ORGANIZED CRIME INDEX
BACKGROUND PAPER

GLOBAL INITIATIVE
AGAINST TRANSNATIONAL ORGANIZED CRIME

MEASURING THE SCOPE AND SCALE OF WILDLIFE CRIMES

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ABOUT THE SERIES

With the launch of the second iteration of the Global Organized Crime Index in September 2023, we are publishing a series of 13 discussion papers. These cover each illicit market considered during the development of the Index. The papers, written by international experts, have been commissioned to help move forward the debate around definitions and measurements used in analyzing transnational organized crime markets, and thus support responses to organized crime.

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GLOBAL INITIATIVE
AGAINST TRANSNATIONAL ORGANIZED CRIME

FROM VISION TO ACTION: A DECADE OF ANALYSIS, DISRUPTION AND RESILIENCE

The Global Initiative Against Transnational Organized Crime was founded in 2013. Its vision was to mobilize a global strategic approach to tackling organized crime by strengthening political commitment to address the challenge, building the analytical evidence base on organized crime, disrupting criminal economies and developing networks of resilience in affected communities. Ten years on, the threat of organized crime is greater than ever before and it is critical that we continue to take action by building a coordinated global response to meet the challenge.

INTRODUCTION

Trade in wild animals and plants occurs in most countries of the world and involves a wide range of species and commodities. Over the past 50 years in particular, a considerable array of policy and legislative measures have been introduced to both address trade-related conservation harms and enhance wildlife resource use sustainability, largely by exerting conditionality on access and commerce.

Nevertheless, wildlife trade remains a major element of the overexploitation of wild species, the second most significant driver of global biodiversity loss after land-use change.[1] A 2019 World Bank review of the costs of this trade concluded that when financial and economic values are combined, illegal logging, fishing and other forms of wildlife trade have an estimated full global economic value of between US$1 trillion and US$2 trillion per year.[2]

One of the key reasons that efforts to counter wildlife overexploitation struggle to succeed, is the emergence of criminal activities that circumvent regulatory measures and drive significant levels of illegal wildlife trade. Such wildlife trafficking varies greatly in scale and impact from country to country and between different wildlife commodity sectors. In some cases, criminal activity runs through the whole trade chain: from poaching or illegal harvest, through wildlife smuggling, to black market sale of prohibited goods to consumers. In other cases, crime is focused on a particular step along the trade chain, such as illegal timber harvest, with resulting products later being infiltrated into ostensibly legal markets.[3]

Wildlife trafficking has profoundly negative environmental and human impacts, threatening wild species and undermining their ecological roles, their value to human livelihoods and potentially contributing to the climate crisis through harm to ecosystem functionality.[4] The criminality driving poaching, smuggling and sale of wildlife in contravention of local, national and international laws and treaties is a significant global security challenge, often converging with other sectors of the illicit economy. Five decades of increasing international cooperation between governments, the private sector and civil society to address the challenge of wildlife trafficking has to some extent moderated its potential impact, but overall, the environmental, economic and social harms arising from such crime persist.

Significant investment by national governments, multilateral institutions and other funding agencies is being made to tackle this challenge. A 2016 World Bank analysis (currently being updated) documented US$1.3 billion of international donor funding between 2010 and 2016 to tackle illegal wildlife trade, in addition to substantial national investments domestically.[5] Key questions for those making such investment decisions include: knowing where the most significant problems are; whether interventions implemented at national, regional and global levels are effective in reducing criminal and environmental harm; and whether, overall, the problem is getting better or worse.

This paper aims to address the question of how the significance of such wildlife crime can be measured at a national level within the context of a global index of organized crime.[6] It begins by considering issues of definition, i.e. what activities fall within the scope of wildlife crime, across both flora and fauna markets highlighted in the crime index. This is followed by a review of past and present efforts to measure these crime areas. Finally, the paper looks ahead to consider how methods of measuring wildlife crime might be enhanced in future and how such efforts may need to evolve as the market itself changes over time.

DEFINING WILDLIFE CRIMES

There are two main considerations in defining wildlife crime as a type of criminal market: first, what falls within the scope of the term 'wildlife'; and second, what types of human activity constitute wildlife crime?

Defining the term 'wildlife'

The International Union for Conservation of Nature (IUCN) defines wildlife as 'living things that are neither human nor domesticated'.[7] This includes animals, plants, fungi and other living organisms, but excludes humans and domesticated species, such as sheep, horses, domestic dogs and many arable crops.

The emphasis of this definition is on the nature of the organism, rather than the manner in which it lives, so this definition encompasses individuals of wild (i.e. non-domesticated) species whether inhabiting a natural environment or kept in controlled (captive or farmed) conditions.

The term 'domesticated' can be defined as 'living organisms selectively bred and genetically adapted over generations to live alongside humans, genetically distinct from wild ancestors'.[8] Domestication is a long-term process of genetic and behavioural modification, the mechanisms and stages of which are subject to ongoing academic debate. Nevertheless, there are many animal and plant species clearly established as domesticated, including some species kept as pets and a wide range of breeds of agricultural livestock and arable crops.[9] The definition is not inclusive of wild species, such as parrots, songbirds or orchids, that are bred and kept in controlled conditions, but remain genetically indistinct from free-living wild populations.

Although it could be argued that illegal markets for domesticated species (or derived products), such as donkey hide, live cattle or arable crop trafficking, might overlap with those for wild species with regard to criminal participation and geography, the policy context is quite distinct. Wildlife crime has a distinct environmental policy context concerned with natural resource sustainability and nature conservation harms.

In certain contexts, particularly in North America, the taxonomic scope of the term 'wildlife' is interpreted in a more restrictive sense to include wild animal species only (or even a subset of wild animal species, such as terrestrial mammals, birds, reptiles and amphibia, therefore excluding marine and freshwater fish and invertebrates). Hence the common appearance of apparently tautological phrases such as 'forest and wildlife' or 'fish and wildlife'.

In other contexts, the term 'wildlife trade' is interpreted to exclude specific large-scale types of economic activity, particularly commerce in marine fishery products and timber, but this distinction is by no means clear cut in a definitional sense and is not employed in the current paper.

In summary, this paper adopts an inclusive interpretation of the term 'wildlife', as used by the IUCN. The labels 'fauna' and 'flora', used to distinguish between two types of wildlife market in the crime index, are consequently treated as referring to those involving all non-domesticated animals and plants, respectively. For animals, this includes species used in fisheries, and for plants this includes species harvested for timber. This usage is consistent with that employed in the context of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), an international treaty with 184 member states and which has been in operation since the mid 1970s.[10]

Activities that fall within the scope of wildlife crime

'Wildlife crime' is not a consistently defined term. Unlike the situation for some other forms of organized crime, such as human trafficking or firearms trafficking, there is no international treaty or other form of agreement that provides a formal, internationally accepted designation of the activities that fall within the scope of wildlife crime. This is equally true of the broader concept of 'environmental crime'.[11]

An obvious approach is to consider the term 'wildlife crime' to be inclusive of any criminal activity that involves or affects wildlife species. An activity within this scope might be one carried out in contravention of directly relevant legislation or administrative rules related to resource ownership or access rights; nature conservation; human, animal or plant health protection; or animal welfare. It could also be the case that an activity involving or affecting wildlife is deemed criminal because it contravenes more general legislation concerning, for example, theft, taxation or other fiscal provisions.

