INTRODUCTION

Section 1: Killing, Capture, Trade and Conservation

This, the fourth in the *State of the Apes* series, focuses on the impact of killing, capture and trade on ape conservation and welfare. The first three volumes of *State of the Apes* briefly considered these issues in relation to extractive industries, industrial agriculture and infrastructure development (Arcus Foundation, 2014, 2015, 2018). This volume explores these relationships more explicitly, featuring in-depth analysis of the hunting of and trade in apes, the impact on wild ape populations and captured individuals, the relevant legal and regulatory framework, the cultural and socioeconomic drivers behind ape hunting, and the responses to these drivers, including conservation initiatives and law enforcement efforts.

Trade in live apes, parts and products occurs across multiple scales, from the local to the global. The drivers of this trade are dynamic, reflecting evolving consumer preferences and economic fluctuations. Illegal hunting and the ape trade thrive under a variety of circumstances, including when law enforcement is inadequate; corruption is rampant; law enforcement officials are not trained to identify trafficked species or

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conduct meaningful investigations; infrastructure development permits better access to forests, markets and transportation; people associate ape meat consumption or owning a pet with status; and enhanced connectivity allows for the spread of social media. These and other factors complicate efforts to curb the demand for apes and to protect ape populations. As a result, interventions to date have not been enough to halt their overall slide towards extinction.

With the aim of helping conservationists, local communities, international agencies and other stakeholders reverse that trend, this volume of *State of the Apes* provides collected insights, tools and techniques for use in strategies to stem the demand for apes, as well as the supply. Ultimately, this volume is a call to engage with the complex drivers of the hunting, buying and selling of apes with a view to securing their conservation and well-being over the long term.

The *State of the Apes* Series

Commissioned by the Arcus Foundation, the *State of the Apes* series strives to raise awareness of the impacts of human activities on all great ape and gibbon populations. Apes are vulnerable to a range of threats that are primarily driven by humans, including hunting that supplies the trade in wild meat, body parts and live animals; deforestation and degradation of habitat; and the transmission of disease. Interactions between humans and apes continue to increase as development and human population growth drive further incursions into spaces that apes inhabit. By using apes as an example, this publication series aims to underscore the importance of wider species conservation.

State of the Apes covers all non-human ape species, namely bonobos, chimpanzees, gibbons, gorillas and orangutans, as well as their habitats. Ape ranges are found throughout the tropical belt of Africa and South and Southeast Asia. Robust statistics on the status and welfare of apes are derived from the Ape Populations, Environments and Surveys (A.P.E.S.) Portal (IUCN SSC, n.d.). Abundance estimates for the different ape taxa are presented in the Abundance Annex, available on the *State of the Apes* website at www.stateoftheapes.com. The annex is updated with each new volume in the series, to allow for comparisons over time. Details on the socioecology and geographic range of each species are provided in the Apes Overview.

Each volume in the *State of the Apes* series is divided into two sections. Section 1 focuses on the thematic topic of interrogation, which in this case is killing, capture and trade. The immediate objectives are to provide accurate information on the current situation, present various perspectives and, wherever applicable, highlight best practice. In the longer term, the key findings and messages are intended to stimulate debate, multi-stakeholder collaboration and changes to policies and practice that can facilitate the reconciliation of economic development and the conservation of biodiversity. Section 2 is included in every volume to present details relating to the broader status and welfare of apes, both in their natural habitat and in captivity.

An Overview of the Ape Trade

The hunting of apes and the trade in live apes, their meat, body parts and products involve a series of illegal activities, from the killing or capture of individuals, to their transport and sale (see Box I.1). The live trade entails the capture, trafficking and sale of living wild apes (see Chapter 4); the wild meat trade supplies fresh or smoked ape meat for

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human consumption, while traffickers of body parts and products offer their goods for cultural, medicinal or symbolic use (see Chapter 3). The drivers of ape hunting and trade vary across species, locations and socio-economic conditions. On the supply side, strong economic incentives motivate the illegal trade in protected species, particularly for the live trade (see Figure I.1), while poor law enforcement, corruption and challenges in species identification (including of body parts) hamper efforts to curtail the trade (Clough and May, 2018; Stiles *et al.*, 2013).

The hunting of apes and the associated trade have direct and indirect impacts on their conservation and well-being. The primary direct impact is population decline or local extinction in areas where they are hunted (Tranquilli *et al.*, 2012). Hunting also affects ape behavior and ecology, leading to changes in social grouping, communication and interaction, as well as feeding and ranging behaviors. Among chimpanzees, human pressure in the form of hunting and habitat destruction can also increase the degree of intergroup conflict and lead to a higher rate of intraspecific killing (Williams *et al.*, 2008). Indirectly, hunting affects ecosystem functions in ape habitats, for example by limiting the reproduction of flora that are reliant on apes for seed dispersal and by having an impact on the abundance of chimpanzee prey species, such as monkeys (Effiom *et al.*, 2013; McGraw, 2007).

Determining the level of threat that the illegal trade poses to global ape populations is challenging, as many activities along the supply chain are conducted covertly. Threat levels may be ascertained by type of illegal trade or by ape species. The live ape trade attracts the most media attention and therefore greater efforts are focused on curtailing it (Shukman and Piranty, 2017); it remains unclear, however, which of the three types of trade—that in live animals, body parts or wild meat—poses the greatest threat to global ape populations (O. Drori and K. Ammann, personal communication, 2017).

Determining threat levels across species is similarly difficult, due largely to limited data, but some studies have been able to show that the killing of apes accounts for a significant loss of life. An interview-based survey in Borneo, for example, estimated that between 630 and 1,357 orangutans were killed between September 2008 and

BOX I.1

Hunting vs. Killing and Capture: A Note on Terminology

"Poaching"—which is illegal by definition—and "hunting" can involve the killing, injury (which may be fatal) or capture of wild animals. Ape body parts and products may be harvested for food; medicines or substances perceived to have medicinal properties; use in ritual or traditional practices; or personal fulfillment. Captured apes may be kept or supplied into the live animal trade, including for use in entertainment facilities, as photo props in the tourism industry and as pets (Etiendem, Hens and Pereboom, 2011; Fa, Currie and Meeuwig, 2003; Hastie and McCrea-Steele, 2014).

The terms "poaching" and "hunting" are often associated with the acquisition of meat or parts, and thus with the death of an animal. As this volume demonstrates, however, many apes are captured alive. Regardless of whether apes are killed or captured, their removal from the wild has implications for the survival of the species in their natural habitats (Stiles et al., 2013).

Apes are also killed for non-harvesting reasons, such as in retaliation for crop-raiding or damaging property, or in connection with fear for personal or community safety. Such killings are not always perceived as the results of hunting (Davis *et al*., 2013).

As the title of this volume indicates, the key hunting-related threats to the viability and well-being of ape populations are killing and capture.

