CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES
OF WILD FAUNA AND FLORA

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WORLD WILDLIFE TRADE REPORT

1. This document has been submitted by the Secretariat in relation with agenda item 12*.

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World Wildlife Trade Report

(a pilot edition for CoP19)

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Contents

Foreword

Trade has been ongoing from neolithic times as history and archaeological data reminds us when studying the Aztecs, Incas and Mayans, the Silk Road trade route, the adventures of Marco Polo, the Mesopotamia and Indus Valley peoples, the Amazon and Congo basins and many more regions of the world. The geography of trade (the buying and selling of products we want and need) has evolved since people began to trade with one another between 9,000 and 6,000 BC. Demand for “exotic” wild plants used as spices, incense or perfumes in the ancient world led to the development of an extensive network of trade routes. However, the scale, trends and patterns of that trade was incomparable to today’s globalised economy involving 8 billion people.

Humans are using millions of products in their daily lives that are derived from wild animals and plants; often without being aware of our relation and interdependency with nature and its web of life.

As we know, CITES is the global treaty that regulates international trade in nearly 40,000 species of wild animals and plants, including timber and marine species, that are included in its Appendices. This World Wildlife Trade Report is a first attempt to provide as comprehensive an overview of wildlife trade as possible from all angles. It considers the routes, scale and patterns of international trade in CITES-listed species, together with the values, conservation impacts and socio-economic benefits of such trade as well as the linkages between legal and illegal trade. It aims to present a balanced view of the positive and the negative sides of wildlife trade.

As CITES approaches its 50th anniversary since its signature in Washington D.C. on 3 March 1973, it is timely to have a clearer picture of the global wildlife trade regulated under the Convention. This is particularly relevant as CITES stands today more than ever at the intersection between trade, the environment and development. The achievement of sustainable, legal and traceable use of wildlife in line with the United Nations Sustainable Development Goals (SDGs) is the common purpose of all the partners involved in the preparation of this report.

The primary aim of this report is to document the many values of trade in wild species of animals and plants and reinforce the call for more investment in nature to address the biodiversity crisis. Asia and Europe remain the top two exporting and importing regions when it comes to international regulated trade in CITES species, with Asia accounting for 37% of export transactions and 31% of import transactions, and Europe 34% of export transactions and 38% of import transactions. The report reveals that the proportion of wild-sourced plants in trade has decreased over the past ten years to 4% in terms of the number of individual plants. In other words, the vast majority of plants in trade are artificially propagated and are no longer “wild”. For animals, while captive-breeding is increasing, a substantial proportion of trade is still in wild-sourced animals and this will require constant monitoring to improve our understanding of the world’s wildlife trade.

Authors of this pilot report have been fortunate to have at their disposal the primary data provided by Parties in their annual reports and uploaded on the CITES Trade Database. They have also deployed their best efforts to research and analyse available information on values, conservation, and socio-economic impacts of the wildlife trade. The report highlights some of the methodological and data challenges associated with providing a definitive assessment, but nevertheless provides clear illustrative insights into the nature, scale and various values of the trade and some of its impacts both on people and wildlife.

Whilst the report that you are about to read offers some useful insights and helps fill the information gap, it is evident that there are limitations in collecting and analysing the data and further inputs are required if we are to make such reports even more useful. We believe that they will greatly improve our understanding of trade in CITES-listed species, contribute to the implementation of the Convention, the achievement of the CITES Strategic Vision: 2021-2030 and the SDGs. It is my sincere hope that you will see value in this information and we very much welcome your advice and inputs.

On behalf of the CITES Secretariat, I would like to thank our global alliance of partner organizations for their active engagement in this initiative and the authoring organizations for their remarkable efforts. My warm thanks to the United Nations Environment Programme and the government of China for their generous financial contribution which has made this report possible.

Ivonne Higuero
CITES Secretary-General

Messages from partners

Inger Andersen
UN Under-Secretary-General & Executive Director, UN Environment Programme

For the past 50 years, CITES has been hard at work to ensure that the international trade in wild animals and plants is ecologically sustainable. The pilot edition of the World Wildlife Trade Report presents, for the first time in the history of the Convention, an overview of the legal wildlife trade that embraces the ecological, social and economic dimensions of sustainability.

The sustainable and legal trade in wildlife can be a critical contributor to the conservation of wild species and their habitats, to the livelihoods of rural communities that live with wildlife, as well as to national economies. This important contribution can only be widely recognized when a strong body of evidence to support it is assembled and made widely accessible. Understanding the benefits that sustainable and legal trade brings – and comparing these against the negative impacts of unsustainable and illegal trade – can also provide strong incentives for national authorities to better manage the international wildlife trade. The pilot edition of the World Wildlife Trade Report is an important step in this direction.

We at UNEP are very pleased to have contributed to making this pilot edition of the World Wildlife Trade Report possible. I hope that the Conference of the Parties to the Convention will recognize the importance of producing regular, evidence-based and accessible reports on the conservation, economic and social value of the CITES-regulated trade. Such reports would not only support the Parties in their deliberations, but also help showcase the important work of the Convention to a wider audience.

Rebeca Grynspan
Secretary-General, UNCTAD

We would like to express our warm congratulations on the launch of the World Wildlife Trade Report. This report is a milestone in addressing legal trade in wildlife. The commercial trade of wildlife while conserving species and ecosystems contributes to improving the livelihoods of local communities. It is therefore important to ensure that international trade in CITES-listed species is sustainable, legal and traceable.

The report's estimated export value of trade in CITES-listed species of US$11.1 billion per year is comparable to trade in mainstream agricultural commodities such as cocoa beans valued at US$8.5 billion in 2020. Trade regulation by CITES provides conservation safeguards for significant flows of legal international trade, with considerable potential to contribute to national economies and local livelihoods.

Capacity-building for trade management and regulation efforts by exporting countries is critically important to ensure such benefits are maximized and that risks from unsustainable or illegal trade are further reduced.

Biodiversity loss is a global concern and international cooperation is ever more crucial. By working together to enhance livelihoods in rural and vulnerable areas through sustainable trade, we can greatly contribute to the conservation of biological resources. UNCTAD's longstanding partnership with CITES highlights the positive mutuality between trade and environmental conservation. We look forward to continuing to work together.

Ngozi Okonjo-Iweala
Director-General, World Trade Organisation

We are at a pivotal moment in our lives - the polycrisis of wars, energy and food insecurity, climate change and biodiversity loss constantly remind us of our fundamental duties as leaders in our global community: we need to offer credible and effective solutions to these profound challenges directly affecting our peoples. Trade is no exception. Trade is about people, how we exchange our ideas, the fruits of our labour, how we interact and connect with our neighbours and strive to create positive and beneficial interlinkages across the globe. And maybe no other area in international trade is closer to our relationship with nature than trade in wildlife. The multilateral trading system has thus a duty – anchored on its central objective to promote sustainable development – to ensure trade is a key part of the solution to the wildlife conservation crisis.

However, for too long the picture of how trade interacts with wildlife has been incomplete. This first World Wildlife Trade Report makes a concrete contribution to current discussions and efforts to align trade and trade policies with conservation efforts. Not only does it contribute with sorely needed data, but – importantly – it also points to areas where more work is required, including from the trade community. Recent results at the WTO show how concerted trade action can make a difference; from the agreement to ban subsidies that contribute to illegal, unreported and unregulated fishing, to improvements in transparency and traceability of trade through investments in trade facilitation and customs modernisation. The WTO stands ready to continue and reinforce our historical cooperation with CITES and the other leading institutions responsible for this important Report.

Bruno Oberle
Director General, IUCN

IUCN is delighted to have been involved in the production of this pilot edition of the World Wildlife Trade Report. The Union has long recognised that the sustainable use of wild living resources can provide a critical incentive for people to conserve species and protect habitats. Its 2000 policy statement on the Sustainable Use of Living Wild Resources recognises the clear link between socio-economic and conservation benefits. This report also highlights that link. While not a definitive, systematic assessment, this report provides key insights into the scale, value, conservation and socio-economic impacts of legal, international trade in CITES-listed species. More data and evidence will help greatly to enhance the utility of any future editions of this report. IUCN remains committed to help to build and analyse that evidence base through the work of its Secretariat, expert Commissions and the Membership. The Union remains hopeful that the Parties to CITES will also be willing to join this effort.

Rick Scobey
Executive Director, TRAFFIC

TRAFFIC is delighted to have collaborated with the CITES Secretariat and other partner organisations in the development of the pilot edition of the World Wildlife Trade Report.