Since the context for defining wildlife crime in this paper is the assessment of criminal markets as pertains to transnational organized crime, further exploration of the term will focus specifically on criminal activities involving the commercialization of wildlife species, parts and products for trade, or 'trade-related wildlife crime'. However, it is important to acknowledge that in other contexts the general term 'wildlife crime' is employed more inclusively. For example, in an EU policy context, wildlife crime may be understood to include not only illegal wildlife trade but also illegal persecution, killing, poisoning or poaching of wildlife for reasons not related to trade, as well as the unauthorized alteration or destruction of habitats in contravention of environmental laws.[12]

Even with a specific focus on trade-related wildlife crime, there are some important questions to resolve in forging a clear definition of this type of activity. Following from a basic dictionary definition

that crime is 'an action or omission which constitutes an offence and is punishable by law',[13] a starting point would be to take stock of what types of legal provision make wildlife trade unlawful. These vary enormously from country to country and in many cases include differentiated treatment for particular groups of wildlife species. Some common components include restrictions on:

- the harvest (i.e. gathering, capture or extraction from nature) of specific native species (i.e. those occurring naturally within the country's borders), often based on assessments of conservation threat at the national or international level
- the harvest of native species from specific protected geographical areas;
- trade in certain native species, usually those for which harvest is also restricted, with trade taken to mean activities such as acquisition, purchase, transport, advertising, sale, transfer, possession, commercial breeding, import or export
- trade in certain non-native species, usually because of their listing under an international agreement to which the country is party (particularly CITES), but also in some cases as a measure to restrict introduction of potentially invasive species.

In some cases, such restrictions take the form of complete prohibitions on specified activities; in others, the activities may be allowed within the terms of rules or licensing conditions regulated by state authorities. Even in the case of general prohibitions, there may be provision for exceptions, justified for scientific research or to allow trade in antique or farmed specimens.

Typically, a country will apply different levels of regulatory treatment to different lists of species, based on assessment of conservation status or considering other values of policy importance. CITES takes a similarly differentiated approach, with a general prohibition on commercial trade in species listed in Appendix I of the treaty (again subject to specific exceptions) and requirements for government licensing for trade in species listed in appendices II and III.[14]

The legal instruments under which wildlife trade restrictions are enacted vary greatly from country to country. In some cases, a single piece of legislation governs all activities related to the harvest or trade for all native and non-native species. However, in many cases, such provisions are governed by various legislative instruments, often in a sectoral or thematic basis (e.g. species protection law, forestry management law, marine conservation or fisheries management law, legislation regulating introduction of alien invasive species or CITES implementation law). General trade and market laws, such as those relating to labour rights, trade duties, customs and market regulation functions, may also be applicable. Specialized primary legislation typically frames the policy context, definitions, general rules and statutory powers for trade restrictions, leaving the formulation of detailed provisions, even the designation of sanctions for non-compliance, to subsidiary regulations or administrative orders.

Sanctions for contravention of legal instruments that restrict wildlife trade vary enormously from country to country and often even between different sectoral laws in the same country. In some cases, they meet or exceed the serious crime threshold of 'punishable by four years or more in prison' as set out in the United Nations Convention against Transnational Organized Crime.[15] In other cases, sanctions include lesser prison terms, criminal or administrative fines. Delineating what activities are or are not to be considered trade-related wildlife crime on the basis of applicable sanction levels would be extremely difficult to do in practice and would create a distorted picture of the problem.

A final consideration is whether there is any justification to restrict the definition of trade-related wildlife crime to illegal activities involving only international trafficking, thereby excluding domestic trade within a source country. This question sometimes arises because trade regulation measures

under the primary international treaty governing wildlife trade, CITES, apply only to international trade transactions. However, restricting attention only to cross-border transactions would make little sense from the perspective of gaining an understanding of the value or reach of national wildlife markets. For some illegally harvested and traded wildlife species, domestic trade, for example to urban markets within the source country, is predominant. Excluding such internal illegal trade flows would seriously compromise any assessment of associated criminal markets.

Defining trade-related wildlife crime

For the purposes of setting up a global organized crime index, the aforementioned factors, together with the emphasis on criminal markets, are taken into account to define wildlife crime as 'taking and trading any wild species in contravention of national law'.

This definition is inclusive of all non-domesticated species and all forms of economic activity (such as timber and fisheries trades). It does not seek to limit the inclusion of criminal activities by type of applicable law or the severity of associated sanctions.

This approach is consistent with the definition used in the World Wildlife Crime Reports of the UN Office on Drugs and Crime (UNODC), which states that wildlife crime involves 'harvest and trade contrary to national law', with the additional condition of 'particularly, but not exclusively, the national laws implemented in fulfilment of CITES obligations'.[16] The emphasis on the contravention of CITES-related legislation provides a useful grounding in international policy of strong importance to UNODC's global assessment of wildlife crime. However, for full consideration of criminal markets at a national level, it makes sense to consider wildlife crime in its widest scope, as the main policy foundation is the applicable national law of the country in question, which typically will encompass species other than those listed by CITES.

It is important to recognize that the definition set out here deliberately places trade-related wildlife crime in a specific national legal context. It is often the case that the harvest or trade of a species is illegal in one country but not in another. Even for species prohibited from international commercial trade under CITES, local trade within national borders of some countries may not be subject to legal restriction and may even be specifically permitted as a matter of national policy.

MEASURING WILDLIFE CRIME

Assessments of the scale of trade-related wildlife crime and trends over time are of critical importance. They can help demonstrate the significance of the problem, highlight particular commodities or places of concern, assist in focusing remedial interventions and provide some evidence of their impact. However, as is typical with other crime sectors, quantification of illegal, sometimes hidden, activities can be challenging.

The following sections of this paper consider first which aspects of trade-related wildlife crime might be useful to be measured in order to characterize the significance of this market and then proceed to review some of the existing approaches with regard to their strengths, weaknesses, data sources and lessons. This is followed by an examination of the particular challenges of measuring trade-related wildlife crime at a country level.

Characterizing the significance of trade-related wildlife crime

There are several ways to consider the significance of trade-related wildlife crime at a global, regional, national or species/commodity-specific level. The five most commonly considered measures are: volume of illegal trade; level of conservation harm caused; monetary value of illegal trade; level of criminality involved; and level of human harm caused. The meaning, metrics and relevance of each of these measures are discussed below:

- **Volume of illegal harvest and trade** is a measure of the flow of wildlife goods harvested and traded illegally at some relevant geographic scale. It is often estimated based on seizures (which will be discussed in more detail later), through records of poaching or illegal harvest incidents or through observations of the availability of illegal wildlife goods in physical or online markets.