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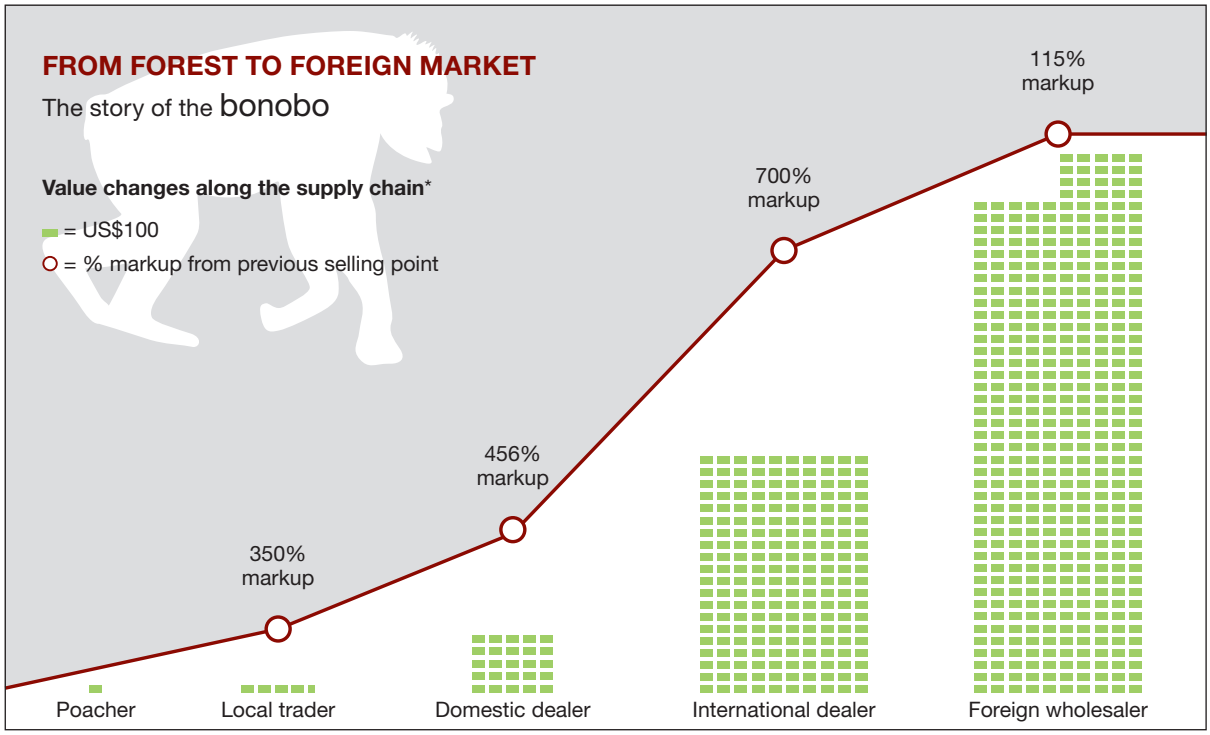
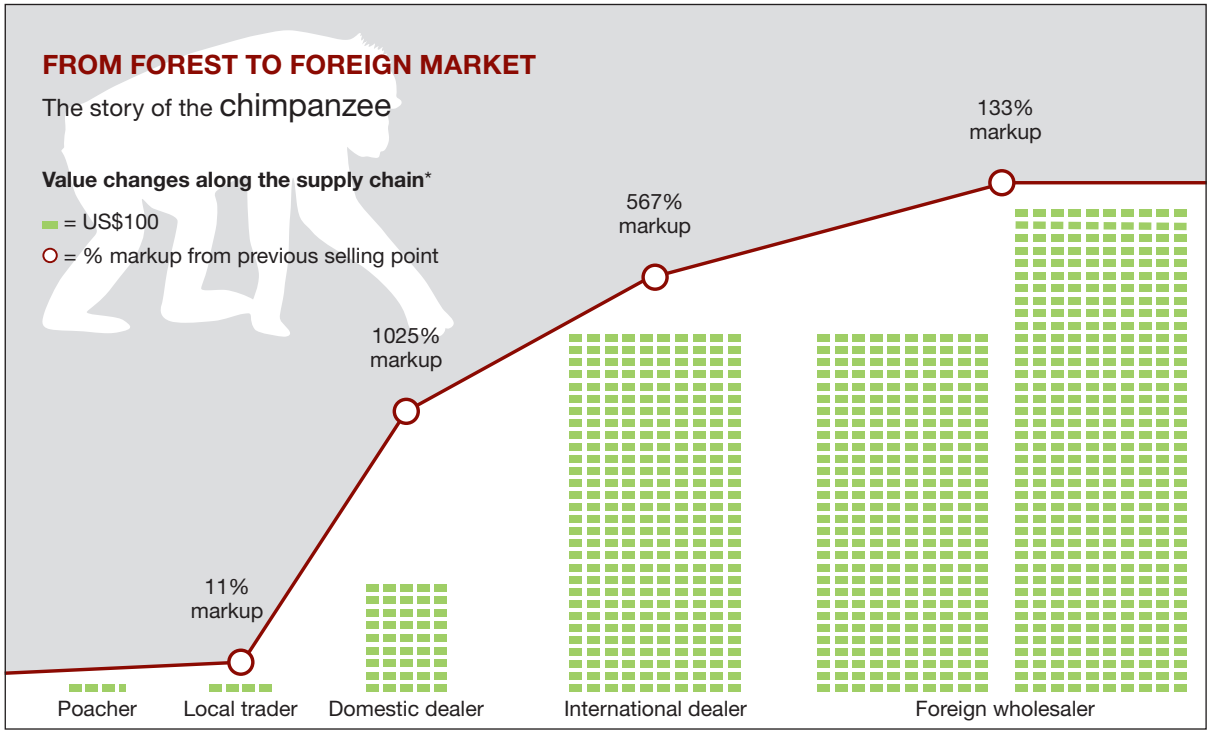
FIGURE I.1

Value Changes from Forest to Foreign Buyer for Bonobos, Chimpanzees, Gorillas and Orangutans





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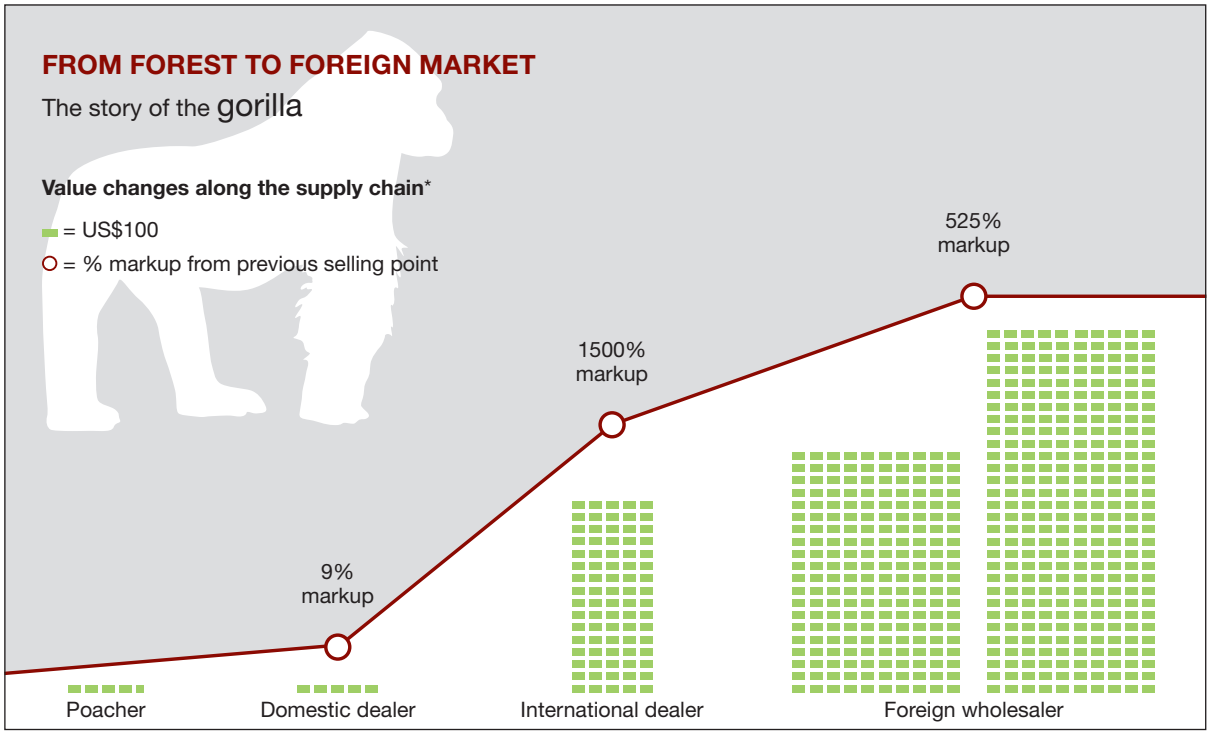

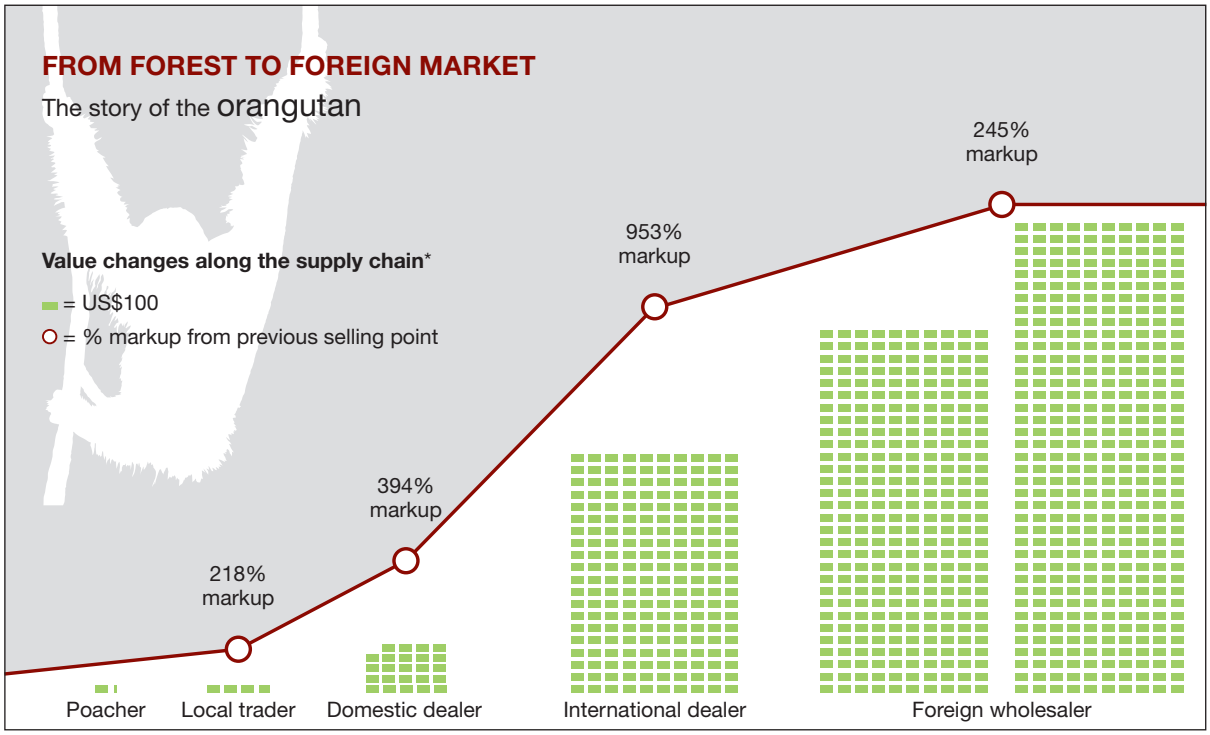

Note: * The original research uncovered a range of prices at each point in the supply chain. For graphical purposes, the study utilized the upper value for each segment of the supply chain.