The aim of this report is breaking new ground, it highlights the socio-economic and conservation benefits of legal and sustainable trade in CITES-listed species for indigenous peoples and local communities (IPLCs), as well as addresses the linkages between legal and illegal trade, with insights on practical steps to reduce illegal trade.

TRAFFIC developed the latter chapter on those linkages and our contribution aims to help Parties and other stakeholders better understand the causes behind the illegal wildlife trade in CITES Appendix II-listed species. This focus is deliberate given that, unless they are subject to stricter national regulations, they could be legally traded according to CITES provisions.

Data from the CITES Illegal Trade Database indicates that over half of the seizures in the last decade involved Appendix II species. Addressing the causes that lead to these, would promote the sustainable use and conservation of CITES-listed species while benefitting IPLCs and others involved in the supply chains, and would enable more effective and focused law enforcement efforts.

We look forward to feedback on this pilot report and hope it will lead to collaborations generating valuable information to help reduce the pressure of illegal and unsustainable wildlife trade on biodiversity, and enhance the benefits to wildlife conservation and human wellbeing that derive from trade at sustainable levels, and thus, ensure progress towards the Sustainable Development Goals and other international commitments.

Executive summary

Overview of this report

- The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is an international agreement that aims to ensure that international trade in wild animals and plants does not threaten the survival of the species. CITES works by regulating trade in the over 38,000 species that are listed in its three Appendices. The vast majority of these species, roughly 97%, are in Appendix II. These are species that are not necessarily threatened with extinction, but in which trade must be controlled in order to avoid over-utilization and a future threat to their survival.
- This pilot edition of the "World Wildlife Trade Report" aims to provide an overview of regulated international trade in CITES-listed species of wild plants and animals from both conservation and socio-economic perspectives. It focusses on trade – and the impacts of trade – that have been documented over the last decade.

Trade in CITES-listed species

- Between 2011-2020, approximately 3.5 million CITES shipments were reported in direct trade by exporters. This amounted to over 1.3 billion individual organisms (1.26 billion plants and 82 million animals) and an additional 279 million kg of products reported by weight (193 million kg of plants and 86 million kg of animals).
- Not all of the ~38,000 species listed in the CITES Appendices are routinely involved in trade – the trade described above involved just over 12,000 species - 58% of the listed animal species and 28% of the listed plant species.
- The majority of trade involved individuals (or parts and derivatives) that were artificially propagated (for plants) or captive-produced (for animals bred or born in captivity). Overall, trade in wild-sourced individuals accounted for 18% of all trade and was dominated by plants (81% of global wild-sourced trade)
- Asia and Europe represented both the top exporting and importing regions, with Asia accounting for 37% of export transactions and 31% of import transactions, and Europe 34% of export transactions and 38% of import transactions.

Conservation impacts of trade

- Wildlife trade can benefit both wildlife populations and people, but if not effectively regulated can drive biodiversity loss. The outcome generally depends on a complex mix of biological, socio-economic and governance factors. A rapid literature review of the most traded CITES-listed species highlights a wide range of conservation impacts – both positive and negative. These include impacts on the species in trade, impacts on other species, and impacts on habitat.
- Positive impacts on traded species include:
  - Population increase: this was the most commonly documented type of positive impact and was often associated with a recovery from an earlier decline driven either by unsustainable or illegal harvest and trade.
  - Population stabilisation: a declining population no longer declining (even if not increasing) due to regulated trade.
  - Population maintenance: population of a traded species maintained despite trade – commonly reported for reptile species.
  - Reduced pressure on wild population – previous threats to a traded species in the wild reduced as a result of legal trade of captive bred/produced or artificially propagated specimens.

Cyclamen coum

- Three key mechanisms can be identified that support the management of these traded species and thus deliver the positive outcomes: improved protection, improved management practices, reduced illegal or unregulated harvesting. These findings are consistent with broader analyses which show that for many species, utilisation – as long as it is well managed – is sustainable.
- Harvest and trade of one species can also help reduce pressure on other species and assist in population recoveries. Perhaps more significantly though, it can provide incentives for wider habitat protection and/or restoration, benefitting a myriad of other species and essential ecosystem services.
- By contrast, poorly managed trade can have a negative impact on traded species, resulting in local or widespread population declines – as has been noted by the CITES Review of Significant Trade process. Such declines are generally driven by over-harvesting as a result of inadequate regulation. In some cases, this extends to use of legal trade as a cover for illegal trade. Deliberate or accidental release of traded species (often pets) outside of their natural range can also have implications for other species in the form of spread of disease, genetic dilution through cross-breeding and competition of habitat, food or other resources.
- One key biological factor that affects conservation outcomes include the life history strategies of species in question ("R-selected" species produce lots of offspring and fare better under human intervention than "K-selected" which produce few offspring). Another factor is whether the species in question are wild-sourced or captive-bred/artificially propagated. The shift in production away from wild-sourcing that has been witnessed in the last 20 years has in some cases relieved pressure on wild populations but in others, removed local incentives for conservation.

Financial value of trade

- The annual revenue generated by the global legal trade in wildlife (CITES and non-CITES) in total has been estimated at USD 220 billion/year.
- In this analysis we estimate the financial value of direct global exports of CITES-listed species over the period 2016-2020 was approximately USD 1.8 billion for animal exports and USD 9.3 billion for plant exports. Note the figures represent the value at the point of export/import (for animals) or point of sale (for most plant data), and do not indicate the full value of all CITES trade throughout the supply chain.
- Captive-produced commodities account for approximately two-thirds (65%) of the average annual value of direct global exports of CITES-listed animals, with wild-sourced animal products representing just under one quarter (24%) of the trade by estimated value. In contrast, for plants, wild-sourced trade accounted for the majority (58%) of the estimated average annual value, with artificially propagated plants comprising one third (34%) of the estimated value.
- Across all animal commodities, exports of reptiles (particularly crocodiles for skins) and fish (particularly sturgeon for caviar) accounted for over two thirds (~72%) of the average annual value of global CITES-listed exports. Across all plant commodities, approximately two thirds (66%) of the estimated average annual value of global CITES-listed exports was attributed to timber exports (USD 6.2 billion), with exports of non-timber plants (USD 3.17 billion) accounting for the remaining third (34%) of global exports by value.
- Asia and Africa are the regions that account for the highest proportion of the estimated value of global exports. Approximately half of the estimated annual average value of global CITES-listed animal exports originated from Asia while almost two-thirds of the estimated annual average value of global CITES-listed plant exports was attributed to exports from Africa.

Socio-economic impacts of trade

- Socio-economic impacts of international wildlife trade include macro-economic impacts such as export earnings, GDP contributions, job creation as well as local level livelihood impacts. Indeed, many of the socio-economic impacts associated with wildlife trade are closely aligned with the development aspirations that are enshrined within the United Nations Sustainable Development Goals (SDGs).
- The literature review identified a wide variety of socio-economic impacts. These ranged from macro-economic impacts such as contributions to GDP, to local level impacts such as improved nutrition or strengthened rights. More evidence was found on economic impacts than on other social aspects, likely due to the very direct linkages of the trade with impacts such as income generation and job creation. Income generation was the most frequently documented impact. The conservation impacts described earlier are deeply intertwined with the socio-economic benefits that are generated – the latter often providing the incentive for the former.

- The documented socio-economic impacts were nearly all described as positive. Where negative impacts were recorded these were often better described as limitations rather than purely negative outcomes – particularly in terms of how benefits are distributed and to whom. For example, while jobs are created and income is generated, these jobs and income often accrue to limited numbers and segments of the population and are not evenly distributed along the wildlife trade value chain. There are, however, some clearly documented negative impacts associated with some trade in some species – for example there is an inherent risk of the spread of zoonotic disease when humans come into contact with wildlife.
- Overall, there is limited information regarding the socio-economic implications of wildlife trade. Supply chains vary in form and in distribution of benefits from species to species, trade to trade and county to country. Various analysts have highlighted that wildlife trade supply chains are: typically long and complex – particularly for international trade; rarely linear and stable – more often convoluted and dynamic; often have multiple strands running in parallel; frequently feature prices that vary significantly from harvesters to consumers, with very limited efforts to ensure equitable sharing of benefits through the value chains. Nevertheless, benefits that do accrue to the bottom of the chain can still be significant. Furthermore, this analysis does not take into account the multiplier effect of wildlife trade and this would need to be taken into account to gain a full picture of its impacts.