- **Level of conservation harm caused** is a measure of the conservation significance of an illegal flow of wildlife goods. This could be based on the overall conservation status of the species involved or on specific population impact measures.
- **Value of illegal trade** is a measure of the monetary worth of an illegal flow of wildlife goods, based on available price reference points at a particular stage of the trade chain. This is typically taken to be an indication of criminal significance.
- **Level and impact of criminality** refers to an assessment of the extent to which organized crime groups are engaged in an illegal flow of wildlife goods and the impact of their activities on society.
- **Level of human harm caused** is a measure of the significance of negative impacts on people and communities beyond the crime itself, such as loss of resource use value, insecurity or increased risk of disease exposure.

Deciding which of these measures to employ in any assessment of trade-related wildlife crime requires clarity about purpose. Many studies focus on either conservation significance or criminal significance, but sometimes both of these factors are of interest.

Measuring the significance of trade-related wildlife crime

Metrics, methods (quantitative and qualitative), data availability and strengths and weaknesses of each of the five measures outlined in the proceeding section are assessed below, along with examples of past and present application.

Volume of illegal trade

Estimating flows from illegal harvest and trade is not only a primary concern in its own right, but also of fundamental importance to the assessment of other measures of conservation significance and monetary value. Three main forms of measurement are employed to assess illegal flows globally, for specific geographical areas or for particular species/commodities, namely population losses, contraband seizures, and market observations.

Population losses

Meaningful assessment of population losses linked to illegal wildlife trade flows is feasible for only a limited number of cases. Quantitative assessment needs fairly precise evidence of population numbers or poaching/illegal harvest incidents, together with some means of assessment of the extent to which these losses relate to trade.

Two examples are assessments carried out on poaching of and trade in rhinos and elephants under the auspices of CITES. For rhinos, CITES Parties commission regular reports by the African and Asian Rhino Specialist Groups of the IUCN Species Survival Commission (IUCN SSC) and TRAFFIC. These reports include examination of rhino population numbers and records of poaching incidents. A trade connection for poaching incidents is inferred from the condition of observed carcasses, particularly when horns (the primary part in demand) have been removed.[17] For elephants, CITES has developed a poaching assessment programme in Africa and Asia. The Monitoring the Illegal Killing of Elephants (MIKE) programme assesses the proportion of elephant mortality related to poaching in a representative sample of sites to help estimate and monitor trends in the illegal killing of elephants.[18]

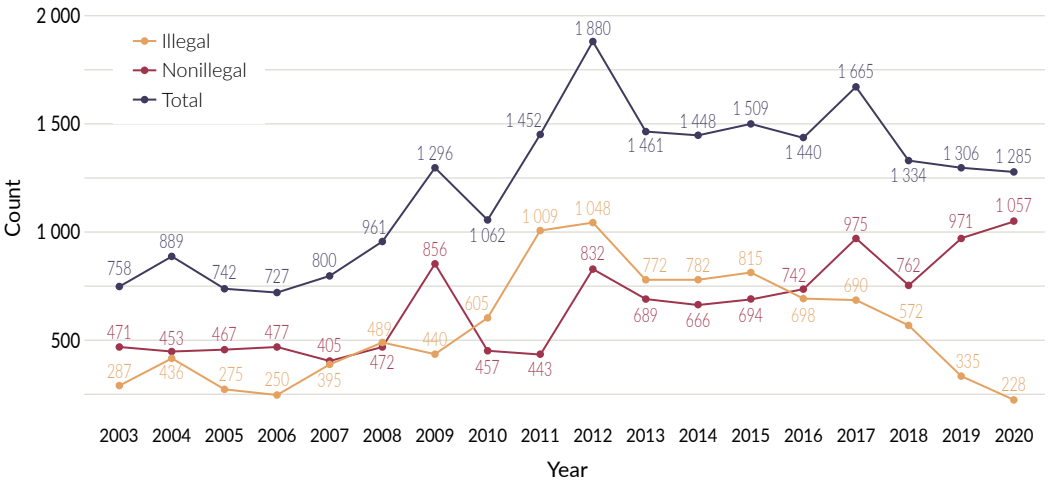


FIGURE 1 CITES MIKE analyses of elephant carcass data, showing annual number of carcasses by type of death.

SOURCE: Adapted from CITES, Monitoring the Illegal Killing of Elephants (MIKE) PIKE trend analysis 2003–2020, CITES, 2021, https://cites.org/sites/default/files/MIKE/E-PIKE_Trend_Analysis_Aug2021.pdf

Rhino populations are relatively small and largely restricted to well-studied areas, and both rhino and elephant poaching incidents can feasibly be assessed through ground and aerial observation owing to carcass size and the nature of much of their habitat. In both cases, dedicated conservation investments, including in population-level monitoring, are far higher than is typical. Unfortunately for most wildlife species, detailed data on populations and illegal harvest incidents is simply not available.

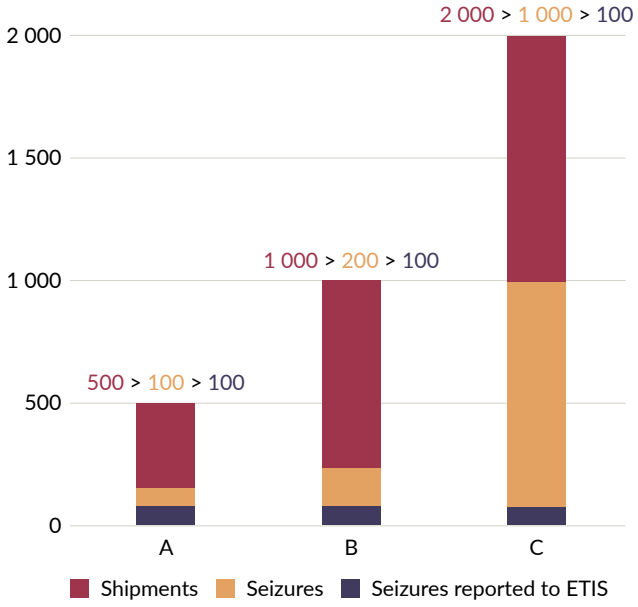
Population losses can also be inferred from factors such as offender arrests or assessed through qualitative methods, such as by questioning perceptions of changes in wildlife abundance, trends in necessary hunting or harvest effort and other relevant observations. However, such measures typically lack precision and are often geographically limited.

Contraband seizures

Compilation of seizure data is the most common approach to quantitative assessment of illegal wildlife trade flows. Most countries compile official records of such incidents and annual reporting of seizures of CITES-listed species is now formalised under that treaty. In addition, several NGOs now systematically collate seizures records from open sources, such as government news releases and media reports. Nevertheless, there are some important challenges to analysis of illegal trade flows on the basis of wildlife seizure data:

- **Data access** is patchy at best. Few of the sources of wildlife seizure data are openly accessible. CITES Annual Illegal Trade Report (AITR) data is largely restricted for analysis by multilateral agencies that are members of the International Consortium on Combating Wildlife Crime and some NGO holdings are managed for internal use only. However, the TRAFFIC-managed 'Wildlife Trade Portal'[19] and the 'Global Environmental Crime Tracker'[20] operated by the Environmental Investigation Agency, provide open access to a subset of wildlife crime data held by those organizations. It is also possible to access US seizure data for all species, including those not subject to CITES controls, from the US government Law Enforcement Management Information System.