Source: Clough and May (2018, pp. 8, 9, 25). © Global Financial Integrity 2018

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BOX I.2

The Apes Seizure Database

The Apes Seizure Database was launched at the 17th Conference of the Parties of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in October 2016 to address a significant lack of verified qualitative data on the scale of the illegal trade in great apes, including live animals, body parts and meat (CITES, 2016; GRASP, n.d.-a). Developed by the Great Apes Survival Partnership (GRASP) and the United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC), it is the first global online database to gauge the scale and scope of poaching and illegal trade in great apes (GRASP, n.d.-b; UNEP-WCMC, n.d.). The aim is to assist national authorities, civil society and businesses to monitor the trade patterns, develop longer-term strategies and channel resources effectively to combat the trade.

As requested by the CITES Standing Committee, GRASP and the Primate Specialist Group of the International Union for Conservation of Nature Species Survival Commission prepared a report on the status of great apes and the relative impact of illegal trade and other pressures on their status (GRASP and IUCN, 2018). Recommendations from this report, including the call on CITES parties to contribute to the Apes Seizure Database, are reflected in an amendment to the resolution on great apes, adopted at the 18th Conference of the Parties, in August 2019 (CITES, 2019b).

Great ape sanctuaries, protected area authorities and other such actors are the key providers of relevant and case-specific seizure information. All data, once submitted, is validated by a great ape expert panel, the Technical Advisory Group. The database is hosted at database.un-grasp.org, but given the sensitive nature of the data, access to the database is restricted. GRASP and UNEP-WCMC manage the data providers' user rights, while only staff members of GRASP and UNEP-WCMC have access to all reported data.

Phase 1, including the development of basic technical infrastructure, is nearly completed and the database is operational. Ongoing activities include the development of an interactive user manual to attract regular submissions of new data, as well as refinement of a robust data validation process, the cornerstone of an independent and credible platform.

As data become truly useful when they are analyzed and overlaid with other contextual information, Phase 2 of the database, which is contingent on new funding, is to provide the following capabilities:

- the creation of automatic, web-based, geospatial data analysis tools to identify the state, trends and hot spots regarding poaching and illegal trade, including a public annual report to highlight main findings;
- the development of a sampling and export protocol to identify seized great apes or body parts using genetic data, as a way of supporting analysis of illegal activities and enabling repatriation of live apes to their country of origin, potentially with the help of the facial recognition algorithm "ChimpFace," developed by Conservation X Labs (Timmins, 2019); and
- geographic and sectoral expansion of the database to increase involvement of West African stakeholders, customs organizations and other actors that are currently under-represented.

September 2009, and that roughly 2,000–3,000 animals were killed per year on average within the lifetimes of the survey respondents (Meijaard *et al.*, 2011, 2012). Given that fewer than 105,000 Bornean orangutans remain in the wild, these harvest rates are categorically unsustainable (Ancrenaz *et al.*, 2016; IUCN SSC, n.d.; see Box 1.3). Similarly, in Africa, an investigation into the scale of the wild meat trade in the Cross-Sanaga rivers region that stretches across Cameroon and Nigeria estimated that about 2,400 chimpanzees and 700 gorillas were hunted on an annual basis (Fa *et al.*, 2006). In view of the fact that the Nigeria–Cameroon chimpanzee population comprises 3,500–9,000 individuals, this offtake rate represents a major threat to their survival (IUCN SSC, n.d.; Oates *et al.*, 2016).

The complicity of corrupt authorities thwarts attempts to monitor the scale of the problem, while motivations for hunting and trade are also challenging to counter. Recent initiatives have sought to address the current lack of verified qualitative data on the scale of illegal trade in great apes (see Box I.2).

Hunted, Captured and Traded Apes: Typology and Scale

Wild apes are hunted, captured and traded for many different purposes, which vary across species and regions. The trade in apes is part of a much larger global wildlife trade—both legal and illegal—that occurs in and between virtually all countries (see Box I.3). Its three main subcategories are the trade in live apes, in wild meat and in body parts, as discussed below.

The Live Ape Trade

The live trade entails the illegal capture of living wild apes—typically infants—for sale

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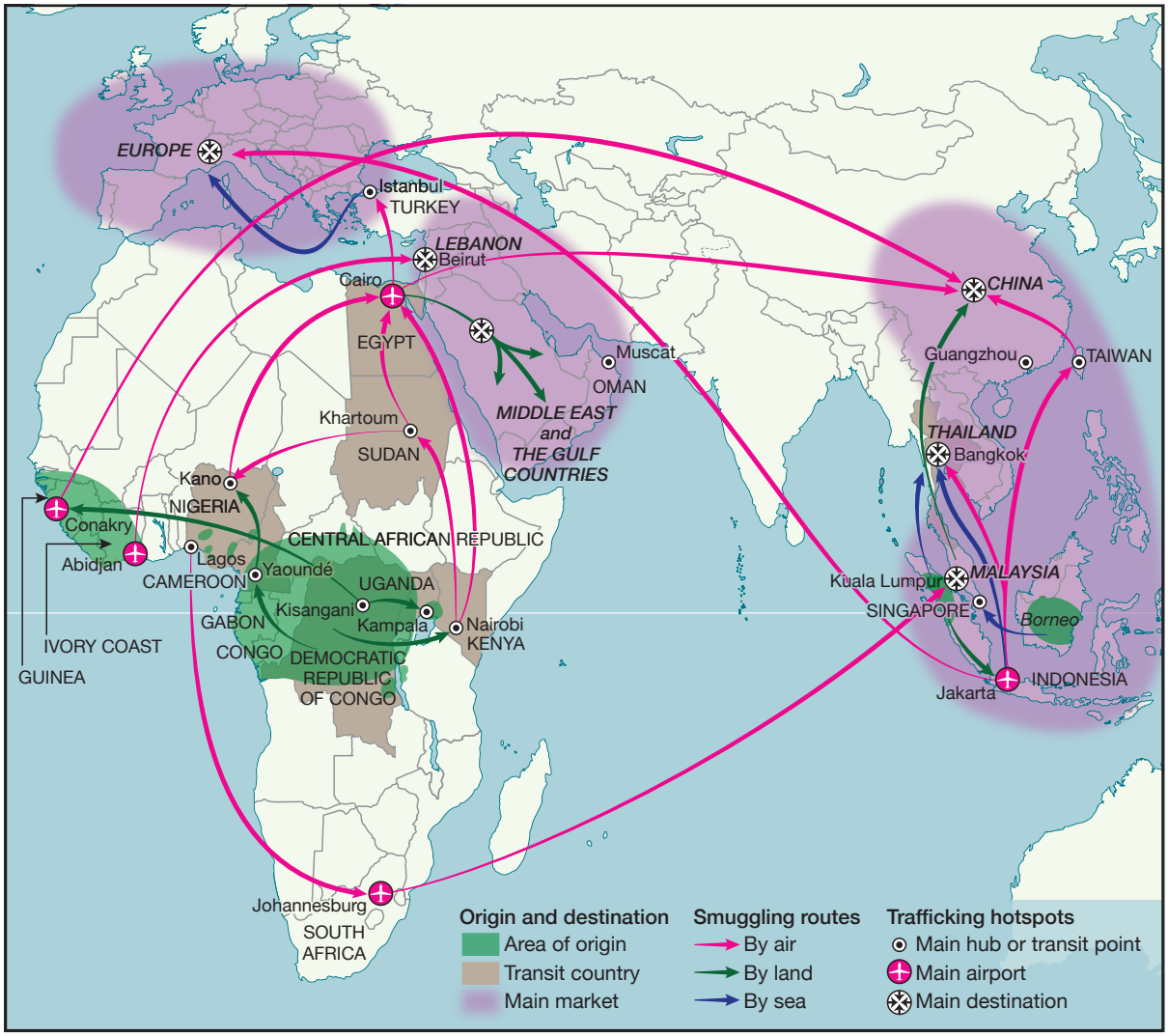
on the local or international market. Locally traded apes are primarily used as pets; they may serve as playthings for hunters' families, status symbols for rich and influential personalities, highlights of private zoos or ranches, or exotic tokens and even "rescues" (Caldecott, Miles and Annan, 2005; Nijman, 2005b; Stiles, 2016). Internationally traded apes are generally used as prestige pets or in entertainment, such as ape boxing attractions in Asia (Kerr, 2017). They may also be used to attract tourists to amusement parks, safaris and circuses. The use of apes—particularly gibbons—as photo props for tourist photo sessions on Asian beaches is also widespread (Stiles *et al.*, 2013).

