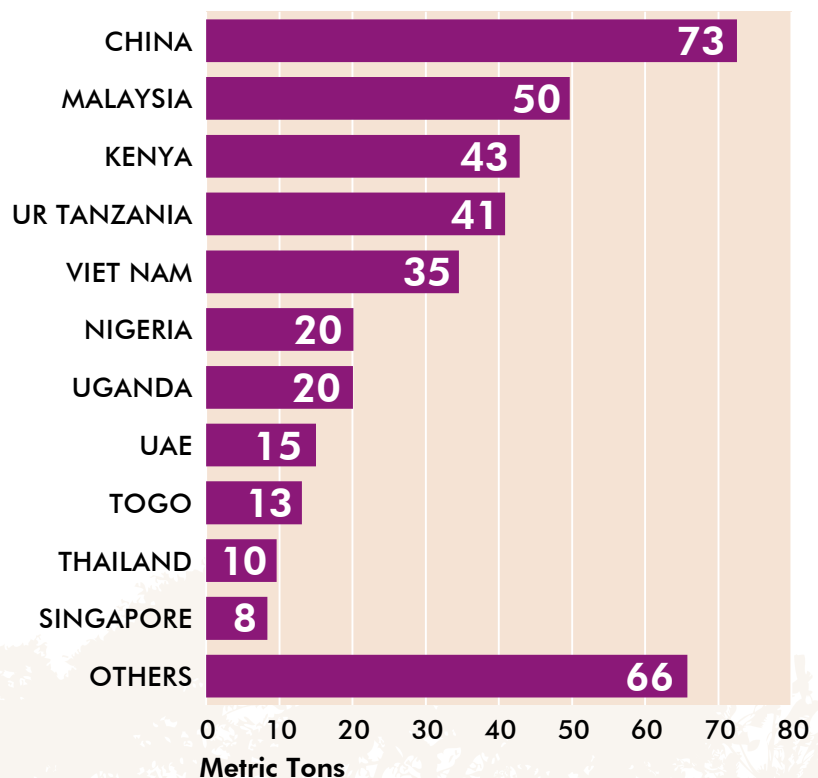
One of the most remarkable facets of the illegal ivory trade is the amount of contraband seized. Every year, law enforcement authorities in Africa and Asia make large ivory seizures, many measuring over 500 kg. The CITES Elephant Trade Information System (ETIS) collects ivory seizure data from CITES parties. Between 2009 and 2014 ETIS has recorded 91 such shipments, totalling 159 metric tons of ivory. This represents ivory from at least 15,900 elephants. Due to the considerable volumes of goods crossing international borders, it is likely that only a fraction of any contraband flow is seized. Poaching estimates suggest tens of thousands of elephants are illegally killed each year, producing hundreds of metric tons of ivory for export. Annual seizures on the order of tens of metric tons would seem commensurate.

It appears that most ivory trafficked from the African continent departs by sea in mass shipments of raw tusks. Over 70% of the ivory seized between 2009 and 2013 has been found in large shipments of raw ivory.²⁹ Eastern

Africa acts as the maritime gateway to the East, where demand for ivory lies. About 70% of the ivory seizures between 2009 and 2013 reported to CITES emanated from Eastern Africa, principally Kenya and the United Republic of Tanzania.³⁰

Based on the forensic evidence, elephant population surveys, and MIKE data reviewed above, the source of this ivory is likely the big reserves of the United Republic of Tanzania and, to a lesser extent, Kenya, Mozambique, and Central Africa. The container ports of Mombasa, Dar es Salaam, and Zanzibar are frequently associated with large ivory seizures. Large volumes of ivory seized by Uganda also indicates its use as a staging area. There appears to be trafficking within the region to Uganda and possibly Sudan, which serve as transit countries.³¹ A second flow emanates from Western Africa, with seizures associated with departures from Nigeria and Togo. Much of this ivory comes from

Fig. 5 Weight of ivory of large-scale ivory seizures (> 500 kg) by country identified in trade chains (as source, transit, or destination) (metric tons), aggregated 2009-2014