- **Data gaps** undermine the representativeness of wildlife seizure data. Other than for CITES-listed species, commodity coverage fairly weak. Although media reports on non-CITES trade, such as of timber or marine product seizures, may provide some useful evidence, they often provide inadequate detail of the species involved or other important variables. Geographically, reporting of seizure data is patchy. A report on submission of CITES AITRs for 2016–2020 indicated that less than 40% of CITES member countries had submitted reports and noted that it is difficult to assess the extent to which those not reporting had also made significant seizures.[21] Similarly for open-source reporting, data availability is, to some extent, a reflection of patterns of government transparency, media capacity and attention.
- **Data limitations** frustrate efforts to use seizure data in gaining an understanding of the significance of particular market nodes and trade routes. At the time of seizure, shipment routing information may concern only one leg in a series of trade transactions and there may be an absence or lack of certainty of evidence about the original source and intended destination of the goods. Even when such information is available, it may not be included in accessible seizure records.
- **Data interpretation** faces some important challenges, chief among which is disentangling the extent to which seizures are a manifestation of how much law enforcement and reporting effort has been made, rather than a representation of actual flows of illegal trade (also see Figure 2). An absence of seizure reports for a country or species/commodity could accurately reflect an absence of trade, but it could also demonstrate that no law enforcement effort was made or that seizures were carried out but not reported. Conversely, high seizure reports for a country or species/commodity could reflect high levels of trade, but the significance of this finding relative to those for other countries or species/commodities can be hard to assess. Similarly, incomplete routing information may attract undue analytical emphasis on the location or country of seizure, which may, in fact, be a transit node with limited relevance to understanding associated crime patterns.

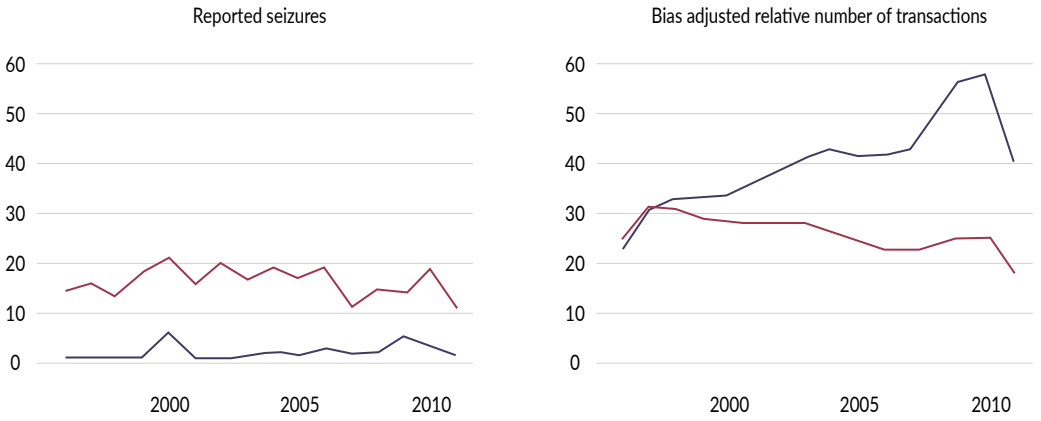


This example illustrates such discrepancies and the bias that can arise in seizure data. Three countries, A, B and C, each have different numbers of ivory **shipments** passing through them.

Each country also has a different **seizure rate**, meaning they only intercept a percentage of said shipments, and each also reports a different proportion of those seizures to ETIS (**reporting rate**). Thus, despite very different numbers of ivory flowing through each country, they all actually report the same numbers of ivory seizures (**100**) to ETIS.

FIGURE 2 An illustration of seizure data biases.

SOURCE: Adapted from TRAFFIC, Understanding ETIS: An introduction and overview of the Elephant Trade Information System, 2019, https://www.traffic.org/site/assets/files/3817/understanding-etis-vfinal-web.pdf



The example above compares reported seizures from **Country A** and **Country B** over a 15-year period, before and after bias adjustments are applied. Without any bias adjustment, data would otherwise indicate that Country A is a consistently more significant actor within global ivory supply chains than Country B. However, the number of incidents by country changes significantly once bias adjustments are applied, giving a far more accurate representation of each country's position within global ivory trade.

FIGURE 3 Bias adjustment of seizure data.

SOURCE: Adapted from TRAFFIC, Understanding ETIS: An introduction and overview of the Elephant Trade Information System, 2019, https://www.traffic.org/site/assets/files/3817/understanding-etis-vfinal-web.pdf

Many analyses of illegal trade flows based on seizure data are presented without adequate caveats to address the aforementioned challenges. Others provide appropriate signalling of data coverage and potential biases.[22]

One of the few examples to attempt statistical correction of reporting and enforcement effort biases in seizure records is the TRAFFIC-managed CITES Elephant Trade Information System (ETIS), which analyses global trends in illegal ivory trade and the role of individual countries in inferred trade flows.[23] A simplified illustration of the impact of bias adjustment is provided in Figure 3. ETIS has been employed by CITES member governments as a decision support tool since the late 1990s, though it is notable that a small number of countries have questioned the statistical methodology, particularly as it relates to the identification of countries most implicated in illegal trade flows, a topic examined later in this paper.

Ivory trade analysis also provides a good example of an additional challenge in measuring the significance of illegal wildlife trade flows. As a durable commodity, ivory is often stored for long periods before processing, sometimes because of hindered movement and sometimes because of economic circumstances that affect investment decisions and sales opportunities. It therefore cannot be assumed that recent illegal trade flows are representative of recent elephant poaching or of current market demand.

Other, simpler approaches to seizure data analysis make clear the potential biases of enforcement and reporting effort, indicating that reported seizure levels are minimum representations of trade flows and at least a partial illustration of geographical patterns from which useful insights can be drawn about the significance of illegal wildlife trade. Two examples are a recent TRAFFIC study of illegal tiger trade trends[24] and a Wildlife Justice Commission review of rhino horn trafficking.[25] Many such reports plot trends over time with appropriate caveats, but resulting graphics are sometimes presented without the degree of caution they deserve.

Though useful to characterize significance for individual species, the use of seizure data as an indicator of the significance of total illegal wildlife trade flows for all species is particularly challenging owing to technical complications of data aggregation. For commodities reported by weight, timber or other bulk commodities may predominate, with changes in trade flows for other goods forming a small minority of the total, making fluctuations in levels of trade for all but those traded in bulk difficult to discern. An alternative approach would be to calculate annual percentage changes in illegal trade levels for individual species/commodities and then take an average of those figures as an aggregated trend. This is the approach used to assess aggregated wildlife population trends in the Living Plant Index.[26] However, the potential utility of this aggregated trend method depends on the precision of the constituent data inputs, which for reasons already noted may be questionable for inferred illegal trade trends based on wildlife seizure data.