Links between legal and illegal trade

- Given that Appendix II species can be legally traded yet are often found in seizures it is insightful to understand the causes of seizures in order to determine why these species are being illegally rather than legally traded. For example, data from the CITES Illegal Trade Database revealed that there was a total of 94,478 commodity records in the period 2010 to 2021 with over half of these involving Appendix II species. Meanwhile the Wildlife Trade Information System (WiTIS) managed by TRAFFIC recorded a total of 26,586 commodity records in 17,688 seizures over the same period, of which 23% involved Appendix II species. WiTIS is subject to reporting bias and contains mostly open-source data, which should be noted when interpreting findings from this database.
- Although seizures occur because the commodities being exported or imported are suspected of being illegal, in some cases when investigations confirm the illegality of seized goods, these commodities are confiscated and can go on to be traded legally by the State if national legislation allows. For example, between 2011 and 2020, a total of 106 CITES Parties reported legal trade in previously seized commodities.
- According to the CITES Illegal Trade Database, the most common reported reason for commodities being seized was the absence of a CITES permit, which accounted for close to 70% of all commodity records. Similarly the WiTIS data reveals that 84% of the seizures involving Appendix II species were reported as having no documentation and a further 12% had incorrect documentation.
- Interviews with national CITES authorities revealed a number of other underlying factors for illegal trade including: a lack of awareness by exporters and importers of CITES requirements – especially when the importer is a tourist; the relatively high cost of compliance – obtaining CITES permits – compared to the low level of fines; and a lack of legal trade options.
- Ensuring that compliance with CITES regulations is as straightforward as possible would reduce the amount of illegal trade and, consequently, reduce the burden on law enforcement officers. Law enforcement officers could then focus on CITES-listed commodities most at risk from trade (e.g., Appendix-I species where illegal trade is a relevant conservation threat) and those smuggled with criminal intent, rather than those exported illegally due to a lack of trader awareness or motivation for use of permits.

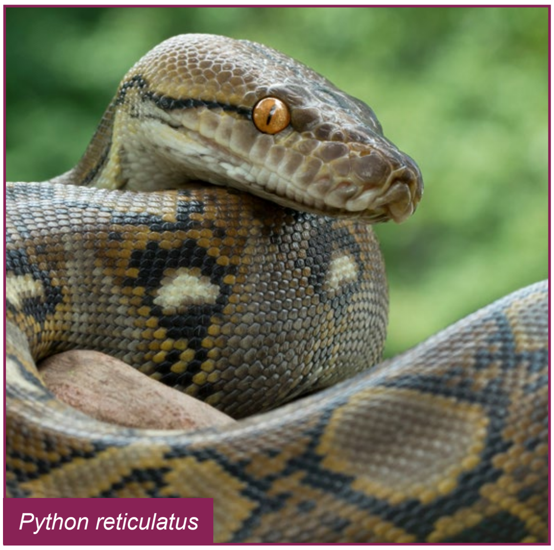

Varanus salvator

Introduction

Legal trade in wildlife, which includes both wild animals and plants for the purpose of this report, involves thousands of species from across the taxonomic spectrum, traded for a vast array of purposes and products, by millions of producers and consumers across the globe. The annual revenue generated by the global legal trade in wildlife (including CITES and non-CITES trade) has been estimated at between USD 2.9 and 4.4 trillion from 1997 to 2016 or USD 220 billion/year[1] - whereas the value of the illegal wildlife trade has been estimated at USD 7-23 billion/year[2]. Timber is the world's most valuable wildlife commodity in trade with the total value of global exports of forest products estimated to be USD 244 billion[3].

Legal trade in wildlife involves thousands of species from across the taxonomic spectrum, traded for a vast array of purposes and products, by millions of producers and consumers across the globe.

CITES seeks to regulate some of this trade, but does not cover the entirety of global wildlife trade. It only covers international trade, not domestic, and only trade in species that have been listed in the CITES Appendices – just under 39,000 of the many more thousands of species that are in trade globally.



Python reticulatus

The "World Wildlife Trade Report" aims to provide an overview of regulated international trade in CITES-listed species of wild plants and animals from both conservation and socio-economic perspectives. This pilot edition has been compiled on behalf of the CITES Secretariat by the United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC), the IUCN Sustainable Use and Livelihoods Specialist Group (SULi) hosted by the International Institute for Environment and Development (IIED), and TRAFFIC.

Chapter I of the report provides a brief introduction to CITES and the species it regulates. Chapter II then provides an overview of the nature, scale and characteristics of trade, drawing on data contained in the CITES Trade Database[4]. Chapter III discusses some of the documented conservation impacts - positive and negative – of trade in CITES-listed species, based on a rapid review of scientific and grey literature. Chapter IV analyses the financial value of trade in CITES-listed species, providing insights into the estimated average annual financial value of direct exports of CITES-listed species, as a first step towards examining the economic benefits of CITES trade to producer countries. Chapter V looks beyond financial export values to explore the wider socio-economic impacts of wildlife trade and its contributions to the UN Sustainable Development Goals (SDGs). Finally, Chapter VI discusses the links between legal and illegal trade, particularly in terms of how much potentially legal trade is categorised as illegal because of non-compliance with CITES regulations. Full details of the methodology applied in each of the chapters is provided in Annex A.

This pilot report represents a first step in trying to understand the nature, value and impacts of trade in CITES-listed species. Throughout, it highlights some of the methodological and data challenges associated with providing a definitive assessment but nevertheless provides clear illustrative insights into the nature, scale and value of the trade and some of its impacts both on people and wildlife.

1 Andersson, A.A; Tilley, H.B; Lau, W; Dudgeon, D; Bonebrake, T.C and Dingle, C (2021) CITES and beyond: Illuminating 20 years of global, legal wildlife trade. Global Ecology and Conservation, Volume 26, e01455
2 Nellemann, C. ; Henriksen, R., Kreilhuber, A., Stewart, D., Kotsovou, M., Raxter, P., Mrema, E., and Barrat, S. (Eds). 2016. The Rise of Environmental Crime – A Growing Threat To Natural Resources Peace, Development And Security. A UNEPINTERPOL Rapid Response Assessment. United Nations Environment Programme and RHIPTO Rapid Response–Norwegian Center for Global Analyses, www.rhipto.org. Recent studies suggest that the true value may be higher.
3 FAO (2021) Forest Product Statistic, Facts and Figures. Available at https://www.fao.org/forestry/statistics/80938/en/
4 https://trade.cites.org/

I. CITES at a glance

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is an international agreement that aims to ensure that international trade in wild animals and plants does not threaten the survival of the species. The Convention entered into force with nine contracting Parties on 1 July 1975 and, as CITES nears 50 years, has since grown to include 184 Parties across the world; 183 States and the European Union.

CITES operates by placing controls on international trade in animals and plants (and their parts and derivatives) that are listed in its three Appendices. Appendix I includes species that are threatened with extinction, and trade is only permitted in exceptional circumstances (for instance, for scientific research). Appendix II includes species that are not necessarily threatened with extinction, but in which trade must be controlled in order to avoid utilization detrimental to the survival of the species in the wild. Appendix III contains species that are protected by national legislation in at least one country and where that country has asked the CITES Parties for assistance in controlling the trade.

There are currently over 38,700 species listed in the CITES Appendices, which includes approximately 32,800 species of plants and 6,000 species of animals. The majority (~97%) of species are included in Appendix II with just 3% on Appendix I and < 1% in Appendix III. Nineteen species are included in both Appendix I and II (so-called "split-listings" where the conservation status and threats to different populations of the species vary in different countries and the level of required trade restriction is thus also different). The taxonomic group with the greatest number of species listed in Appendix I is plants (395 species), whereas the taxonomic group with the largest proportion of species listed in Appendix I is mammals (37% of all CITES-listed mammal species).