Source: CITES ETIS

Central Africa, particularly Cameroon, Gabon, and the Republic of the Congo (Brazzaville).³²

Although air freight is sometimes detected, the main mechanism of international transport appears to be containerised sea freight. Based on the seizure records, key transit countries for containerised trafficking include Malaysia (particularly Port Klang), Viet Nam (particularly Da Nang and Hai Phong), Nigeria, Uganda, Togo, the United Arab Emirates, and Singapore. Air couriers have also been detected recently.³³ Some media report a trend towards mixed loads, in which ivory is detected alongside rhino horn, lion teeth, and pangolin scales, suggesting a confluence of these trafficking chains.³⁴

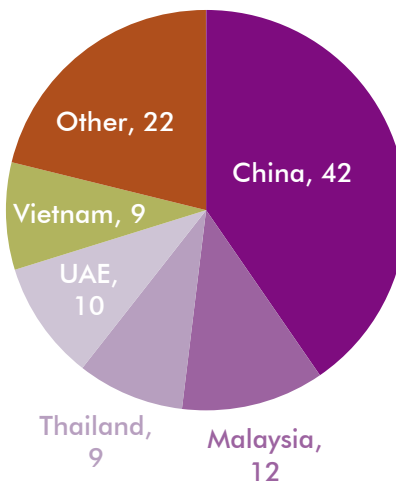
The predominance of large-scale seizures in the seizure total and the geographic concentration of poaching suggest a market controlled by a limited number of large players.³⁵

The destination markets

Ivory is traded openly in a number of countries where domestic ivory trade is legal. These legal domestic markets are usually subjected to national regulations, which differ from country to country. Academic researchers have been documenting wildlife retail markets since the late 1970s, and many surveys have been done of the shops and stalls selling ivory in at least 29 countries around the world.³⁶ Since the surveys involved open retail establishments, the sale of these objects was legal, or at least tolerated.

Many of these surveys are quite dated, and the market is likely to have changed considerably since they were conducted, but they illustrate the fact that demand for ivory is not confined to a single country. Looking at only the most recent survey for each area, a total of just under 200,000 objects have been counted globally. These surveys typically document thousands of individual ivory objects for sale, but most of these objects are very small, such as bangles, buttons, and chopsticks.³⁷

Fig. 6 Share of ivory shipments by country identified destination (metric tons), aggregated 2006-2015



Source: World WISE

Looking at these surveys, and other information about legal ivory production, it becomes clear that the known legal market for ivory is much smaller than the estimated illicit supply.³⁸ This fact calls into question whether the legal market for ivory has the potential to launder much illegally acquired ivory. Looking more broadly at all that is known about legal and illegal retail markets, the problem persists.³⁹ It is difficult to see where the ivory of tens of thousands of poached elephants is going.

According to analysis done under ETIS, the largest national destination market for detected ivory shipments appears to be China.⁴⁰ While not as complete as ETIS, World WISE documents over 800 raw ivory seizures between 2006 and 2015, for a total of just under 123 metric tons of ivory. For those seizures where the destination of the ivory was reported (104 metric tons), about 40% (42 metric tons) were directly destined for China.

Based on seizures reported to World WISE, the second most prominent destination for illegal shipments of ivory is Malaysia, a country where the domestic ivory market has not been formally assessed. Since seizures made in Malaysia tend to be both small in number and very large in volume, it

is likely that a large share of this ivory was ultimately destined for another country. About 60% of the weight of the ivory seized in Malaysia was destined for China, according to the Malaysian authorities. The Southeast Asian region as a whole is the destination of 39% of the ivory seized. So, adding China (40%) to Southeast Asia (39%) indicates that this part of Asia is the destination of 79% of the seizures captured in World WISE. This conclusion is similar to that drawn by ETIS in 2007: at least two-thirds of the ivory seized is destined for East Asian markets.⁴¹