An extension of the use of seizure data to gain insights into illegal wildlife trade trends is the methodology for an indicator of target 15.7 of the UN sustainable development goals (SDGs) on poaching and trafficking of protected wildlife species. The indicator estimates the proportion of traded wildlife that was illegally traded, using a standardized price-based aggregation method, which has already been employed in UNODC analyses of wildlife seizures in the World Wildlife Crime Reports.[27] For the SDG indicator, this aggregation method is used to compare reported legal trade and seizures (as a proxy for illegal trade) for CITES-listed species. The aim is to express the relative significance of illegal trade as a component of the wildlife trade market as a whole, rather than to consider changes in levels of illegal trade in isolation.[28]

Market availability

Many assessments of wildlife crime aim to gain insights to illegal wildlife trade flows through direct observation of wholesale and retail markets. With increasing levels of commerce shifting to internet platforms over the past two decades, trade monitoring is now commonly carried out at both physical and online market sites. There are some important methodological and interpretation challenges for the use of such information:

- **Simple recording of commodity occurrence in physical markets is not necessarily a good measure of illegal trade flow.** Market surveys typically record what goods are on display or claimed by traders to be in stock, but gain little insight into trade turnover levels. For perishable commodities, such as fresh wildlife meat, this may be less problematic if an assumption can be justified that products on display are typically sold the same day. However, for durable commodities, it is more difficult to ascertain how regularly sales take place and a well-stocked store is not necessarily a sign of high trade flow. It is possible to address this constraint through parallel qualitative enquiry or even through covert observation of sales transactions, but it is unlikely to be practical to do this at scale.
- **Reliable market sampling to assess trade changes over time** is often difficult owing to the transitory nature of many wildlife-based businesses and seasonal trade flows. Retail outlets observed one year may not exist at the same location at a later date. For markets near source locations, trade fluctuations may reflect seasonal availability of particular commodities, a factor often missed in research design.
- **Online markets are particularly difficult to assess**, because offers of illegal goods for sale may be fraudulent or speculative, rather than representative of actual trade flows. However, transactions taking place within a structured electronic system provides significant opportunity for observation and assessment if access can be secured.

- **Representativeness of market surveys is difficult to assess** as they tend to focus on particular species/commodities or locations for reasons related to policy-driven funding priorities and the programmatic interests of implementing institutions. The apparent absence of evidence of illegal wildlife markets in a country may simply reflect the fact that no surveys have been carried out. Similarly, the apparent persistence or absence of trade in particular species/commodities may reflect the fact that they were or were not the focus of observation effort. Many market observations are carried out by NGOs with specific species priorities, so other components of illegal wildlife trade in the same locations may simply not be recorded.

Despite these limitations, particularly in their use as quantitative measures, market observation can provide good insights into illegal wildlife trade flows. This is particularly the case when analyzed alongside other measures, such as seizure records. Market observations can also be analyzed together with price signals and surveys of consumer demand to provide deeper insights to illegal trade drivers and significance.[29] However, so far there have been few examples of quantitative comparative assessments of illegal retail markets for species in trade or at a regional or global level. More typically, assessment has drawn from qualitative research into key markets, such as the series of ivory market studies led by Esmond Martin and Lucy Vigne.[30] Such qualitative assessments can be used to inform simple comparative scoring of different markets, as was done for the 2012 WWF Wildlife Crime Scorecard.[31]

Level of conservation harm caused

Conservation harm is often expressed by flagging the globally or locally recognized conservation status of species in trade, often with reference to listings in the IUCN Red List of Threatened Species.[32] This may prove to be a correlation with limited significance if the primary threats leading to inclusion in the Red List may have nothing to do with trade. Nevertheless, such expressions of global conservation concern are at least a useful starting point in considering potential conservation significance of a particular trade flow.

For some intensively studied species it may be viable to go a step further by estimating the level of harvest from the wild population that is likely to have occurred to supply the estimated annual trade flow and then assessing the likely impact on population viability. As noted in the discussion about estimating illegal trade flows based on population loss, there are few cases in which direct observation of harvest or inference from mortality evidence is feasible.

Another approach is to use trade flow data based on seizure records or market observations to calculate at least a minimum number of live individuals extracted from the wild population. For trade in live individuals (or whole dead specimens), such calculation is reasonably straightforward, but needs to consider associated incidental mortality (for example, live birds that do not survive initial movement and holding prior to onward trade). For trade in animal and plant parts and derivatives, some form of live equivalent conversion factor is needed (for example, to estimate how many live pangolins might have been removed from the wild population to produce a certain weight of meat or scales thought to be involved in the trade flow). Such conversion factors have been researched and employed for a range of species. Examples include global analyses of tiger[33] and pangolin trade.[34]

Whether assessing levels of harvest from wildlife populations for illegal trade from population data or trade flows, using such information to evaluate conservation harm is not straightforward. The impact of removing individuals from a population on the conservation status of a species depends

on its inherent life history characteristics. For some species, high levels of harvest may have minimal impacts on population status, while for others even low levels of harvest can be a serious threat.

Consideration of conservation harm can also be viewed in a context beyond immediate species-level threat. Harvest-induced changes in population size and structure may alter a species' role in its ecosystem, potentially affecting other species and associated natural functions, including those related to climate.[35] A 2019 World Bank study of wildlife crime costs attempted for the first time to quantify negative impacts on ecosystem functions and services in monetary terms.[36]

Value of illegal trade

Monetary value of illegal wildlife trade is often estimated on the basis of declared values of wildlife shipments at international borders, but can also be assessed with reference to prices at other points of a trade chain, such as amounts reported to be paid to harvesters or associated with advertisements in retail markets.

As a measure of significance, valuation has the advantage that it can be aggregated across different wildlife commodity types as a common measure. This is the approach proposed, though not yet implemented, for the measurement of SDG indicator 15.7 on wildlife trafficking.[37] However, its significance, particularly as an indicator of criminality, can easily be misunderstood or misrepresented, because a spot price along the trade chain is not necessarily a good indication of potential profit, as associated trade costs are not quantified.

However, there are good methodologies available for assessing potential criminal profits from illicit financial flows that can extend the utility of value-based analyses. A good example is the analysis of supply and value chains and illicit financial flows from the trade in ivory and rhino horn in the 2020 UNODC World Wildlife Crime Report.[38]

Level and impact of criminality involved

The level of criminality involved in illegal wildlife trade is sometimes inferred from the occurrence of high-value individual seizures or evidence of connectivity between multiple seizures. For example, ETIS ivory trade analyses for CITES assume that illegal shipments over 500 kg are strongly indicative of the involvement of organized criminal activity.[39]

The level of criminality can also be assessed on the basis of qualitative evidence from interviews with convicted offenders or other informed sources. The recent rhino trade research carried out by the Wildlife Justice Commission provides a good example of integrated analysis of seizure data and investigative insights to identify geographical patterns of criminal activity in the trade chain.[40]

Another important manifestation of criminal significance of wildlife crime is the level of related corruption. A study of linkages between wildlife trafficking and corruption in East and Southern Africa illustrates how illegal trade benefits from vulnerabilities of weak governance systems.[41]