~38,700
species listed in the CITES Appendices

184
Parties to the Convention

23 million
trade records

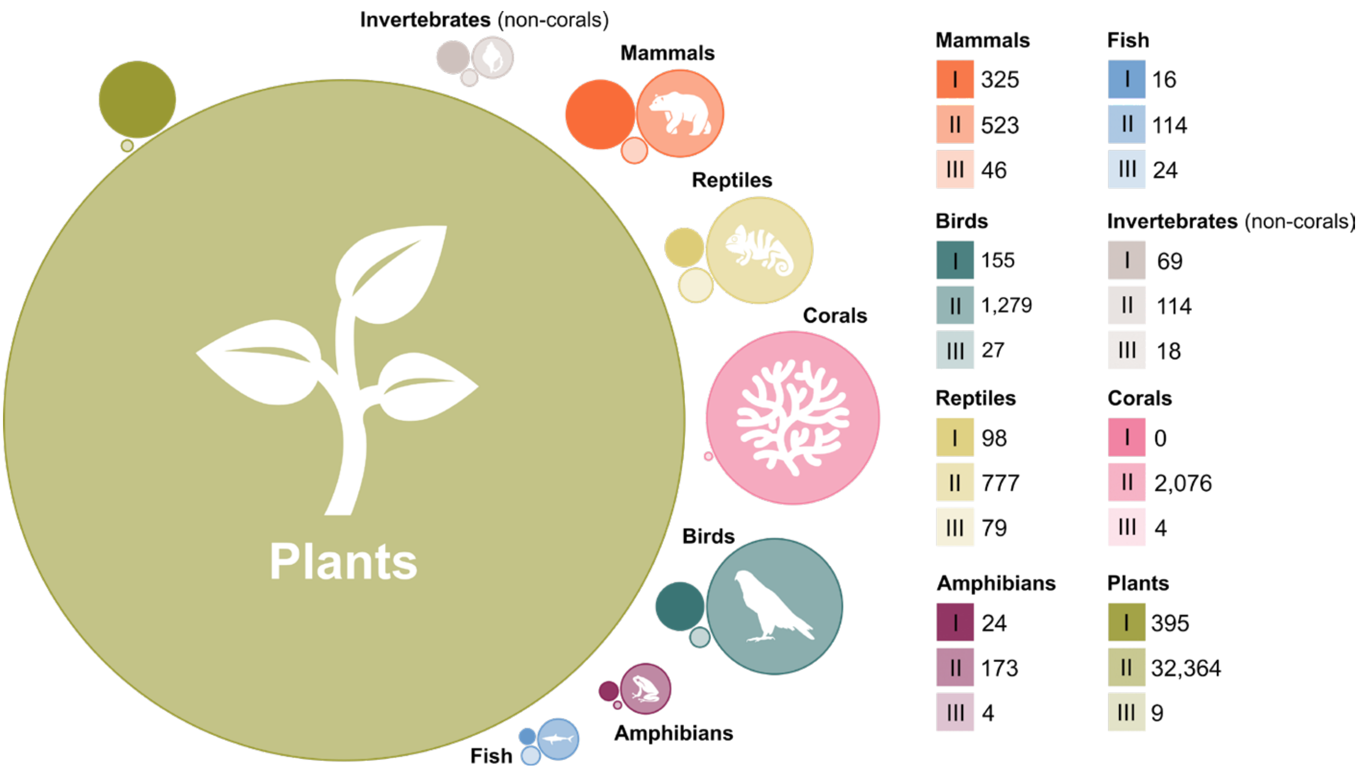


Figure 1.1. *Overview of species listed in CITES Appendices I, II and III (tinted from dark to light, respectively) by taxonomic group as of 26 November 2019 (post-CoP18). Numbers are approximate because there are no agreed species lists for some of the higher taxa, and 19 split-listed animal species have each been counted towards Appendix I and II.*

Trade in species protected by CITES requires appropriate documentation (export and, for Appendix I-listed species, import permits), and Parties to the Convention are required to submit an annual report summarising the permits granted in the previous calendar year, including the quantities and types of species and their products traded. The data contained within these annual reports are entered into the CITES Trade Database, which is a publicly available resource dating back to the start of the Convention in 1975. The CITES Trade Database enables the monitoring of the overall volume of trade subject to the Convention.

In recent years, approximately one million records are added to the CITES Trade Database annually. The full scale of transactions is likely to be higher, as Parties are not required to report imports of Appendix II taxa.

Every two to three years, a meeting of the Conference of the Parties (CoP) is held to review the implementation of the Convention, including the consideration of proposals to amend the lists of species included in the Appendices (to add species to, transfer between, or remove from the Appendices). At each CoP, the number of species included in the Appendices tends to increase. Over 100 additional species were added to Appendices I and II at CoP18 (held in Geneva in 2019), with over half (58%) of new listings involving reptiles and amphibians.

The CITES Trade Database currently holds over 23 million records of international trade in CITES-listed species.

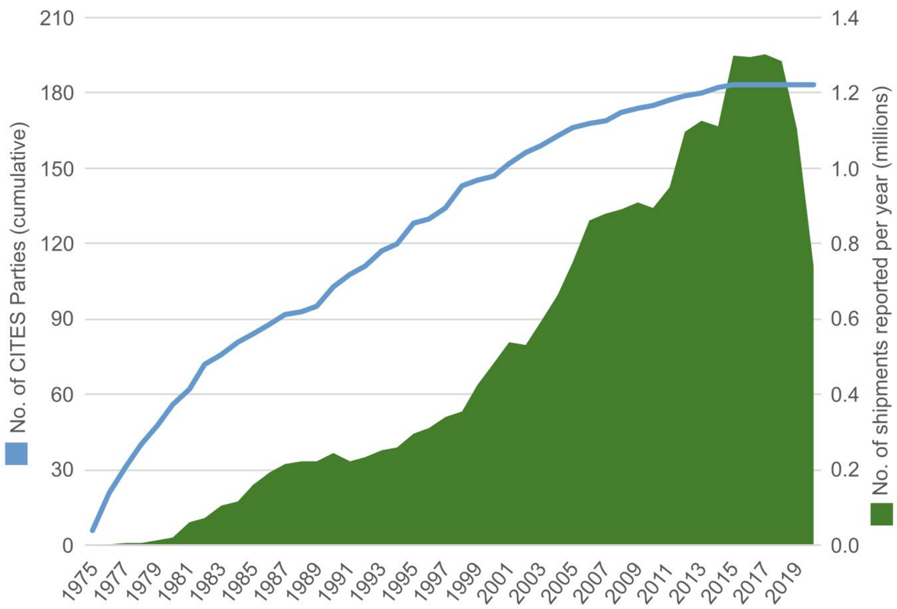


Figure 1.2. *The number of trade transactions reported per year (green, in millions) and the number of Parties to the Convention (cumulative, blue line) since CITES entered into force in 1975. The apparent decrease in transactions reported in 2020 is likely due, at least in part, to delays in submission of annual reports and lower levels of trade during the COVID-19 pandemic.*

CITES permit system

The CITES permit system is the key mechanism by which trade in CITES-listed species is regulated. With each permit issued, the national CITES Management Authority (MA), as the issuing authority is providing confirmation that the trade is legal, sustainable, and traceable in accordance with Articles III, IV and V of the Convention. The MA of each Party must ensure that the specimens have been obtained in accordance with national laws by undertaking a legal acquisition finding guided by the recommendations in Resolution Conf. 18.7. For species included in Appendices I and II, the national CITES Scientific Authority (SA) of the exporting Party undertakes a non-detriment finding (NDF), which is a science-based assessment that verifies whether the proposed export is detrimental to the survival of the species. Only if that is not the case should the export be authorized and an export permit issued. Resolution 16.7 (Rev. CoP17) on *Non-detriment findings* recommends that the NDF should consider the species' conservation status, biology and life-history characteristics, range, population status and trend, threats, volume of trade, and other factors. The permits issued by the Management Authority are compiled in the CITES annual reports submitted by each Party.

II. Overview of CITES trade

The aim of this chapter is to provide an overview of the scale, patterns, and trends in international trade in CITES-listed plants and animals over the most recent 10-year period (2011-2020), at both a global and regional level. It is based on data of exporter-reported direct trade in species listed in Appendix I, II and III, which are submitted by Parties in their CITES annual reports and recorded in the CITES Trade Database. Re-exports of animals and plants that were previously traded internationally (indirect trade) are excluded in order to avoid double-counting of quantities.

Trade in CITES-listed taxa is reported in a variety of units, including the number of specimens or the weight or volume of specimens traded. This analysis focusses on trade reported in terms equivalent to whole organisms[5] (hereafter referred to as 'number of individuals'), trade reported by weight (kg), and trade reported by volume (m^3); however, these three unit types have not been combined. Whenever multiple quantities of trade are provided, it should therefore be noted that these are additive rather than representing the same absolute quantities converted into different units; for example, trade in stony corals (Scleractinia spp.) may comprise four million individuals reported by number *in addition to* 17 million kg. The summary statistics presented in this analysis do not represent all direct trade, as trade reported in units of area (m^2), length (m), and liquid volume (ml, l) are excluded. Statistics on the number of transactions reported by Parties are also referenced throughout the analysis; the number of transactions does not represent estimates of trade quantities but rather the number of shipments recorded in the CITES Trade Database. Further details on the methods and considerations involved in CITES trade data analysis can be found in Annex A.