Due to inadequate law enforcement, the trade in live apes is very difficult to measure, although some studies have investigated certain aspects of it (Nijman, 2005b;

FIGURE I.2

Main International Routes for Illegal Trafficking of Great Apes



Source: Stiles *et al.* (2013, p. 32), based on the original map by Riccardo Pravettoni

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Nijman *et al.*, 2017). In many cases, estimates of the scale of the trade are based on confiscations and the number of apes held in sanctuaries, even though these figures probably represent only a small portion of the trade (Stiles *et al.*, 2013). For a detailed assessment of the trade in live apes, see Chapter 4.

The international live trade is sophisticated, lucrative and involves many rich and powerful players, including collectors, middlemen and transporters. In Africa, apes appear to be captured and "stocked" so that demand can be met without significant delay (O. Drori and K. Ammann, personal communication, 2017). Transportation methods vary along the supply chain; when it comes to air travel, smugglers use private, charter and commercial planes of well-known airline companies, including Togo-based ASKY, Ethiopian Airlines, Kenya Airways and Turkish Airlines, often moving between carriers (K. Ammann, personal communication, April 2017; Stiles, 2016). Traffickers tend to rely on a number of approaches to enable transfer of apes: they use fraudulent permits from the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES; see Chapter 6); they integrate apes with other species that may be traded legally, such as certain monkeys; or they smuggle them using concealment in a carry-on or cargo container (Stiles, 2016).

International ape trafficking involves complex networks of actors in various countries (See Box 1.4). Figure I.2 shows key trade routes that originate in West and Central Africa and Southeast Asia and link to markets in China, Malaysia and Thailand; the Arabian Gulf states; and Europe. Although not shown in Figure I.2, key destination countries also include ex-Soviet states, as revealed in undercover investigations (Stiles, 2016). Ape transport networks are in a constant state of flux, responding to changes in demand, as well as surveillance, law enforcement, the complicity of corrupt CITES officials and flight scheduling.

Little is known about how orangutans are trafficked along Asian trade routes. Evidence suggests they may be transported by boat from ports in Borneo to Singapore and then by road or rail to Kuala Lumpur or Bangkok (Stiles, 2016). Orangutan traffickers are also known to take boats to Jakarta and then planes to Bangkok, Muscat, Guangzhou and other Chinese cities. While most of the live trade in gibbons appears to be domestic rather than international, limited evidence indicates that the Middle East and Singapore are destinations for this species (C. Kalaweit, personal communication, April 2017).

The Wild Meat Trade

Across most ape range countries of tropical Africa and Asia, the wild meat trade involves the sale of fresh or smoked ape meat for human consumption. The meat is usually butchered and either used to meet subsistence consumption needs, especially among local hunters and their families, or sold for economic gain. As shown in Figure I.3, supply chains for the commercial trade in ape meat can be long and complex. Products generally increase in value at each stage of the chain (see Figure I.1).

Within ape range states, the rate of ape meat consumption is generally associated with cost and taste, as well as status, particularly in urban areas (Nijman, 2005a). The international trade in ape meat, which is far more lucrative than the local one, is also linked to prestige, culture and status among consumers. For a detailed analysis of the wild meat trade, see Chapter 3.

The domestic and international trade in ape meat for human consumption has been well documented across Africa and Asia.[1] Less clear is the frequency with which it is consumed, and whether food is always the primary driver for killing apes, or whether wild meat is also acquired as a by-product of the trade in body parts or live animals, such

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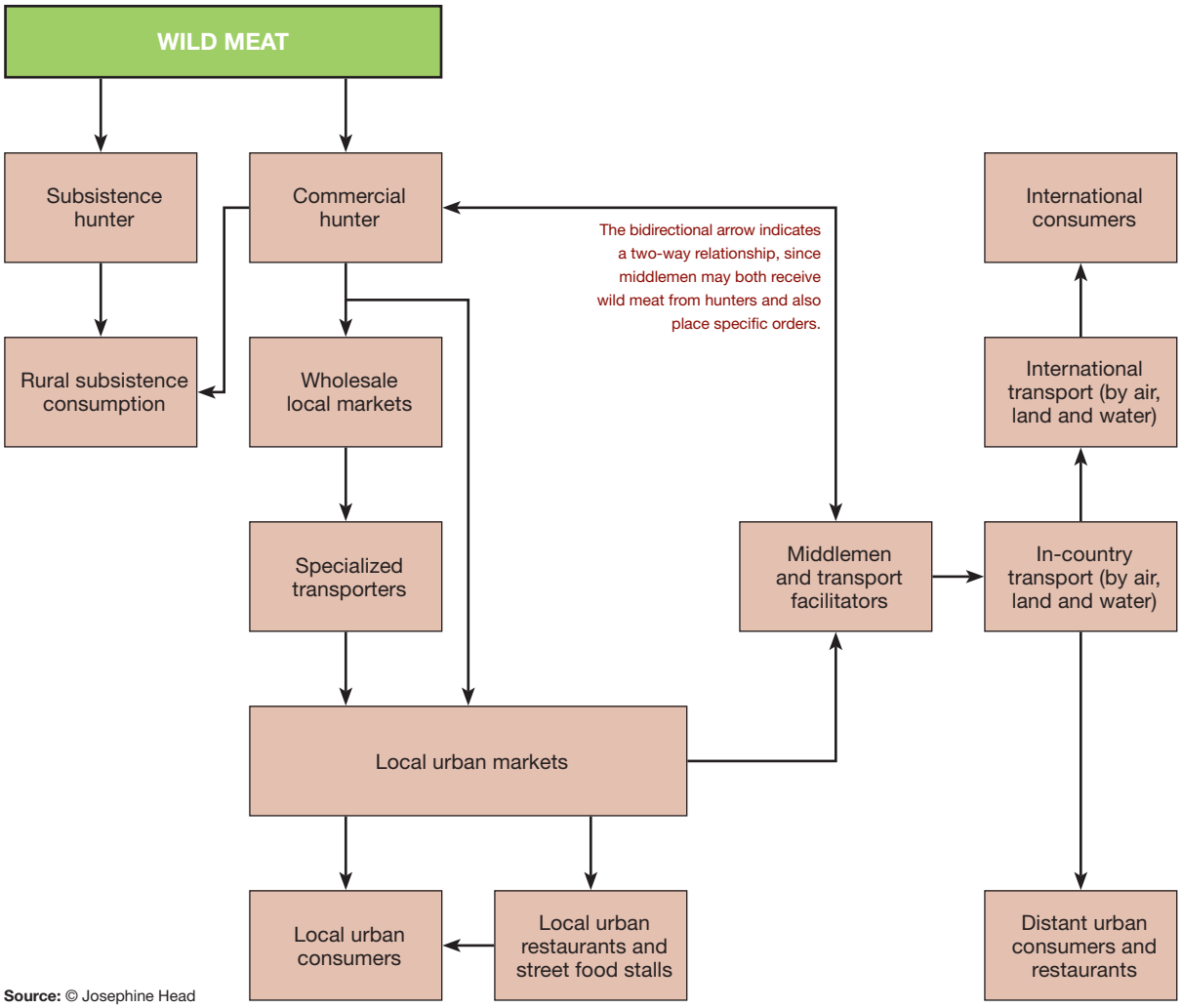
FIGURE I.3

A Wild Meat Supply Chain



Source: © Josephine Head

as when hunters kill mothers to capture their young. People who kill orangutans do so primarily for food, while traditional medicine and the live infant trade account for just 3% of the killings each (Davis *et al.*, 2013). In West and Central Africa consumption of ape meat is widespread and ape meat is regularly found for sale in local markets. It is not known what proportion of ape meat is exported from Africa, as data on the international trade is limited, but a 2006 study of illegal markets in Brussels, Chicago, London, Los Angeles, Montreal, New York, Paris and Toronto identified 27 records of chimpanzee and gorilla parts for sale (Brown, 2006). A few years later, in 2011, wild meat tested on a market stall in central England was found to be from a chimpanzee (Ellicott, 2011).

Anecdotal evidence suggests that ape meat that is exported to the United States and Europe is part of the wider illegal trade in wild meat. Customs data on confiscations of wild ape meat in Swiss airports between 2011 and 2013 indicate that the vast majority

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came from Africa, while less that 2% arrived with passengers from Asia or the Middle East (Wood *et al.*, 2014). Evidence suggests that in the UK, the illegal wildlife trade operates through established smuggling routes of organized criminals (see Box I.5). Based on one report, 50% of those prosecuted for wildlife trade have previous drug- and firearm-related convictions (Cook, Roberts and Lowther, 2002). While various studies examine the international wild meat trade, assessing what percentage of internationally traded wild meat comes from primates, and specifically apes, remains challenging (Brashares *et al.*, 2011; Chaber *et al.*, 2010; Wood *et al.*, 2014).

The Trade in Parts

The trade in ape body parts occurs in countries of origin and beyond. Commonly traded parts—such as heads, hands, feet and bones—tend to be ascribed cultural or symbolic significance. Within ape range states their consumption or possession is linked to a range of beliefs, including making children stronger, healing fractures, curing arthritis, improving agility and protecting houses against fire (CITES and GRASP, 2006; Nforngwa, 2017; Zhou *et al.*, 2005). Although not covered in this volume, there is a suggestion that ape skulls are considered prized trophies in Western countries, particularly the United States, while in China, bones are in high demand for use in traditional medicine (Nforngwa, 2017). For more details on the trade in ape body parts, see Chapter 3.