Level of human harm caused

With regard to human harms caused by wildlife crime, there are no widely accepted definition of relevant factors and indicators, which include issues such as levels of violence, diminished resource use value, loss of earnings, undermining community cohesion or exposure to disease risk.[42]

An example of a national study including assessment of wildlife crime impacts on poor communities was carried out in Uganda.[43] Another approach to assessing human impact is through economic indicators, such as losses in resource value or taxation revenue from legal trade. Comparative national assessments of such indicators were tested in the 2019 World Bank study of wildlife crime costs.[44]

The potential negative human impacts of zoonotic disease exposure related to wildlife crime have received particular attention as a result of the COVID pandemic, although a major review of related evidence indicates that risk probabilities are hard to quantify owing to a lack of consistent reporting and surveillance.[45]

It is also worth noting that various studies raise concern about the negative impacts on people and communities of law enforcement activities targeting poaching and wildlife crime, so it is important not to view human impacts of crime in a simplified manner.[46]

Assessing wildlife crime at a country level

Setting the scene

In considering options for evaluating the prevalence of trade-related wildlife crime at a country level, it is important to keep in mind the underlying biological and economic geography affecting this trade. From a biological perspective, the sourcing of wildlife exploited in this business is a result of both natural patterns of distribution and past impacts of human exploitation. Some trade sectors, by their very nature, focus on sourcing from regions of high biological diversity (especially tropical zones), whereas others seek bulk commodities that may have a long history of exploitation and depletion, which shape current sourcing choices. From an economic perspective, the prevalence of illegal wildlife trade in a country may be influenced by the state of the wider economy, its general role in global trade and a range of local socio-economic factors.

Another contextual consideration is that illegal wildlife trade is diverse, with different commodities each with distinct patterns of sourcing, trade, processing and consumption. Some countries act largely as sources or end markets for illegal wildlife trade, but for many these roles are not clear cut: a country may be a source for some species, but a trade hub or market for others. Developing a simple measure of the scale and impact of a country's role in illegal wildlife trade as a whole is therefore a significant challenge.

The potential utility of the different measures of significance of trade-related wildlife crime through a quantitative approach is analyzed in Figure 4.

MEASURE	UTILITY
Volume of illegal harvest and trade	
Population losses	Limited cases for which population loss data may be sufficient to infer trade flows, even at species level. Data at national level is not generally available.
Contraband seizures	■ The most comprehensive seizure datasets have restricted access, but good coverage at least for CITES species. ■ Data gaps for important non-CITES commodities. Some countries may skew assessments. ■ Seizure records are a hybrid indicator of enforcement action and market prevalence. It is critical to consider not only the country of seizure, but also those implicated in the trade chain, particularly upstream from where illegal harvest or smuggling has occurred without intervention.
Market availability	■ Data availability is patchy with regard to geographic and species/commodity coverage. ■ Predominant focus on commodity occurrence or offers rather than evidence of actual trade flow limits the utility of market data as a quantitative indicator of market prevalence.
Level of conservation harm	■ Data for simple correlation with global species threat status is available, but this is not a clear indicator of market significance. ■ Conservation assessments (e.g. the CITES–MIKE analysis of illegal elephant killings) are typically carried out at site, population or species level, with geographical boundaries that do not fall within individual country borders. ■ Availability and precision of population impact data at national level and assessment of the relative contribution of illegal wildlife trade are highly variable.
Value of illegal trade	■ Use as a quantitative measure depends on availability and inclusiveness of trade flow data (likely derived from seizure reports, which are generally not comprehensive) and a consistent price estimate for all species involved. ■ May be piloted as part of SDG indicator 15.7. ■ Gross trade value may not be a reliable indicator of criminal significance, which is more likely linked to associated opportunities for profit. ■ Illicit financial flow assessment methods may be useful, but difficult to apply across multiple commodities.
Level and impact of criminality	No obvious quantitative measures currently available.
Level of human harm caused	No obvious quantitative measures currently available.

FIGURE 4 Utility of different measures of trade-related wildlife crime at national level.

Review of examples

Although limited, some examples of how such measures are applied at a country level are reviewed.

CITES Elephant Trade Information System

The most prominent example, albeit applicable only to a single commodity, is the ETIS analysis of countries most implicated in illegal elephant ivory trade. Although centred on analysis of seizure data, ETIS employs a statistical cluster analysis of variables selected to draw out the general characteristics of a country's involvement in illegal ivory trade, differentiate law enforcement performance, and consider total ivory trade flows, especially those representing the greatest trade volumes.[47] Figure 5 shows the results for the 2022 ETIS analysis. Despite it being a powerful analysis, which continues to be used to inform CITES policy decisions, the complexity of the analytical approach has attracted criticism.

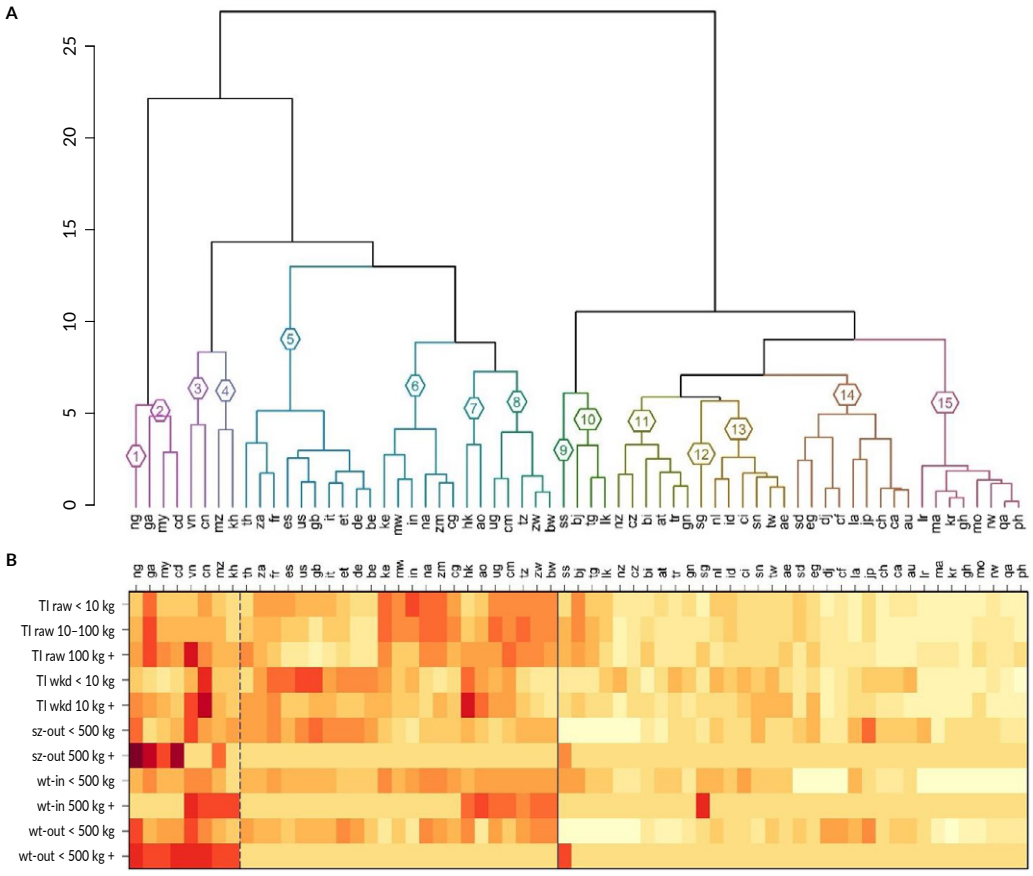


FIGURE 5 ETIS cluster analysis output, 2022.