Global trade patterns

Between 2011-2020, approximately 3.5 million CITES shipments involving 12,028 species were reported in direct trade by exporting Parties (Figure 2.1). This involved approximately 58% of the animal species and 28% of the plant species that are listed in the CITES Appendices, the majority of which are listed in CITES Appendix II (93%). These species were traded for a variety of purposes, with commercial trade (3,868 species) and trade for scientific purposes (3,024 species) involving the highest diversity of species.

Trade over the 10-year period amounted to over 1.3 billion CITES-listed plants and animals traded as number of individuals (1.26 billion plants and 82 million animals) and an additional 279 million kg reported by weight (193 million kg of plants and 86 million kg of animals) (Figure 2.2).

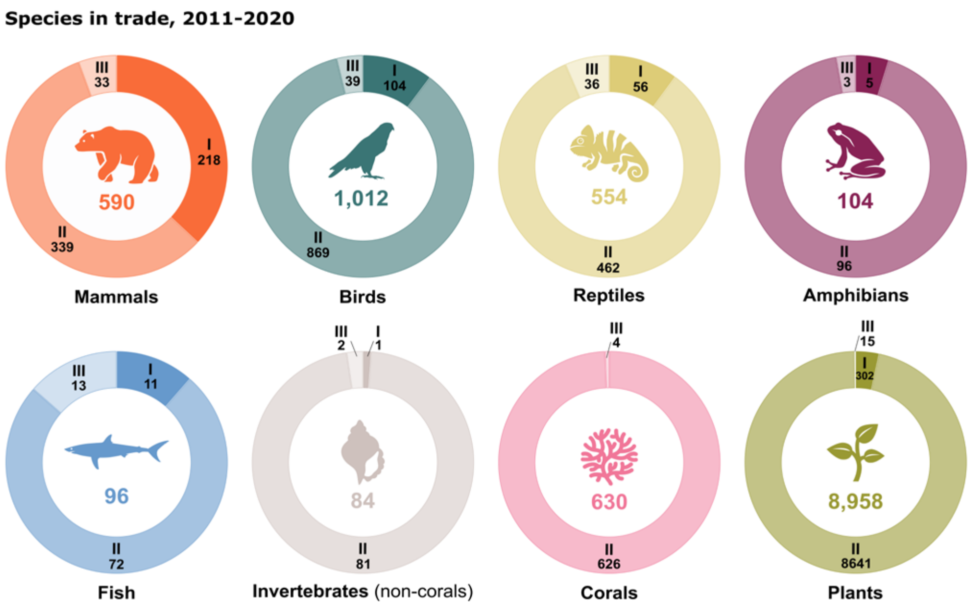


Figure 2.1. *Number of CITES-listed species within different taxonomic groups in direct trade (all purposes and sources) as reported by exporting Parties 2011-2020 (numbers within inner circles), with the proportion of species listed in each CITES Appendix for each taxonomic group (at the time that the trade was reported). A total of 12,028 species were reported in trade over this period.*

[5] Based on whole organism equivalent terms reported by unit 'number of specimens': bodies, fingerlings, live, skeletons, skins, skulls, and trophies.

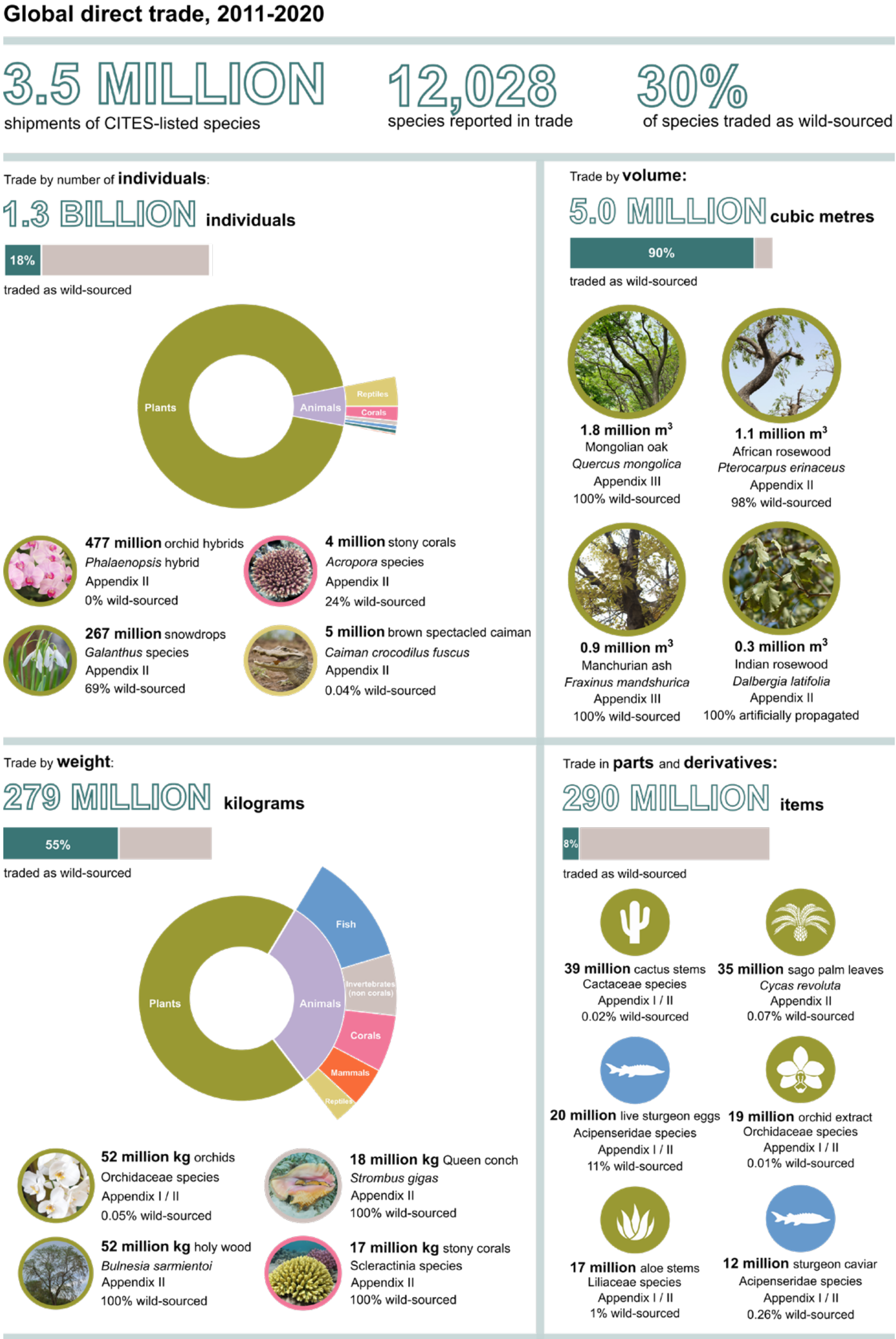


__Figure 2.2.__ Overview of global direct trade as reported by exporting Parties, 2011-2020. Quantities of the most traded taxa as number of individuals[6], by weight, by volume, and as parts and derivatives, together with the current CITES Appendix and proportion of trade in wild-sourced specimens for each taxa. Quantities are additive rather than conversions between different units. Trade reported by number of individuals and by weight were dominated by plants, but the top two plant and top two animal taxa traded are noted for each.

[6] Based on whole organism equivalent terms reported by unit 'number of specimens': bodies, fingerlings, live, skeletons, skins, skulls, and trophies.

Isurus oxyrinchus

Trends in trade by source

The majority of global trade between 2011 and 2020 involved individuals (or parts and derivatives) that were **artificially propagated** (for plants) or **'captive-produced'**[7] (for animals) and was dominated by **plants**. When trade was analysed by number of individuals and weight, plants were predominantly traded as artificially propagated specimens; amphibians, birds and fish were predominantly captive-produced; reptiles were evenly split between wild-sourced and captive-produced; and mammals, corals, non-coral invertebrates and timber were primarily wild-sourced (Figure 2.3). Looking at trends over time, Harfoot *et al*. (2018)[8] found that the proportion of trade by number of individuals generally shifted between 1975 and 2014 from wild to non-wild sources for several taxonomic groups, namely mammals, birds, reptiles, invertebrates, and plants. Our analysis of trade over the most recent decade found that the proportion of trade in animals that was wild-sourced varied, decreasing from 54% of trade by number of individuals in 2011 to 50% in 2020, but increasing from 52% to 63% in these years for trade reported by weight (Figure 2.3) which was likely due, at least in part, to wild-sourced trade in the recently listed shortfin mako (*Isurus oxyrinchus*). For plants, the proportion of wild-sourced trade has decreased over the 10-year period for trade reported both in number of individuals and by weight (from 23% to 4% and 75% to 19%, respectively; Figure 2.3).