According to World WISE, one-third of the illicit ivory seized was destined for markets outside China and Southeast Asia, and the licit markets there have not been assessed recently. But there is no indication that they are bigger than those in Asia, and even with considerable turnover, it is difficult to account for the hundreds of tons entering the market annually. In addition to this central incongruity, there are several other reasons to suspect that speculation may be taking place, including discussion of ivory as an investment noted by those who monitor illicit markets; growth in demand from whole polished tusks; high volatility in reported ivory prices, and even research that has correlated poaching with changes in the investment climate.⁴²

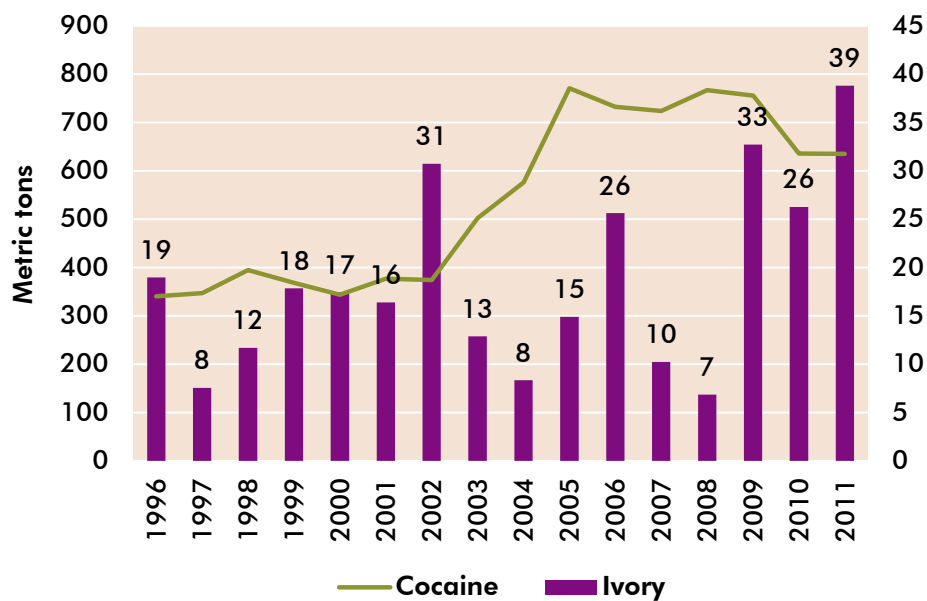
Analysis

This chapter has explored the possibility that ivory has become the object of speculation. The core evidence presented in this chapter is the incongruity between the amount of ivory being generated and any charted retail demand.

There may be issues with the way the data are being gathered or interpreted, leading to an overestimation of supply or an underestimation of demand. In particular, there may be a large and uncharted retail trade somewhere, including internet sales of small items. One possibility is that large numbers of small objects are being sold in illegal



Fig. 7 Total weight of large-scale (> 500 kg) ivory seizures recorded by ETIS versus global cocaine seizures



Source: For ivory CITES ETIS; for cocaine, UNODC

venues not currently monitored. Bangles and chopsticks can be produced by machine, and lower quality figures and pendants do not require master carvers.

Another venue for illicit retail sales is the internet, including the dark web, and a number of studies have monitored on-line sales of alleged ivory products. It seems likely that buyers and sellers of ivory meet electronically, as they do for all other forms of merchandise today, but the volume of charted retail sales of finished products detailed in these studies still would not account for the hundreds of tons of ivory entering the market each year.

It is also possible the charted retail demand may be larger than suggested in this chapter, due to back-room dealing, high rates of turnover, or other factors. But the large and continuous flow of raw ivory, teamed with rapid price changes and touted investment value, suggest that speculation might indeed be occurring. More research would be required to test this possibility, which has important implications for policy.