Experts disagree on the scale of the trade in ape body parts. Some investigators of wildlife trafficking point to a rapid increase in demand, indicating that gorillas and chimpanzees are being hunted vigorously to feed a growing international trade in skulls and other body parts. They argue that this trade has all but supplanted the meat-based black market. Others maintain that the market is old, that the associated crimes are relatively uncommon, and that the body parts are simply by-products of the trade in wild meat and live animals. They note that in ape-range states in Africa, the demand for hands and bones for medicinal purposes is scattered, small-scale and largely opportunistic (O. Drori and K. Ammann, personal communication, 2017).

Supply chains for the wild ape meat and body parts tend to overlap. Body parts from Africa largely transit through Cameroon, Nigeria and the West African coast, while much of the Asian trade originates in Indonesia and Malaysia (Stiles, 2016). The international supply chains begin with small-scale poachers in African and Southeast Asian forests, who supply game to a network of dealers, traders and traffickers, who smuggle the body parts—often alongside butchered wild meat—to final destinations, including in China, Europe and the United States (Brown, 2006).

Drivers of the Ape Trade

People become involved in the wild ape trade for various reasons, many of which depend on personal and local conditions, such as limited economic opportunities, a lack of affordable alternative protein sources, poverty, conflict and insecurity, cultural beliefs, urbanization and the commercialization of the illegal trade at the regional level (De Merode and Cowlishaw, 2006; Kümpel *et al.*, 2010). Other drivers of the trade include new and improved infrastructure that provides increased access to markets via shipping and flight routes, corruption and technology (Cook, Roberts and Lowther, 2002; Stiles, 2016). The extent to which the trades in live animals, wild meat and body parts influence each other is difficult to assess, not only because of the dearth of reliable, comprehensive data, but also because of the dynamic nature of these markets.

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Chapter 2 presents a detailed exploration of the cultural drivers of the live ape trade, including cultural norms (Malone *et al.*, 2003; Nijman *et al.*, 2017). Such dynamics are also influenced and facilitated by social media (see Box I.6). Ape meat consumption is variously driven by taste, customs, tradition and the desire for prestige. People acquire ape body parts as trophies or for use in traditional healing and religious practices (CITES and GRASP, 2006; Nforngwa, 2017; Zhou *et al.*, 2005). Economic gain and local value are also key drivers of the illegal trade. In comparison to the trade in meat and parts, the trade in live infant and juvenile apes is the more lucrative, with an average annual value of between US$2.1 million and US$8.8 million (Clough and May, 2018). In some regions ape meat that is consumed locally can be significantly more affordable and more widely available than chicken, pork or beef (Bassett, 2005; Olupot, McNeilage and Plumptre, 2009; Willcox and Nambu, 2007). The socioeconomic factors driving the illegal ape trade are examined in Chapters 3 and 4.

Photo: Drivers of the ape trade at the regional level include limited economic opportunities in rural areas, a lack of affordable alternative protein sources, poverty, conflict and insecurity, cultural beliefs, urbanisation and the commercialisation of the illegal trade.
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BOX I.3

The Global Wildlife Trade

Wildlife trade—the sale or exchange of animals, plants, fungi, their parts or their derivatives—affects a wide variety of species around the globe and is conducted within and between virtually all countries (Broad, Mulliken and Roe, 2003; Nijman, 2010; Phelps *et al*., 2010; Rosen and Smith, 2010). The various market segments vary in scale; trades range from the exchange of a small sum for a single animal or plant within a village to the global commercial timber industry worth billions of US dollars per year. The illegal trade in wildlife may appear to overshadow the legal trade, particularly since a few charismatic mammals—such as elephants, pangolins, rhinos and tigers—seem to attract disproportionate funding, policy attention, public awareness campaigns and research (Sas-Rolfes *et al*., 2019; Scheffers *et al*., 2019; World Bank Group, 2016). Although much of the trade in wildlife is legal and regulated with long-term sustainability goals in mind, illegal trade persists and, in some areas, it is flourishing (Bergin and Nijman, 2020). The trade in wildlife, both legal and illegal, acts as a significant barrier to the conservation of wild populations of animals, threatens ecosystems through the introduction of non-native species, and can pose a risk to human and animal health by facilitating disease transmission (Karesh *et al*., 2005; Nijman, 2010; Westphal *et al*., 2008).

While there are no reliable estimates of the value or volumes of all wildlife trade—that is, totals for the domestic and international, as well as the legal and illegal trade—data are available for the international portion of the legal trade. The United Nations International Trade Statistics Database, known as UN Comtrade, is a global depository for trade data. States report their statistics, including volume and import value, on thousands of articles and products using Harmonized System codes, such as 01061100 for live primates (Chan *et al*., 2015; Nijman, 2017; World Customs Organization, 2017). In contrast, the trade database of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) only contains data relating to species that are listed on one of the three CITES appendices, and reporting can be biased (CITES, n.d.-b; Phelps *et al*., 2010). The database currently lists dozens of trade terms for the form in which a species can be traded—such as "ears," "live," and "plate"—which makes it difficult to identify how many individuals are involved in any trade; complicating matters is a lack of consistency in the use of these terms.

Based on UN Comtrade import data, the wildlife trade-monitoring network TRAFFIC estimated the value of global wildlife imports in 2009 at more than US$323 billion, which suggests that the current annual value of the legal trade exceeds US$400 billion (Newton and Cantarello, 2014). Timber and fisheries, excluding aquaculture, account for more than 50% and 30% of this value, respectively, and ornamental plants ▸

Table I.1

The Monetary Value of Examples of the Global Legal Wildlife Trade

Wildlife traded		Value (US$ million)*
Live animals	Birds (caged and birds of prey)	62
	Primates	110
	Ornamental fish	376
Animal products for decoration and clothing	Mammal furs and fur products	5,828
	Ornamental coral and shells	125
	Reptile skin	372
Animal products for food	Game meat	534
	Frog legs	58
	Edible snails	87
	Fisheries (excluding aquaculture)	100,199
Plants	Medicinal	1,457
	Ornamental plants	16,079
	Timber	169,910

Notes: * Values originally reported in euros for the year 2005; converted to US dollars and corrected for inflation to 2020 values (EUR 1 = US$1.1; cumulative rate of inflation = 32.5%).

Data source: Engler and Parry-Jones (2007, table 1)

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and non-wood forest products account for around 5% each (see Table I.1). CITES trade data does not provide insight into the monetary value of the trade, but analysis of 40 years of import records reveals that, in terms of individuals, plants dominate with 86%, while reptiles form the next-largest group (7%) and fish make up less than 1% (Harfoot *et al*., 2018).

The United Nations Office on Drugs and Crime estimates that the illegal wildlife trade, excluding illicit timber and unregulated fisheries, is worth US$8–10 billion, while timber accounts for another US$7 billion and illegal and unregulated fisheries possibly double that (Newton and Cantarello, 2014). Since most of the public attention and enforcement efforts are focused on a few illegally traded mammals, seizure data reflect that bias: all together, big cats, elephants (ivory), pangolins and rhinos (horn) make up 25% of the monetary value of global seizures. Reptiles—both live animals and their parts—account for 15%. Meanwhile, the 33 species of rosewood[2] make up 35% of the value of these seizures and agarwood[3] accounts for 6% (UNODC, 2016). The illegal wildlife trade is a way for organized criminal networks to generate profits by extracting high-value animals and plants, yet it is also central to livelihood strategies in some of the poorest and most marginalized communities in the world (Broad, Mulliken and Roe, 2003).

Monetary value aside, it is clear that the international trade in wildlife has increased over time. Rapidly expanding human populations, increased per capita wealth, changing consumer preferences for wild meat and exotic pets, improvements in infrastructure and logistics, increased internet connectivity and more widespread access to mobile devices, as well as easier access to harvest areas, mean that more wildlife is traded at present than ever before. At the national level, the wildlife trade is regulated to varying degrees, depending on a country's legislation (see Chapter 6). In some countries, wildlife is regarded as common property under the law; in others, all wild animals and forest products are the property of the state. At the international level, CITES governs the trade in about 6,000 animals and 30,000 plant species. CITES Appendix I precludes commercial international trade in about 1,000 of these species, two-thirds of which are animals; Appendix II allows regulated international trade in the remaining species. While CITES provides an international regulatory framework, each state party has to adopt its own legislation to ensure that CITES is implemented at the national level. All species of primate are included on either Appendix I or II of CITES, and all species of great ape and gibbon are listed in Appendix I; all primates are thus subject to CITES trade regulations (CITES, 2019a, n.d.-a).

Despite these regulations, primates are traded in their millions every year, for wild meat and medicinal use, as pets and for use in biomedical research (Nijman and Healy, 2016). As with all wildlife trade, curbing this illegal trade is unlikely to be addressed through a one-size-fits-all solution.

Tackling the Illegal Trade: A Typology of Responses

Conservationists, animal welfare activists and others are using a wide range of approaches to address the threat of hunting and trade. Interventions range from law enforcement activities, protected area management and conservation education, to community engagement, the development of alternative livelihoods and tourism (see Chapter 5). While some of these approaches have made a positive impact—as exemplified by the effects of ecotourism on mountain gorillas in Rwanda and Uganda (Robbins *et al.*, 2011)—none have proven effective on a wider scale.