SOURCE: TRAFFIC, The Elephant Trade Information System (ETIS) and the illicit trade in ivory, CITES CoP19 Doc 66.6, 2022, https://cites.org/sites/default/files/documents/COP/19/agenda/E-CoP19-66-06.pdf

IUU Fishing Index

The IUU Fishing Index provides a measure of the degree to which states are exposed to and effectively combat illegal, unreported and unregulated (IUU) fishing.[48] This index covers 152 countries with a maritime coastline, assessing and scoring their vulnerability, prevalence and response to IUU fishing. The introduction to the index indicates that it is a risk assessment tool and not intended to be used as the basis for computing the incidence of IUU fishing in individual countries, nor the level of perpetration of IUU fishing by given fleets. Nevertheless, the index provides an interesting example of country-level assessment of an important high-value wildlife trade sector. As a reference source for trade-related wildlife crime assessment, some of the 40 individual indicators used for the index, particularly those related to vulnerability to and prevalence of IUU fishing, are of specific interest.[49]

WWF Wildlife Crime Scorecard

WWF's one-off 2012 Wildlife Crime Scorecard report focused on 23 range, transit and consumer countries from Asia and Africa that face the highest levels of illegal trade in elephant ivory, rhino horn and tiger parts.[50] The purpose of the report was to evaluate compliance with and enforcement of CITES commitments for these three species groups, but the methodology included an assessment of illegal trade based on poaching and seizure data. Although the report covers only a few species subject to illegal trade, it illustrates some of the challenges that pertain to using illegal harvest and trade data for comparative purposes. The report's methodology section cautions that poaching data for these species include illegal killing for purposes other than trade and that available seizure data was likely incomplete and subject to effort and reporting bias.

Global Illegal Logging and Associated Trade risk data tool

The global Illegal Logging and Associated Trade (ILAT) risk data tool , developed by Forest Trends, is designed to support a better understanding of global trade in timber, pulp and paper products, including by revealing the main producers and processors of timber commodities as well as the trade routes associated with an elevated risk that the timber was illegally harvested or traded.[51] The tool presents global timber trade data for 211 countries linked to an assessment aimed to help flag the risk of illegal timber entering a supply chain. Although only some of the risk indicators are directly relevant to trade-related wildlife crime measurement, a powerful aspect of the tool is that all variables can be charted against volumes and values of all legal trade.

DISCUSSION

Future options for measurement of wildlife crime

Considering the many limitations to accurately measure global or national trade-related wildlife crime, it is important to ground future suggestions with a good degree of realism. This section of the paper takes stock of current constraints on data availability, and subsequently considers the implications of how trends in both wildlife crime and data availability might evolve in future. With these factors taken into account, some short- and longer-term options for future measurement approaches are suggested, with particular focus on country-level assessment.

Understanding current constraints

In considering how measurement approaches for trade-related wildlife crime might be improved, it is important to consider why current constraints persist. Important factors include the following:

- There is limited motivation for governments to officially report wildlife seizures or related crime statistics. The requirement to submit annual illegal trade reports detailing seizures of CITES-listed species was introduced only in 2016 and, unlike the situation for CITES reporting on legal trade flows, there is no associated compliance mechanism and some countries do not participate. Furthermore, experience from the longer-term CITES requirement to report seizures of elephant products for use in ETIS analyses indicates that reporting incentives can be negatively impacted when such data is used to flag countries of concern. Access to both CITES AITR and ETIS data is currently restricted. Beyond the CITES mandate, few countries systematically collate illegal trade data for other wildlife species, including for economically and environmentally important trade sectors such as timber and fisheries trades.

- Collection and management of other data sources that would aid wildlife crime measurement, such as national or global species population and status assessments, market monitoring and even relevant criminal justice information, are largely carried out by NGOs and academics. Priorities shaping the subject and scope of such data sets are set by individual institutions and often within the constraints of short-term project funding. Data holdings are therefore highly fragmented, managed with limited resources and difficult to access in a systematic manner.
- The basic nature of trade-related crime exacerbates these institutional constraints. As noted earlier in this paper, there are thousands of species involved, with complex patterns of sourcing, trade and consumption. Comprehensive monitoring and data compilation for this sector as a whole would require significant resources and new forms of motivation for participation by and cooperation between relevant institutions.

An evolving landscape

Looking ahead, there are two main considerations that set the scene for new approaches to monitoring and measurement of trade-related wildlife crime: what can we predict about the future development of this market; and how might constraints and opportunities for better measurement evolve in future?

Market trends

- As the biodiversity crisis continues, species and ecosystem status and wildlife resource availability will continue to decline. It is likely that the main policy response will be to introduce greater restrictions on access and trade, which, without big downward shifts in demand, will further increase incentives for criminal activity to supply the market in contravention of applicable legislation. It is also possible that additional wildlife trade restrictions will be introduced, based on concerns about factors such as zoonotic disease risk and animal welfare, again likely creating incentives for associated crime.
- There are diverse end-market drivers of wildlife demand, from food preferences and desire for natural medicines and materials to interests in collection, display and keeping a massive diversity of live animals and plants. Although some areas of interest may decline owing to changing societal values and lifestyle choices, there is no reason to believe that there will be an overall downward trend in incentives for illegal wildlife trade without proactive behaviour change investment. As different economies evolve, new forms of wildlife demand are likely to arise.
- Trade mechanisms within this market are likely to continue to evolve, with the shift to internet-based remote retail and associated parcel delivery likely to continue. At the same time, over the next few years at least, there is likely to be a resurgence of international tourism, which could revive physical wildlife retail markets and smuggling by air passengers in some countries, which was reduced during the COVID pandemic.
- The main potential positive shift to be anticipated is that policy responses to the climate and biodiversity crises may lead to substantial increases in nature-positive investment and action. This could include more effective design and enforcement of interventions to address illegal wildlife trade and associated investment in monitoring and analysis to maximize effectiveness and impact of measures taken. However, the mandate for such enhanced action has been established in a series of earlier iterations of global biodiversity and sustainable development targets in the past, so there is clearly a risk that this will not happen soon. Perhaps efforts to link climate and nature concerns into a common policy imperative will tip the balance.