If ivory has become an investment commodity, this dramatically changes

the rules by which the market operates. Speculation limits the prospects for generalised demand reduction, because the value of the commodity is effectively de-linked from end use demand. Unlike cocaine or heroin, there is an absolute limit on the amount of ivory that can be produced, so there is a danger of a vicious cycle ensuing, where each elephant poached increases scarcity, and thus the incentives for poaching another. Paradoxically, interdiction and destruction of ivory stocks would also serve to limit supply, further enriching those invested in ivory. For these reasons, the illicit markets for investment-grade wildlife products will require a specialised approach.

How great is the illicit ivory flow? Between 2009 and 2013, an average of about 30 metric tons of ivory were intercepted in large-scale shipments annually, according to ETIS (Fig. 7). ETIS argues that these shipments, which exceed 500 kg, are indicative of organized crime activity. The annual seizure totals are highly volatile, however, making it extremely difficult to estimate what share is captured, let alone correlate these totals to other variables (Fig. 7). This is very different from other illegal commodities, like

cocaine or heroin. In fact, the standard deviation of annual changes of seizures in ivory over the 1996-2011 period is almost eight times as high as the standard deviation of annual changes in either heroin or cocaine seizures.⁴³ It is also true that a half dozen ivory seizures can make up more than half the annual total, which would be impossible with cocaine or heroin. The analysis below uses a five-year average of some 30 tons, but given the level of volatility, these figures should be viewed with caution.

Between 2010 and 2012, model-based estimates derived from the PIKE data indicate that some 30,000 elephants were poached, which would generate about 300 metric tons of illicit ivory each year.⁴⁴ This suggests that, on average, about 10% of the ivory flow is seized, although this share varies quite a bit from year to year. It also suggests that at least 270 tons of ivory reached destination markets annually during this period.