Law Enforcement

All apes are protected under international and national law; it is illegal to hunt, trade or consume them. Law enforcement has therefore been an integral part of conservation actions, and a central pillar in efforts to reduce ape hunting across Africa and Asia and the trade in live apes, their meat and their parts in range countries and beyond. Law enforcement takes various forms at different levels—from the creation of national parks and associated patrols by rangers, to checkpoints on main roads, legal and regulatory frameworks and undercover investigations by independent organizations working in collaboration with governments.

The Eco Activists for Governance and Law Enforcement (EAGLE) network is one such independent organization. Operating across eight West and Central African countries, EAGLE aims to develop civic activism and collaborate with governments and civil society to improve the application of national and international environmental legislation through investigations, arrests, prosecutions and publicity. Evidence shows

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Photo: Law enforcement occurs in different forms and at different levels – from the creation of national parks and associated patrols by rangers, to checkpoints on main roads, legal and regulatory frameworks and undercover investigations by independent organisations working in collaboration with governments. Armed EcoGuard, Campo Ma'an National Park, Cameroon. © Jabruson (www.jabruson.photoshelter.com)

that their approach and actions are having some impact. In 2019, for example, the network enabled 171 arrests for wildlife crime, 144 of which were prosecuted and 99 of which led perpetrators to be sentenced to jail (EAGLE, 2019, n.d.).

Law enforcement is an integral part of conservation management. Since it does not address the primary motivations behind the illegal ape trade or offer alternative livelihoods to those involved, however, it works bests as part of a wider approach to tackling the trade (Milner-Gulland and Bennett, 2003). When used in isolation, law enforcement is rarely sufficient and has the potential to turn public opinion against wildlife and conservation. Despite these limitations, law enforcement still tends to be prioritized over behavior change and community engagement (see Chapter 5). Meanwhile, much work also remains to be done to improve legal and regulatory frameworks (see Chapter 6).

Behavior Change

In recent years, there has been an increasing focus on effecting individual behavior change as a way to reduce the threat to apes from hunting and trade (Baker, Jah and Connolly, 2018). Traditional approaches, such as conservation education in schools, focus exclusively on informing individuals about these threats and the importance of conserving apes, yet they do not address people's motivations for hunting, trading or consumption. Conservationists have therefore looked for alternatives to this limited model and sought to take a more evidence-based approach (Chausson *et al.*, 2019). Best practice for behavior change involves conducting baseline surveys to estimate the level of ape meat consumption and truly assessing the context to uncover the motivations behind that consumption (van Vliet and Mbazza, 2011). Findings can be used to inform the best approach to influencing behavior in a particular locality.

Targeted interventions that aim to bring about behavior change (known as "social marketing", see Box I.4, Chapter 3 and Annex II) are becoming increasingly popular among conservationists. They have been referred to as "conservation marketing," defined as "the ethical application of market-

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ing strategies, concepts and techniques to influence attitudes, perceptions and behaviours of individuals, and ultimately societies, with the objective of advancing conservation goals" (Wright *et al.*, 2015). While the use of conservation marketing for protecting apes has been limited to date, its use with respect to products such as ivory, rhino horn, shark fin and tiger bone has been more widespread (Box I.4 and Annex II; Greenfield and Veríssimo, 2019). Examples of conservation marketing designed to protect apes

BOX I.4

The Wild for Life Campaign

In 2015, the United Nations General Assembly and the UN Environment Assembly requested that the United Nations, led by the UN Environment Programme (UNEP), raise broad global awareness of the social, economic and environmental implications of the illegal trade in wildlife and reduce demand for illegally traded wildlife products (UNEP 2016; UNGA 2015).

Campaign

The following year, UNEP launched a global digital campaign in nine languages[4]—with UN partners, governments, businesses, civil society and key opinion leaders—to build a dynamic platform for change.

The campaign built on the insight that people protect what they love and that they tend to love what they know. Around the world, news stories about the legal killing of Cecil the lion and the illegal killing of Satao the elephant highlighted the fact that while thousands of unnamed lions, elephants and myriad other species are poached or illegally trafficked every day, those with names get the public's attention (Dell'amore, 2014; Wildlife Watch, 2018). This confirmed that if wildlife crime was to be relevant to people, it had to be personal. So was born Wild for Life: Wildlife Crime Just Got Personal. The campaign's aim is to mobilize the public to communicate a simple message to governments: endangered species have our attention and our protection, and we expect the government to act to stop the poaching crisis.

The campaign underscores that cultural beliefs, entertainment, fashion, investment, sport and traditional medicine should not contribute to the illegal trade or result in existential threats to protected species. It asks participants to use their own spheres of influence to end the illegal trade, however it touches or affects them.

Wild for Life was designed as a social first strategy, with going viral as a key objective. UNEP deployed a portfolio of celebrity goodwill ambassadors and influencers, each of whom represented a species. Together, they have reached more than 500 million users across social media platforms.[5] Now, more than 30 celebrities champion 26 species, including the elephant, helmeted hornbill, jaguar, lion, manta ray, orangutan, rosewood, sea turtle, sunbear, Tibetan antelope and tiger (Wild for Life, n.d.).

Species were chosen based on how they are affected by wildlife crime, and the dedicated website expands on the variety of factors that threaten them. Most of the represented species appear in CITES Appendix I, which prohibits all forms of international commercial trade in listed species. Website activities are designed around personal connections and include:

- a quiz to let people find their kindred species;
- an algorithm that blends a person's own image with that of a species and then shares the composite image on social media to inspire others to get involved; and
- pledges to help stop wildlife crime through personal spheres of influence.

Successes

By the end of 2018, Wild for Life had reached 1.5 billion people and mobilized millions to participate in the process of making commitments and taking action to end the illegal trade in wildlife and forest products. More than 4.5 million had engaged in the campaign—as evidenced by likes, shares and comments. More than 50,000 had found their kindred species and pledged. More than 20 non-governmental partners were supporting the campaign and it has received a number of industry awards.[6]

Most critically, many of the species in the campaign have maintained or received greater protection from CITES and governments, including elephants, helmeted hornbills, pangolins, rhinos, rosewood and snow leopards; bans on illegal products, including ivory and rhino horn, are being upheld and expanded across the world.

What's Next

With the aim of building and maintaining momentum in phase 2 of the campaign, Wild for Life will identify and raise awareness of emerging threats; advocate wildlife-friendly policies; add new species, including chimpanzees and gorillas; and develop new user journeys to deepen connections. The aim is to achieve a higher level of commitment to robust, targeted and measurable social and behavior change communication campaigns to address wildlife crime drivers and shift norms, thereby reducing demand while supporting stronger enforcement and legislation. To achieve these goals, UNEP is creating an open-source Communication to Combat Wildlife Crime Toolkit with outreach action plans that countries can develop and implement. More information is available at https://wildfor.life.

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include campaigns on social media and local radio, as well as the use of "entertainment–education" programs that focus on incorporating environmental storylines into popular soaps on radio and television (Baker, Jah and Connolly, 2018; see Box 3.3).

Community Engagement

Community engagement is a bottom-up approach to conservation that seeks to empower communities to be stewards of their own resources. It includes local people in decision-making processes and land management with a view to ensuring their buy-in and support for conservation action (Vermeulen *et al.*, 2009; see Chapter 3). Community engagement can also involve providing support for the development of alternative livelihoods, such as farming, fishing or employment as community rangers (Horwich *et al.*, 2010). Where tourism is present, it can support small-scale industry such as retail, accommodation, entertainment and catering (Macfie and Williamson, 2010).

Criminal Networks

In recent years, the trafficking of wildlife has drawn global attention at the highest levels of government, largely due to growing evidence of the involvement of organized criminal networks and the devastating impact on plants and animals, including apes (INTERPOL-UNEP, 2016; see Box I.5). In the past decade, an increasing number of large-scale ivory seizures helped to shed light on the role of organized crime; the complex logistics involved in moving such large volumes of contraband point to the systematic corruption of officials along the trafficking chain. The establishment and maintenance of efficient systems for the illicit trade of large volumes over great geographic distances typically requires significant funds, planning, organization and intelligence. Such systems also necessitate investment in secure facilities for storage and staging purposes; they rely on high levels of collusion and corruption, and the ability to exploit trading links and networks effectively and covertly between range states and end-use markets (CITES, 2007).

Many wildlife crime syndicates also engage in other kinds of criminal activities. Investigators have found links between the poaching of abalone—a marine mollusc eaten as a delicacy—and a growing addiction crisis in South African coastal communities, where drugs are frequently exchanged for illegally harvested abalone (De Greef and Raemaekers, 2014). Similarly, rhino horn syndicates have shown involvement in other crimes, such as drug and diamond smuggling, human trafficking and trading in other wildlife products, such as elephant ivory, abalone, lion bones and live game (Milliken and Shaw, 2012).