Measurement factors

- The trend towards internet-enabled commerce in this sector presents challenges and opportunities. Increased scrutiny and remedial interventions by internet companies have already prompted illegal wildlife traders to shift from e-commerce sites to using social media and messaging platforms, which are more difficult to monitor. Specialized wholesale illegal trade may increase the use of the dark web, which has so far apparently not been a significant factor for illegal wildlife trade. Even if trade is visible, distinguishing fraudulent offers from real ones and assessing actual trade flows in internet commerce are even more challenging than is the case for physical markets. In contrast, cooperation with internet companies can yield excellent opportunities for monitoring and assessing wildlife markets online. Commercial sensitivities can be mitigated by avoiding access to nominal data.
- With increasing digitization of government functions in many countries, there should be good opportunity to improve the quantity and quality of seizure data available for analysis. In the wildlife trade sector in particular, regional support programmes such as the TWIX (Trade in Wildlife Information Exchanges) systems operating in Europe and Africa facilitate data compilation and sharing for participating governments.[52] It is also likely that access to government wildlife seizure records will become less restricted in future. A data dissemination platform for access to records of illegal trade in CITES-listed species was launched in 2023.[53] Although initially planned for governmental access only, the restriction might be lifted in future to provide open access similar to that already provided for data on legal trade in CITES species.
- Better and cheaper technology, particularly remote sensing and observation tools, will likely provide new means for monitoring wildlife populations, transport hubs and physical markets, which should improve the quality of key data for trade-related wildlife crime monitoring.

Future options

Short-term options

In the short term, refinement of country-level measurement approaches for trade-related wildlife crime will likely need to focus largely on qualitative assessment. The following suggestion builds on the market assessment methodology currently used in the Global Organized Crime Index.

- **Enhanced qualitative assessment of criminal markets for wildlife.**
  Although there is merit in using generic assessment guidance for all criminal markets currently considered in the index, a more directed approach for wildlife markets could help with the accuracy and consistency of scoring (see Figure 6). The aim would be to draw attention to specific attributes of this area of commerce and then reinforce overall guidance on assessment relative to other criminal markets and the national economy.

Explanatory notes for each of the six scoring criteria could point to potential sources of evidence about wildlife market value and impact, together with reference points for comparison with other markets and the national economic setting. Notes could also define key terms, such as ‘negative human impact’ and ‘conservation impact’.

1. Market value	1.1 Value of illegal wildlife market in the country	1.2 Value of wildlife market compared to other criminal markets in the country	1.3 Illegal wildlife market value significance in the national economy
	High (2)	Bigger (1.5)	Dominant (1.5)
	Medium (1)	Similar (1)	Significant (1)
	Low (0.5)	Smaller (0.5)	Insignificant (0)
2. Market reach	1.4 Level of negative human impact in the country	1.5 Human impact compared with other criminal markets in the country	1.6 Conservation impact of the country's illegal wildlife market
	High (1.5)	Bigger (1.5)	High (2)
	Medium (1)	Similar (1)	Medium (1.5)
	Low (0.5)	Smaller (0)	Low (0.5)

FIGURE 6 Possible guided scoring matrix for wildlife markets.

NOTE: Indicative scores are shown in parentheses.

Longer-term options

In the longer term, a more robust and at least partially quantitative assessment model could be developed if essential data sources are improved with regard to completeness and accessibility. For ease of comparison, a two-dimensional value and reach structure is retained in the following suggestion, although it could be argued that the principle measure of significance should focus on the human and environmental harm factors bundled under 'reach', with value being a contextual indicator of scale.

- **Potential quantitative assessment of criminal markets for wildlife.**
  An improved quantitative **value assessment** will likely depend on access to better and more comprehensive seizure data. Although clearly an imperfect and partial expression of illegal trade flows, seizures do at least provide an indicator of market scale. Key factors in judging future utility include the following:
  - Increased geographical coverage – most current seizure data sets are incomplete and formal reporting by governments through CITES is currently not universal.
  - Increased species coverage – reporting on seizures of CITES-listed species covers important aspects of the trade, but high-value components, particularly non-CITES timber and fisheries trades, are excluded.
  - Increased transaction coverage – CITES seizure data focuses on incidents connected with international trade, but ideally country assessment should include information on all illegal transactions, including those for which the end market is within the source country.
  - Greater accessibility – access to CITES seizure data is currently limited to participating governments and a small number of multilateral agencies that are members of the International Consortium on Combating Wildlife Crime.

To estimate illegal trade flows for a subject country on the basis of seizure data, it will be necessary to consider not only the incidents reported as taking place in that state but also those reported by other states that can be assumed to have originated from or passed through the subject country.

With improved seizure information as a basis for assessment, value calculations will require access to a standardized price reference point for different species and commodities. However, value estimates should ideally be differentiated between source, trade and end-market locations, although this is likely to be too difficult to achieve consistently.

For improved **reach assessment**, it should be possible to develop a quantitative method for assessment of conservation harm. At a most basic level this could be based on the number of species traded in a country that have been classified as threatened in the IUCN Red List. A preferable, more specific measure would be to link to high-level population trend and threat assessments for individual species in the Red List database, producing a compound measure of conservation significance of illegal trade for species recorded in seizures associated with a country. This could build on existing analysis of overexploitation threat for species included in the Red List.[54]

Probably more problematic to develop as a quantitative measure is an indicator of human impact. The most feasible approach would be to develop a simple assessment tool with a list of human impact factors that could be scored in terms of significance for each country based on expert opinion or literature review. These factors might include incidence of:

- abusive employment practices
- links to trafficking in persons
- disruption of social structures
- loss of resource value to communities
- violence between participants or against non-participants
- involvement of established organized crime groups
- associated with wider problems of conflict and security.

Definitions and reference guides for some of these factors are readily available, such as the Ethical Trading Initiative Base Code on employment standards[55] or the UNODC's[56] and International Labour Office's[57] indicators of human trafficking.

As noted for the short-term approach described earlier, better quantitative and qualitative measures of value and reach of trade-related wildlife crime could be linked to a country scoring matrix to create a consolidated indicator of significance for each country.

Another longer-term option could be to shift to a risk assessment model along the lines of the ILAT tool for assessment of illegal timber trade. Instead of focusing on estimating illegal trade flow, the ILAT approach is to start with an assessment of legal trade flows and then apply a set of risk assessment criteria to indicate the likelihood that illegal trade is happening alongside or within the legitimized trade. This could be used as a basis for country-level scoring of the illegal market, although it would remain an essentially qualitative measurement method.

Conclusions

This paper has suggested a definition of activities that can be classified as trade-related wildlife crime and reviewed current and possible future approaches to measuring its significance at global and national levels. Quantitative measurement of any type of criminal market is a difficult task, owing to

the inherent lack of transparency and observational difficulties. For trade-related wildlife crime, many of the information sources that would best support global or national assessment are incomplete in coverage and some are difficult to access. Access issues may ease in future, but there is less cause for optimism that the current lack of investment in basic data collection and compilation is likely to be solved. Perhaps increasing recognition of the nature crisis and its inter-relationships with socio-economic harms and climate change will improve this prognosis. Nevertheless, even with current data availability, this paper demonstrates that the reliability of global and national evaluations of the significance of trade-related wildlife crime can be improved.

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The Global Initiative Against Transnational Organized Crime is a global network with over 600 Network Experts around the world. The Global Initiative provides a platform to promote greater debate and innovative approaches as the building blocks to an inclusive global strategy against organized crime.

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