Endnotes

- 1 Yufang Gao and Susan G. Clark, "Elephant ivory trade in China: Trends and drivers", *Biological Conservation*, vol. 180 (December 2014), pp. 23–30. Gao and Clark's findings on the use of ivory as an investment were confirmed at a UNODC expert workshop convened in Nairobi, Kenya in February 2015.
- 2 Julie Ayling, "What Sustains Wildlife Crime? Rhino Horn Trading and the Resilience of Criminal Networks", *Journal of International Wildlife Law & Policy*, vol. 16, No. 1 (2013), pp. 57–80. African Wildlife Foundation, "Tackling Poaching & Illegal Wildlife Trafficking in Africa", (2014), p.5.
- 3 According to media sources, gifting of ivory became so popular recently in China that state officials urged a ban on the practice. See Yang Yao, "Call to ban ivory give and take", *China Daily*, 6 April 2014. Available from http://www.chinadailyasia.com/life/2014-04/06/content_15129145.html.
- 4 Based on the 2012 estimates of the International Union for Conservation of Nature/Species Survival Commission/ African Elephant Specialist Group (IUCN/SSC/AfESG), there are definitely 433,999 and could be as many as 683,888 elephants in Africa. See the 2013 Provisional African Elephant Status Report available from: http://www.elephantdatabase.org/preview_report/2013_africa_final/Loxodonta_africana/2013/Africa
In contrast, estimates for wild Asian elephants are in the low tens of thousands, less than 10% of the African population, and only the males have proper tusks. Asian elephants are not currently considered a significant source of supply, although they were in the past and still contribute to some markets.
- 5 Surveys of elephant populations use a range of methodologies, so it is difficult in some cases to come up with clear population estimates or trends at the national, sub-regional, or continental level. The existing population estimates are continually being updated by the IUCN/SSC/AfESG. Only about half the known elephant range has been recently surveyed, so there remain many populations for which no estimates currently exist.
- 6 The African Elephant Database incorporates estimates with a range of uncertainties, and thus does not give a single population estimate. Rather, it gives a series of four non-overlapping population estimates graded according to their basis: known, probable, possible, and speculative.
- 7 This graph reflects the 2013 estimates in the "known" and "probable" categories. See IUCN/SSC/AfESG 2013 op cit.
- 8 Poaching may influence the age profile of the population, and thus decrease average tusk size. For example, if the share of younger elephants in the population grows, the average amount of ivory per elephant would decrease. Poaching can also favor the prevalence of the genetic condition of tusklessness. See H. Jachmann, P. Berry and H. Imae, "Tusklessness in African elephants: A future trend", *African Journal of Ecology*, vol. 33, No.3 (1995), pp. 230–235.
- 9 See CITES SC62 Doc. 46.4 Annex, R. Martin, and others, "Decision-Making Mechanisms and Necessary Conditions for a Future Trade in African Elephant ivory: Final Report", (CITES Notification No. 2011/046) (24 May 2012), p. 16. "The mean tusk weight for the male ivory in all age classes is 8.36kg and that for the females is 2.55kg." This results in mean tusk weight for both genders of 5.45kg, assuming an even gender spread. An alternate tusk weight sometimes used is 3.66 kg per tusk, which would reduce volumes by one-third, but this figure is actually derived from an analysis of the average weight of a raw ivory piece in illicit trade, not a whole tusk weight.
- 10 See CITES SC65 Doc. 42.7 "Disposal of Ivory Tusks": <https://cites.org/sites/default/files/eng/com/sc/65/E-SC65-42-07.pdf>; and CITES SC65 Doc. 42.1 "Elephant conservation, illegal killing, and ivory trade": <https://cites.org/sites/default/files/eng/com/sc/66/E-SC66-47-01.pdf>.
- 11 For a discussion of elephant mortality rates, see the online methodological supplement to George Wittemyer and others, "Illegal killing for ivory drives global decline in African elephants", *PNAS*, vol. 111, No. 36 (2014): <http://www.pnas.org/content/suppl/2014/08/14/1403984111.DCSupplemental/pnas.201403984SI.pdf#namedest=STXT>
- 12 That is, $0.03 \text{ (mortality rate)} \times 500,000 \text{ (elephant population)} \times 10 \text{ kg (ivory per elephant)} = 150 \text{ metric tons}$.
- 13 See CITES CoP16 Doc. 53.1: Monitoring the illegal killing of elephants: <https://cites.org/eng/cop/16/doc/E-CoP16-53-01.pdf>, p 2.
- 14 Ibid.
- 15 See CITES SC66 Doc. 47.1 "Elephant conservation, illegal killing, and ivory trade": <https://cites.org/sites/default/files/eng/com/sc/66/E-SC66-47-01.pdf>, p. 19.
- 16 Based on the 2007 and 2013 African Elephant Specialist Group definite and probable population: <http://www.elephant-database.org/>
- 17 If the 2007 population were to experience a net growth of 5% each year until 2013, then the population would have been 183,262 in 2013. Instead, it was 63,624, and the difference between these two figures is almost 120,000 elephants.
- 18 That is $120,000 \text{ (poaching losses)} \times 10 \text{ kg (ivory per elephant)} / 7 \text{ (years 2007-2013)} = 171 \text{ metric tons of ivory per year}$.
- 19 The elephants in the Selous system in southern Tanzania intermix with the Nyasa reserve in northern Mozambique, so these two populations cannot be readily genetically distinguished. See S. K. Wasser, L. Brown, C. Maitland, S. Mondol, W. Clark, C. Laurie, and B. S. Weir. 'Genetic assignment of large seizures of elephant ivory reveals Africa's major poaching hotspots'. *Science*, 18 June 2015.
- 20 Ibid.
- 21 Wittemyer et al, 2014, op cit.
- 22 Ibid.
- 23 Research conducted for UNODC, April 2015. See online methodological index for details.
- 24 See, for example, the 2014 Final report of the Group of Experts on the Democratic Republic of the Congo to the Security Council, S/2014/42.
- 25 For example: <http://www.theguardian.com/environment/2013/mar/27/ranger-corruption-impeding-fight-poaching>; https://www.savetherhino.org/latest_news/news/977_corruption_threatens_kenyan_conservation_efforts; http://www.standardmedia.co.ke/?articleID=2000108222&story_title=national-park-where-rampant-poaching-thrives-as-rogue-kws-officers-go-scot-free&pageNo=2
- 26 The exceptions are Garamba National Park in the north-eastern Democratic Republic of the Congo and the Jonglei Ecosystem in northeastern South Sudan. In Garamba, half a dozen armed groups are competing for a population of elephants last estimated at 1,708 in 2012. Though tragic, this stock represents less than four-tenths of one percent of the African elephant population, and insurgent groups are likely to lose out to the formal militaries operating in the area. The Jonglei population was last assessed in 2007 at 5,462 elephants, but the population today remains uncertain.
- 27 In 2010 the poachers' price in the region was estimated to have been approximately US\$21 to US\$67 per kilogram, when the illicit wholesale price of ivory was around US\$750 per kilogram. See Dan Stiles, Esmond Martin and Lucy Vigne, "Exaggerated ivory prices can be harmful to elephants", *SWARA: Journal of the East African Wildlife Society*, vol.34, No.4, (October-December 2011), pp. 18–22, accessed at: http://www.rhinoresearchcenter.com/pdf_files/132/1322692493.pdf [3 December 2015].
- 28 Countries with insurgencies include those affected by Boko Haram (Cameroon, Chad, Niger, and Nigeria), the Lord's Resistance Army (Central African Republic, Democratic Republic of the Congo, and Sudan), the South Sudanese civil war, the Somali civil war, and the various insurgent groups active in the DRC, Ethiopia, and Burundi. While it has been alleged that Al Shabaab is deriving income from poaching in Kenya, very little evidence has been marshalled to defend this claim. See Tom Maguire and Cathy Haenlein, *An Illusion of Complicity: Terrorism and the Illegal Ivory Trade in East Africa*, London: Royal United Services Institute for Defence and Security Studies, 2015.
https://rusi.org/sites/default/files/201509_an_illusion_of_complicity_0.pdf
- 29 Fiona Underwood and others, "Dissecting the illegal ivory trade: an analysis of ivory seizures data", *Public Library of Science One* 8(10): e76539, 2013. doi:10.1371/journal.pone.0076539 doi:10.1371/journal.pone.0076539
- 30 According to ETIS data. About 86 metric tons of 120 metric tons where the origin or exporting country was known between 2009 and 2013.
- 31 Based on UNODC field research: see online methodological annex for details.
- 32 In a six-year period (2009–2014), almost 100 seizures of over 500 kilograms were made, accounting for the bulk of the ivory seized. At 2014 prices, a 500 kilogram shipment of raw ivory is worth over US\$1 million, and DNA analysis indicates that a