While much more is known about the links between criminal networks and the trade in products such as ivory and rhino horn, there is increasing evidence that ape traffickers utilize similarly sophisticated networks. Investigations by ProFauna Jakarta and others have revealed a complex and extensive network of smugglers working in close cooperation with customs officials, police and airport personnel in the illegal trade in orangutans in Java. This group of organized criminals is suspected of involvement in the export of at least two dozen orangutans in the first few months of 2003 (H. Baktiantoro, personal communication, 2003). The Last Great Ape Organization (LAGA) has uncovered similarly complex networks in both Central and West Africa (O. Drori, personal communication, 2017).

Another indication of links between ape trafficking and diverse criminal activities is the frequency with which apes are discovered in mixed shipments alongside

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other illegal items. They are usually trafficked with other live animals so that smugglers can use the same shipping and concealment methods, which differ from those used for other commodities. A well-known example of a mixed shipment is that of a trafficker in Cameroon who was arrested while in possession of a young chimpanzee as well as four large sacks of marijuana, each weighing at least 50 kg, and a quantity of cocaine (Stiles *et al.*, 2013). The trafficker had been employing at least five poachers and, before his arrest, he regularly traded in other protected primate species. In addition, TRAFFIC reports that 176 shipments that were seized between 2012 and 2018 involved apes as well as other protected species, such as pythons, turtles, birds and other primates (TRAFFIC International, 2018; see Figure I.4). Javan wildlife markets are notorious for selling a wide array of protected species, including orangutans and gibbons, and some larger markets[7] seem to hold key positions in a loose criminal network that transports animals to and within Java (Nijman *et al.*, 2017).

BOX I.5

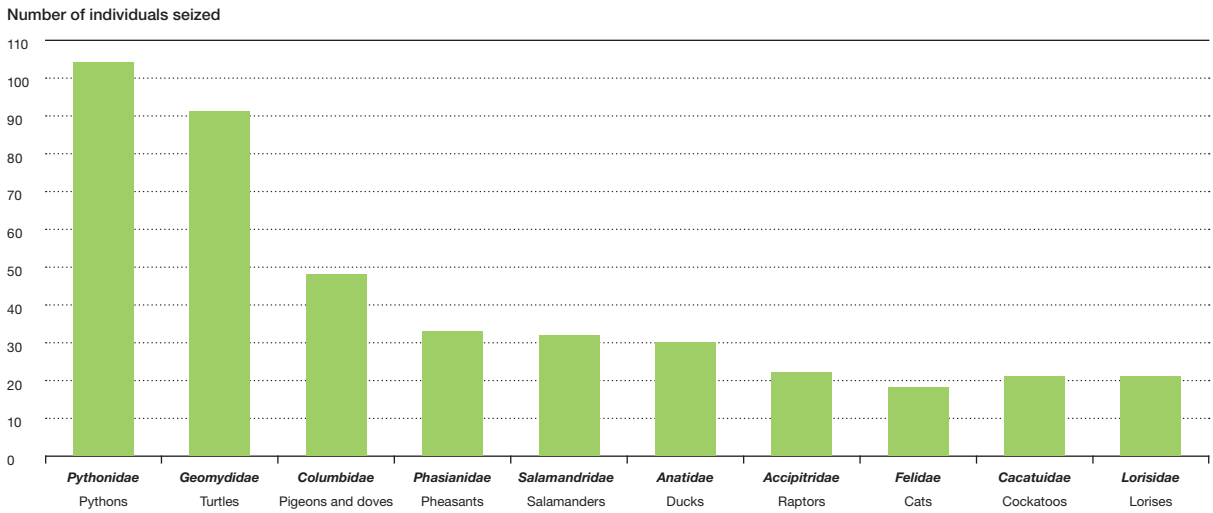
Ape Trafficking as a Transnational Organized Crime[8]

The term "wildlife trafficking" refers to the illegal sourcing, movement and disposal of live or dead wildlife, or their parts or products, usually for commercial purposes. Ape trafficking can include "one-off" events—such as the individual transfer and sale of an ape as a pet; in contrast, this box focuses on organized commercial trafficking, referred to as transnational organized crime (TOC). Trafficking usually entails the movement of wildlife across an international border without the requisite documentation. TOC networks vary in nature, from highly organized and hierarchical structures to dispersed, loose affiliations of people who come together to make profit. Facilitation networks, which operate alongside TOC networks, assist in or turn a blind eye to the commission of related crimes including poaching, bribery, the falsification or illegal acquisition of transfer documents, customs fraud, money laundering and wire fraud. Facilitators may include corrupt customs officers, police officers, CITES officials, members of the judiciary or other government officials. Irrespective of the type of network, key points where transactions occur are frequently referred to as nodes.

From a law enforcement perspective, the complexity of ape trafficking networks presents both challenges and opportunities. While building a case for prosecution of crimes can be extremely time-consuming, TOC networks tend to have multiple points of vulnerability (POV) at which actionable, verifiable information may be gathered and exploited to disrupt activities. Legal and regulatory options may be available to law enforcement officials at each POV, so long as these can be mapped with a fair degree of accuracy. In areas where wildlife laws are inadequate or poorly enforced, but money laundering or other legislation is ▸

Figure I.4

Live Protected Species Most Commonly Seized alongside Apes, 2012–18



Source: TRAFFIC International (2018)

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strong, prosecution could focus on various predicate crimes that tend to be committed at POVs (see Chapter 6).

With the right resources and skill sets, intelligence that can underpin a strong transnational case need not be difficult to obtain. As many ape trafficking networks operate in countries with low enforcement levels, or where high-level government officials and politicians are readily corruptible, their network security is rarely high. Political interference can, however, hamper efforts to collect intelligence.

Understanding and Mapping Ape Trafficking

There is value in mapping TOC ape trafficking networks. Fine-resolution mapping in particular allows for the identification of key source, logistical, financial or corruption nodes that can provide a tangible output around which to discuss and plan disruption options. The mapping of trafficking routes only results in a static snapshot of a dynamic problem, however. Such mapping is based on seizure data only, which provides a limited picture of the true nature of ape trafficking networks and can give rise to incorrect assumptions about wildlife crime. Under ideal circumstances, mapping would be based on real-time, ongoing intelligence from inside a network and a series of local and regional overlays would provide context to help law enforcement officials understand how the network functions.

Successful TOC networks are agile, intimately understand their operating environment, adapt to it and exploit social, economic, governance and cultural loopholes. These networks understand—and are built on—the motivations of vendors and purchasers, be they private zoo owners or traditional healers. When informed by a solid understanding of all such factors, the mapping of ape trafficking networks can allow for the planning of an effective disruption, whereby an entire network can be pulled apart and its ape trafficking activities stopped.

Counter-trafficking Efforts: A Call for Dynamism and Innovation

Like most wildlife trafficking, ape trafficking comprises a set of activities that are fluid and highly responsive to legal, regulatory and public pressure. Yet, in contexts where regulatory and law enforcement institutions are underfunded, inefficient or unresponsive, where corruption fuels illegal activities, or where wildlife issues are not at the top of the political agenda, TOC actors tend to thrive and counter-trafficking efforts grind to a halt. Indeed, the success rate of disruption efforts is extremely low. Since not all wildlife crimes can be stopped by prosecution, innovative methods are required to detect, disrupt, deter and dismantle organized criminal networks.

Counter-trafficking experience to date suggests that programs must be flexible enough to engage in rapid, coordinated intervention activities at local and transnational POVs, across diverse, secure partnerships. To keep apace with—and get one step ahead of—TOC networks, counter-trafficking programs must be at least as dynamic and adaptable. A starting point could be to consider program principles that enable dynamism, such as building in rules for radical program adaptation; aggressively challenging assumptions on what will work and what will not; bringing diverse areas of expertise into the dialog that may well challenge accepted operating norms; and experimenting and being prepared to take significantly larger risks. Ultimately, the true success of any innovative strategies to disrupt TOC networks needs to be measured against the conservation goals and long-term viability of wild ape populations.

BOX I.6

Social Media and Online Trafficking

Around the world, about 3.5 billion people use social media. Facebook accounts for the largest share of users, with close to 2 billion registered users. Nearly 400 million daily active users are in Asia, Facebook's largest region, whose market share is larger than anywhere else in the world (Kemp, 2019). In 2018, Instagram, the Facebook-owned photo-sharing app, became one of the most popular social networks worldwide, reaching 1 billion monthly active accounts, most of which are in Southeast Asia (Clement, 2019). Given its popularity and scope, it is unsurprising that the Internet is playing an increasingly important role in the illegal ape trade. In addition to enabling low-cost, anonymous access to markets, these platforms also create new live ape markets (see Chapter 4).

Social media networks such as Facebook and Instagram can be more appealing to traders than traditional commercial trade platforms or open markets, largely because they allow trade to be conducted free of charge and with a very high degree of anonymity. In addition, social media networks allow users to create special interest groups that provide a layer of control and accessibility that is governed by those managing the group. Such groups generally admit new members only through invites, making it difficult for any non-member to acquire information about the group or view its contents. In this way, social network sites and specialist forums help to perpetuate the illicit wildlife trade, both through legal and illegal means. They do so directly, by enabling trade exchanges, and indirectly, by allowing discussions about the trade (Smith and Cheyne, 2017; Stiles, 2016). To protect their identities further, sellers tend to instruct potential buyers in online groups to communicate via private or direct message on encrypted messaging apps such as WhatsApp and WeChat.