Wild-sourced trade

Wild-sourced global trade reported as number of individuals totalled over 235 million plants and animals and accounted for 18% of all global trade reported as number of individuals. Plants comprised the majority of this trade (81%), which was dominated by two species of **snowdrop**: *Galanthus woronowii* and *Galanthus elwesii* (Figure 2.4). A further 10% of global trade reported as number of individuals consisted of **reptiles**, particularly skins from American alligator (*Alligator mississippiensis*) and Asian water monitor (*Varanus salvator*). Wild-sourced trade reported by weight totalled 154 million kg (55% of all global trade by weight) and mainly comprised 39 million kg of **holy wood** (*Bulnesia sarmientoi*) logs, 17 million kg of **queen conch** (*Strombus gigas*) meat, and 13 million kg of raw **stony corals** (Scleractinia spp.) (Figure 2.5).

[7] Animals either bred (source code 'C') or born (source code 'F') in captivity were considered collectively for the purposes of this analysis.
[8] Harfoot, M., Glaser, S., Tittensor, D., Britten, G., McLardy, C., Malsch, K., & Burgess, N. (2018). Unveiling the patterns and trends in 40 years of global trade in CITES-listed wildlife. Biological Conservation 223, 47-57.

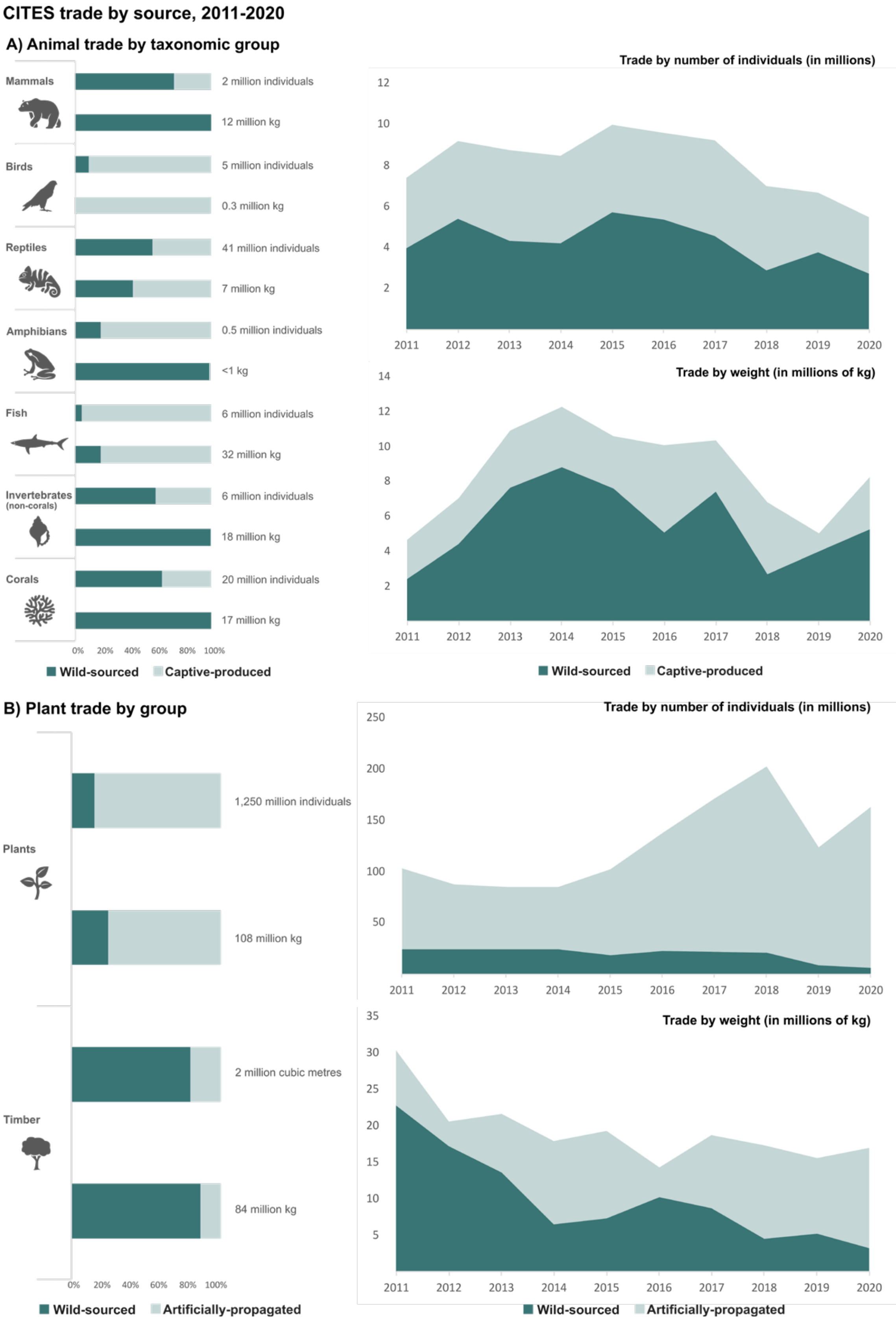


Figure 2.3. *Wild-sourced versus captive-produced/artificially propagated trade by taxonomic group between 2011 and 2020 for (A)* ***animals*** *and (B)* ***plants****. Plants are designated as 'timber' based on the reported species and the trade statistics for the two plant categories are mutually exclusive. Trade trends are shown for trade reported by number of individuals and by weight (in millions), with the exception of timber, which was predominantly traded by weight and by volume (m³). Quantities for each taxonomic group are additive rather than conversions between units. Small amounts of trade in pre-Convention specimens were excluded.*

Wild-sourced trade by number, 2011-2020

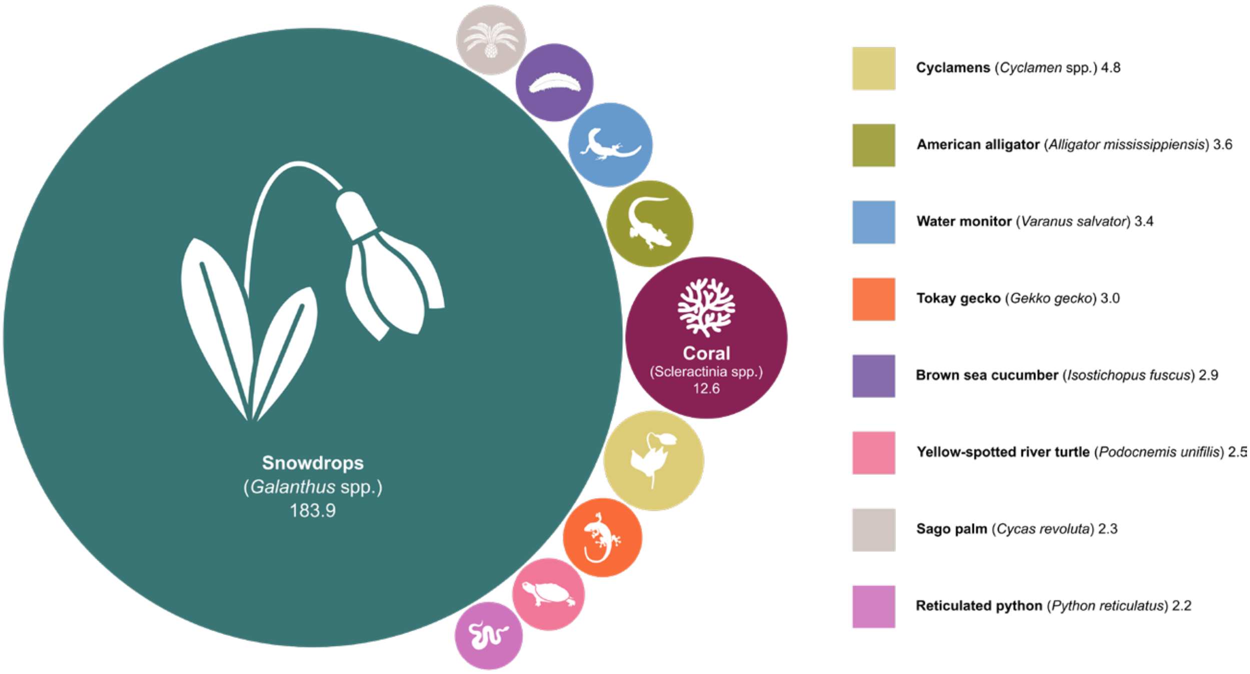


Figure 2.4. *Top 10 wild-sourced taxa directly exported* ***by number of individuals*** *(in millions of individuals), 2011-2020. Total = 234 million individuals. Plotted data represent 95% of this total.*