large share of this came from Tanzania via Mombasa. It appears the traffickers are well resourced and make use of proven trade routes.

33 Wasser et al 2015 op cit.

34 CITES SC66 Doc 47.1
<https://cites.org/sites/default/files/eng/com/sc/66/E-SC66-47-01.pdf>, p. 7.

35 See, for example: <http://vietnamnews.vn/environment/275067/eight-tonnes-of-smuggled-wildlife-products-seized.html>

36 See online methodological annex for details.

37 Ibid.

38 Ibid.

39 Ibid.

40 See CITES CoP16 Doc. 53.2.2 (Rev. 1) "ETIS Report of TRAFFIC": <http://www.cites.org/eng/cop/16/doc/E-CoP16-53-02-02.pdf>, p. 14.

41 See CITES CoP14 Doc. 53.2 "Monitoring of Illegal Trade in Ivory and other Elephant Specimens": <https://cites.org/eng/cop/14/doc/E14-53-2.pdf>, p. 42.

42 Brendan Moyle, "The raw and the carved: Shipping costs and ivory smuggling", *Ecological Economics*, vol. 107, Issue C (2014), pp. 259–265.

43 For ivory, $s = 1.09$ over the 1996–2011 period, compared to $s = 0.14$ for heroin or cocaine seizures. See online methodological annex for details.

44 Wittemeyer et al 2015 op cit.