A 2014 investigation into the online wildlife trade revealed that Russia, Ukraine and the Middle East were the worst offenders for advertising live apes online

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(Hastie and McCrea-Steele, 2014). A similar investigation focused on the United Arab Emirates and found more than 200 live apes on more than 80 Instagram, Facebook and website accounts over an 18-month period between 2015 and 2016 (Stiles, 2016). Many were for sale and some sellers openly listed prices.

Internet scamming has also played a role in the online ape trade, particularly in Nigeria. In 2006 LAGA brought about the arrest of scammers in Nigeria who had advertised the sale of apes and ape skulls that were not actually in their possession; interested parties never received any products for their money, which was simply pocketed. Following the arrest, the scammers realized that they could make more money by actually supplying the skulls instead of pretending that they would. They subsequently became significant traffickers of ape body parts (O. Drori, personal communication, 2017).

Researchers have attempted to understand the drivers of the online ape trade, and tools and resources such as databases, data mining and facial recognition have been used to enhance online monitoring (Hernandez-Castro and Roberts, 2015; Smith and Cheyne, 2017; Stiles, 2017; Timmins, 2019; Zainol *et al*., 2018). However, challenges to investigating and prosecuting online traffickers include difficulties inherent in the identification of suspects, the origin of species and the applicable legislation. Currently there are no global legal studies on how countries deal with these issues, but approaches may differ across ape range states. For example, Malaysia only prohibits the advertisement of illegally imported wildlife, but not of native gibbons or orangutans from Malaysian Borneo (Parliament of Malaysia, 2008, art. 12). Similarly, Indonesia lacks specific provisions on advertising, and online sales are not explicitly included in the country's legislative definition of what constitutes a "sale" (Ministry of Forestry, 1990, art. 21). Filling these legal gaps will require new laws or amendments to existing legislation. Further analysis of legal tools is needed to determine how the law may best serve the purpose of combating online trafficking (see Chapter 6).

Photo: Social network sites and specialist forums help to perpetuate the illicit wildlife trade, both through legal and illegal means, either directly by enabling trade exchanges or indirectly where discussions around the species in trade have been taking place. Chimpanzee for sale. Screenshot courtesy of PEGAS.

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Photo: If shifts in the protection of ape populations are to be made, concerned stakeholders, ranging from local communities to international agencies, will have to make concerted efforts that build on a range of strategies. © Jabruson (www.jabruson.photoshelter.com)

Chapter Highlights

The first six chapters of this volume of *State of the Apes* interrogate the interface between ape conservation and killing, capture and trade. **Chapter 1** looks specifically at the impact of killing, capture and trade on apes and their habitat. **Chapter 2** assesses the role that cultural drivers play in the trade in apes and the responses to them. The next two chapters discuss the socioeconomic drivers of the trade in meat and parts (**Chapter 3**) and the live animal trade (**Chapter 4**), as well as current efforts to control them. **Chapter 5** presents the approaches for tackling illegal hunting and trade at its source, including through community engagement and behavior change. **Chapter 6** analyzes national and international legal and regulatory frameworks that are relevant to the killing, capture and trade in apes.

Section 2 provides updates on the conservation of apes in their natural habitat, in Africa and Asia (**Chapter 7**), and on the status and welfare of apes in captivity (**Chapter 8**). See the Introduction to Section 2 for the highlights of these two chapters (pages 196–197).

Chapter 1: Impact on Apes and Their Habitat

This chapter assesses the impacts of killing, capture and trade on the ecology and well-being of apes and their habitats. It examines to what extent hunting-induced declines in the number of apes affect their socioecology and their overall conservation, including the survival chances of local groups of apes and wider populations. It also explores the knock-on effects of hunting and trading in apes on the ecological functioning of

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forests, the likelihood of disease transmission between apes and humans, ethical and legal considerations, and the impact on legal and illegal ape-based economies.

Chapter 2: Cultural Drivers and Responses

In focusing on the cultural drivers of the trade in apes, as well as the responses to them, the chapter offers particular insight into the demand for ape parts in Cameroon, based on a study commissioned by the Arcus Foundation. It considers shifting cultural practices that are increasing the vulnerability of apes, such as taboo degradation regarding the consumption of ape meat. The chapter highlights the ways in which anthropological research can contribute to ape conservation planning; it also details legal and other opportunities for integrating culture and conservation to protect ape habitat.

Chapter 3: Socioeconomics and the Trade in Ape Meat and Parts

After placing wild meat hunting in its historical context, this chapter offers available data on current offtakes in Africa and Asia. It evaluates the consequences of the trade in ape meat and parts, focusing on resulting declines in wild ape populations as well as the role of wild meat in human food security. In discussing socioeconomic drivers of wild meat hunting, it underscores that while poverty may encourage people to poach for commercial reasons, they tend to do so in response to demand from wealthier communities. The chapter also maps out a commodity chain for great ape meat; identifies ways to curb wild meat trafficking on airplanes; and highlights approaches that can reduce consumer demand for ape meat and parts, including through the promotion of alternative protein sources, awareness raising of the ecological consequences of unsustainable harvesting, improvements to legal frameworks and law enforcement, and the provision of economic incentives to stop hunting and consuming.

Chapter 4: Socioeconomics and the Trade in Live Apes

This chapter examines the demand for live apes, especially from zoos and wild animal parks in China, the marketing and entertainment sectors of the United States and Thailand, and residents of rural Borneo, where misconceptions about apes and their needs fuel a desire to "rescue" orangutans. The chapter also reviews how the use of live apes in the entertainment industry affects the discourse of ape conservation. It considers how social media influences demand and enables supply, particularly by engaging new audiences and conferring value on ape ownership (see Box I.6). In addition, it discusses collaborative counter-trafficking efforts among animal rights organizations and social media companies, including education projects for social media users, and suggests additional approaches to reducing the demand for live apes.

Chapter 5: Responses at Source

In contrast to Chapter 2–4, which focus on the drivers of the ape trade, this chapter provides an overview of ways to curb the killing, capture and trade in apes, primarily within their natural habitat. It briefly reviews legal concerns—which are discussed at length in Chapter 6—and offers details on efforts to strengthen site-based law enforcement and community engagement in the context of ape conservation. The chapter argues in favor of a combination of site-specific approaches

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to tackle the ape trade, citing serious drawbacks of strategies that are built exclusively on top-down law enforcement. It also stresses the need to ensure that individuals and communities perceive engagement in the illegal wildlife trade as more costly and less beneficial than conservation, so that they are more likely to be protectors than poachers of apes.

Chapter 6: The Legal and Regulatory Environment

This chapter scrutinizes the legal and regulatory frameworks that govern the illegal wildlife trade and considers how they may be applied to disrupt the ape trade. It reviews the national laws of 17 ape range states, including domestic legislation that implements a country's obligations under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the main international agreement in this field. The chapter points out what states can do to close regulatory gaps and to increase enforcement opportunities along the entire value chain, particularly with respect to acts associated with hunting, domestic sales and advertising. It also examines the role of CITES—which uses a system of export and import permits to regulate the international trade in endangered wildlife—and other legal frameworks and international organizations that have the power to pursue cross-border enforcement action, such as INTERPOL and the World Customs Organization.

Acknowledgments

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Box I.2: Pauliina Upla and Johannes Refisch

Box I.3: Vincent Nijman, Penny Wallace and Sabri Zain

Box I.4: Lisa Rolls

Box I.5: Fiachra Kearney

Box I.6: Josephine Head and Maria Isabel Rodriguez Valero

Endnotes

1 Bowen-Jones and Pendry (1999); Damania, Milner-Gulland and Crookes (2005); Fa *et al.* (2006); Meijaard *et al.* (2011); Nijman *et al.* (2011); Van Schaik, Monk and Robertson (2001); van Vliet, Nasi and Taber (2011).

2 Rosewood comprises various species in the genera *Cassia, Dalbergia*, *Diospyros*, *Millettia* and *Pterocarpus*.

3 Agarwood is a fragrant dark resinous wood from *Aquilaria* trees that have become infected with the *Phialophora parasitica* mold; it is used in incense, perfume and small carvings.

4 The nine languages are Arabic, Bahasa Indonesia, Chinese, English, French, Portuguese, Russian, Spanish and Vietnamese.

5 Based on feedback from the champions and internal web reports, 2018.

6 Internal web reports and agreements seen by the author, 2019.

7 Most notably Pramuka bird market in Jakarta and the Kupang bird market in Surabaya.

8 Information in this section was provided by Fiachra Kearney of the Global Eye Database.

9 Earthwatch Europe (http://earthwatch.org.uk).

10 Independent consultant.

11 Arcus Foundation (www.arcusfoundation.org).

12 Arcus Foundation (www.arcusfoundation.org).

13 Forever Wild (www.foreverwild.com.au).

14 Oxford Brookes University (www.brookes.ac.uk/social-sciences/courses/anthropology).

15 GRASP (www.un-grasp.org/).

16 Lancaster Environment Centre, Lancaster University (PhD candidate) (www.lancaster.ac.uk/lec/).

17 Wild for Life (https://wildfor.life/).

18 GRASP (www.un-grasp.org/).

19 TRAFFIC (www.traffic.org).

20 TRAFFIC (www.traffic.org).