Wild-sourced trade by weight, 2011-2020

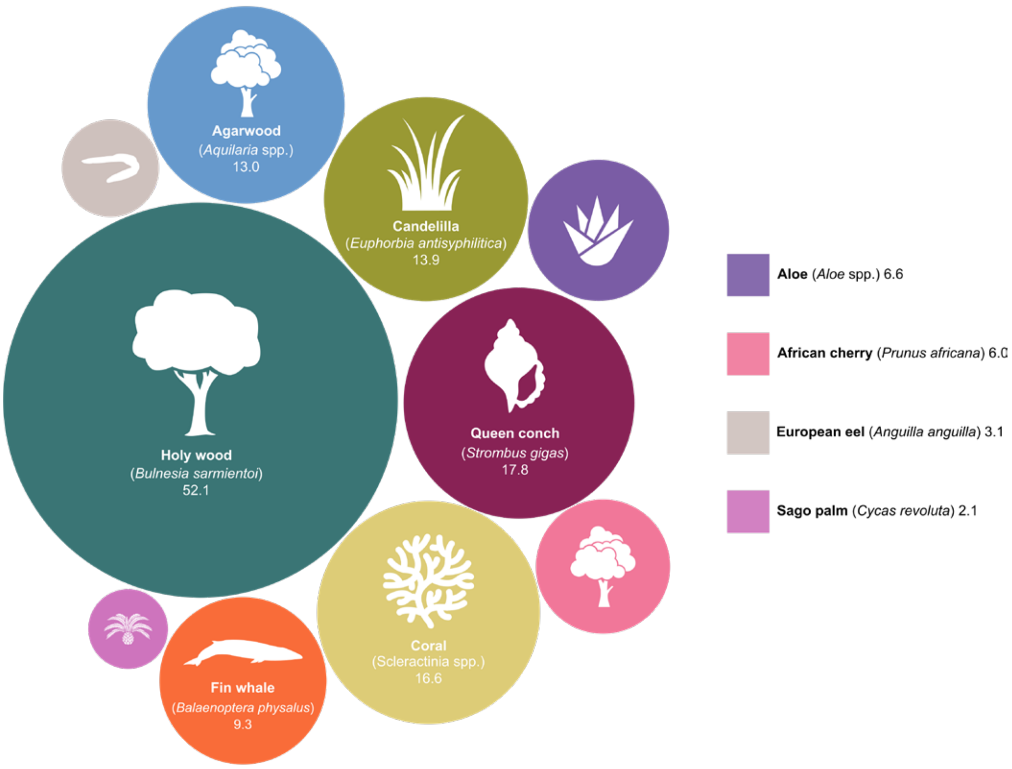


Figure 2.5. *Top 10 wild-sourced taxa directly exported* ***by weight*** *(in millions of kilograms), 2011-2020. Total = 155 million kilograms. Plotted data represent 91% of this total*

Regional trade patterns

Examining the scale and patterns of CITES trade at the regional level can help to identify major trade routes and the main taxa exported from, and imported by, each region. This can be particularly important when considering trade in wild-sourced specimens. Based on an analysis of trade routes by the number of transactions (shipments), the top exporting and importing regions were **Asia** (37% of export transactions, 31% of import transactions) and **Europe** (34% of export transactions, 38% of import transactions) (Figure 2.6). Approximately half of direct export transactions were **plants** (predominantly traded within Europe), with **corals** accounting for a further 25% of transactions (mostly exported by Asia to North America, Europe and Asia).

Based on overall quantities traded (Figure 2.7), **Asia** was the top exporting region for trade reported both by number of individuals and by weight. The majority of exports from each region involved **plants** (including timber for trade by weight and volume), with the exception of exports by weight from Europe (mainly **fish** and **mammals**) and almost all trade from Oceania (**corals**). The top taxa exported from each region as number of individuals and by weight (all sources) are presented in Figure 2.7.

Some of the dominant taxonomic groups exported per region change when comparing trade from all sources with trade in wild-sourced specimens only. In particular, when analysing trade reported by number of individuals, **plants** accounted for the greatest proportion of trade from all sources, whereas the majority of wild-sourced trade consisted of **reptiles** (apart from Europe and Oceania whose top groups remained plants and corals, respectively). When analysing trade by weight and volume, **plants** and **timber** were the main groups traded from all sources, as well as the main groups for wild-sourced trade from in Africa, Asia, Central and South America and the Caribbean, and North America. In Europe, by contrast, **fish** were the top taxonomic group traded by weight when considering all sources (especially *Acipenser baerii*), but wild-sourced trade by weight consisted almost entirely of **mammals**, specifically fin (*Balaenoptera physalus*) and minke (*B. acutorostrata*) whales.

Further details on wild-sourced trade from each region, including the top taxa, exporting and importing Parties, can be found in Table 2.1.


Swietenia macrophylla


Alligator mississippiensis


Podocnemis unifilis


Scleractinia spp

Regional trade routes

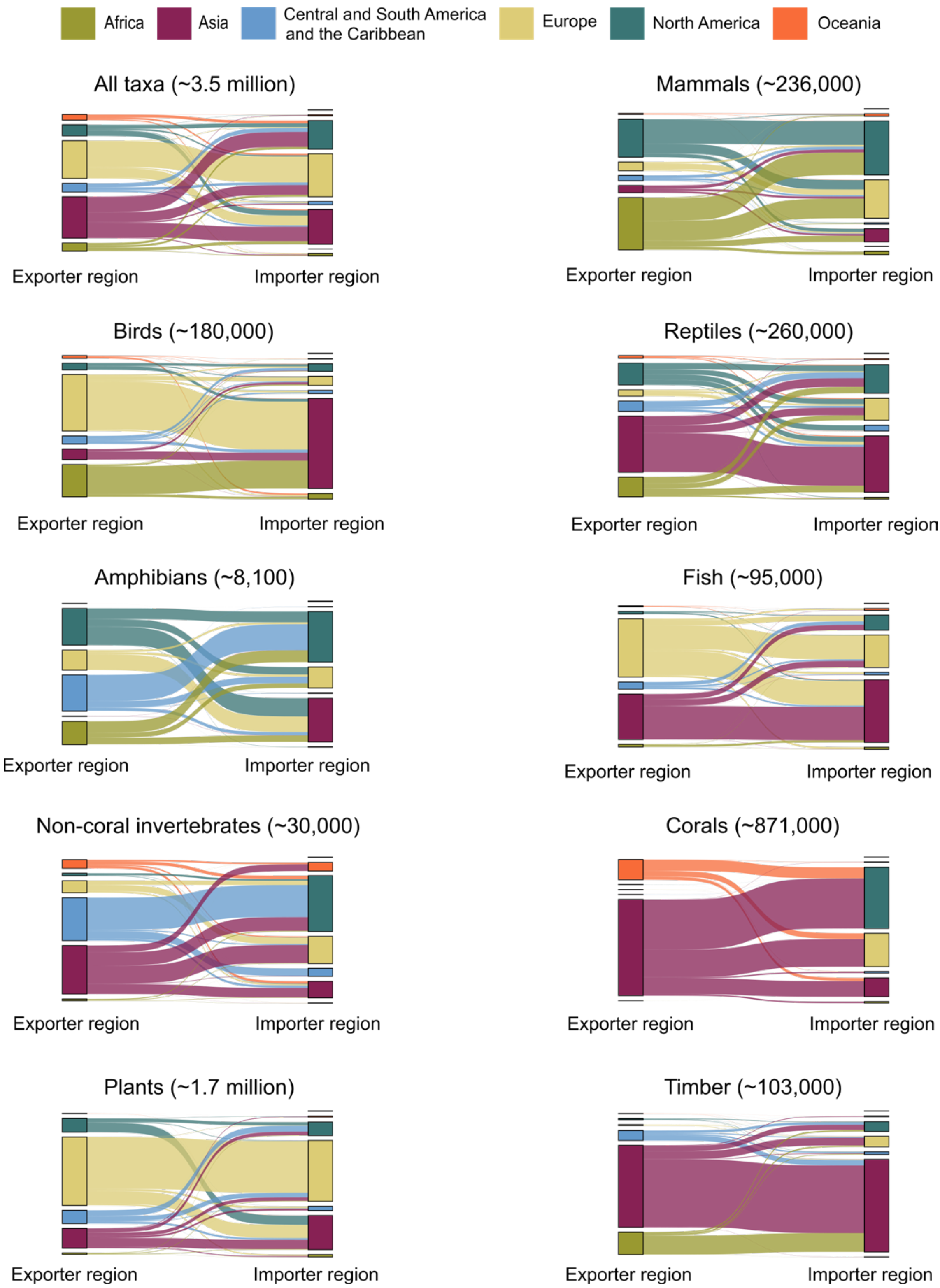
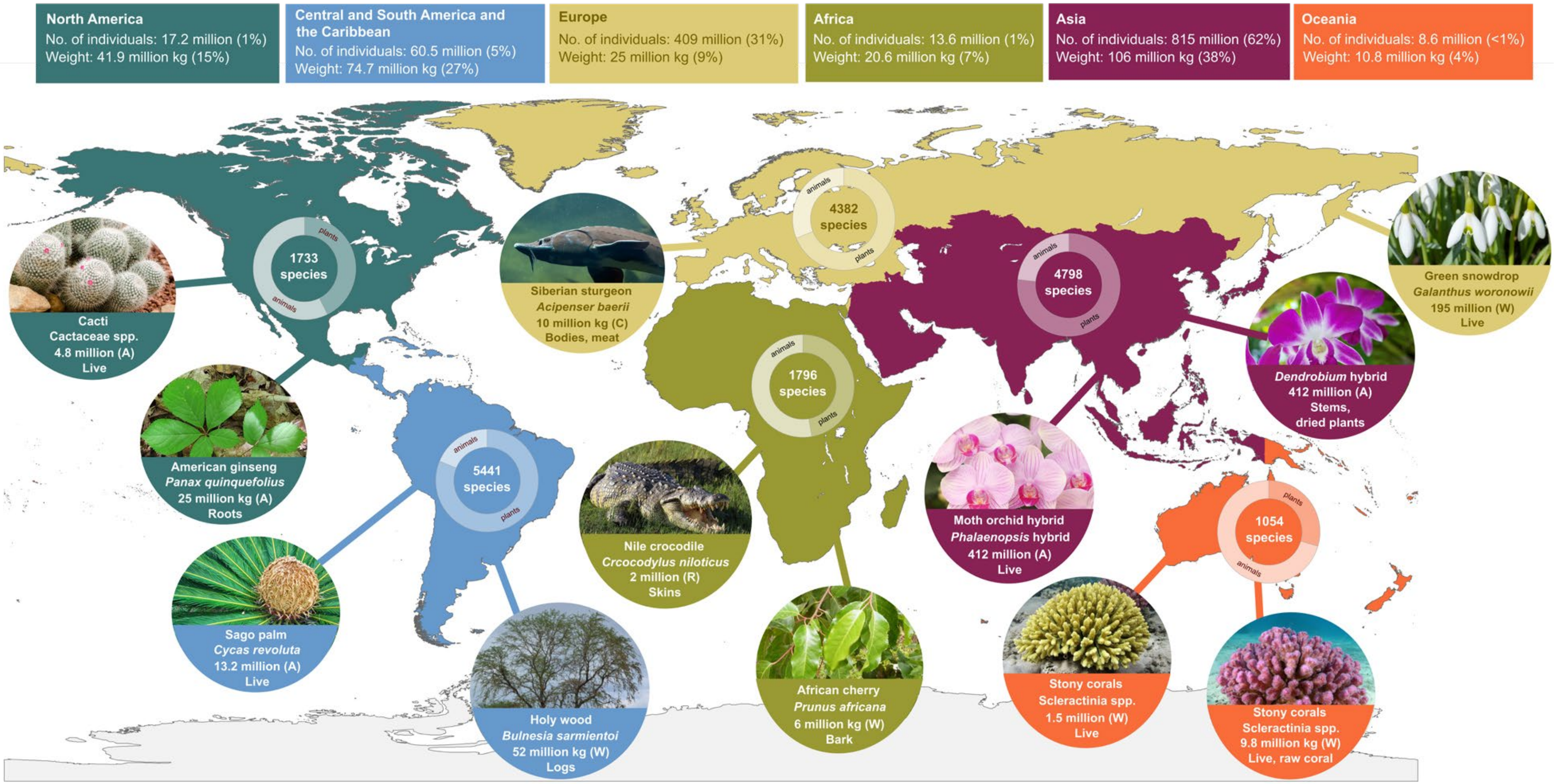


Figure 2.6. *Regional trade routes for all taxa and by taxonomic group based on the number of* ***transactions*** *in direct exporter-reported trade, for all sources and purposes, 2011-2020.*

Top direct exports by CITES region, 2011-2022



Data source: CITES Trade Database (trade.cites.org) Base layers: United Nations Geospatial, 2022. Projection: WGS84. The designations employed and the presentation of material on this map do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

Figure 2.7. *Top taxa directly exported from each of the six CITES regions as **number of individuals**[9] and **by weight** between 2011-2020 (all sources) and the **number of species** traded per region. Species summaries include the **total quantity** exported by number or weight by the region, and the **main source and term(s)** in trade. Global direct exports reported as number of individuals totalled 1.3 billion animals and plants, and trade by weight totalled 279 million kg. The total number of individuals and weight exported per region (and percent of global trade by number or weight) are provided in the legend.*

[9] Based on whole organism equivalent terms reported by unit 'number of specimens': bodies, fingerlings, live, skeletons, skins, skulls, and trophies.

Table 2.1. *Direct **wild-sourced**[10] exports by the six CITES regions 2011-2020 based on exporter-reported trade by number of individuals[11], weight (kg), and volume (m^3). Total quantities, top taxa (by individuals) or commodities (taxon-term by weight or volume), and top exporters and importers for each region are provided.*

	Trade by number of individuals per region				Trade by weight per region				Trade by volume per region			
Exporter region	Total no. of individuals	Top taxa (%)	Top exporters (%)	Top importers (%)	Total weight (kg)	Top commodity (%)	Top exporters (%)	Top importers (%)	Total volume (m^3)	Top commodity (%)	Top exporters (%)	Top importers (%)
North America	7.66 million	*Alligator mississippiensis* (47%), *Isostichopus fuscus* (26%), *Graptemys pseudogeographica* (7%)	US (70%), MX (26%)	US (27%), FR (18%), IT (12%)	14.9 million	*Euphorbia antisyphilitica* wax (93%)	MX (96%)	US (34%), JP (27%), FR (13%)	18,000	*Swietenia macrophylla* (56%), *Cedrela odorata* (12%); both sawn wood	MX (>99%)	US (60%), CU (12%)
Central and South America and the Caribbean	8.7 million	*Podocnemis unifilis* (29%), *Cycas revoluta* (26%), *Isostichopus fuscus* (10%)	PE (31%), HN (26%), AR (14%)	NL (23%), HK (22%), MX (15%)	73 million	*Bulnesia sarmientoi* logs (53%), *Strombus gigas* meat (23%)	AR (61%), PY (10%)	CN (66%), US (19%)	188,000	*Swietenia macrophylla* (30%), *Cedrela odorata* (26%); both sawn wood	NI (25%), GT (19%), BR (17%)	CN (39%), US (29%), DO (11%)
Europe	189 million	*Galanthus woronowii* (77%), *Galanthus elwesii* (20%)	GE (61%), TR (39%)	NL (60%), TR (39%)	11 million	*Balaenoptera physalus* (85%), *Balaenoptera acutorostrata* (14%); both meat	IS (86%), NO (13%)	JP (98%)	2.8 million	*Quercus mongolica* (38%), *Fraxinus mandshurica* (22%); both logs	RU (100%)	CN (98%)
Africa	3.8 million	*Crocodylus niloticus* (31%), *Python regius* (18%), *Varanus niloticus* (7%)	TG (17%), ZW (13%), GH (13%)	US (29%), FR (12%), SG (11%)	19 million	*Prunus africana* bark (31%), *Aloe ferox* extract (30%), *Anguilla anguilla* live (10%)	ZA (33%), CM (20%), MA (11%)	FR (21%), KR (15%), AR (11%)	1.4 million	*Pterocarpus erinaceus* sawn wood (67%), *Pericopsis elata* logs (13%)	NG (35%), GH (19%), CD (15%)	CN (86%), VN (6%)
Asia	16.7 million	*Varanus salvator* (20%), *Gekko gecko* (18%), *Python reticulatus* (13%)	ID (83%), MY (10%)	CN (22%), US (21%), SG (18%)	25.6 million	*Aquilaria filaria* powder (18%) and chips (16%), Scleractinia spp. raw corals (26%)	ID (80%), MY (6%)	TW (18%), SA (17%), US (10%)	67,000	*Dalbergia cochinchinensis* (30%), *Gonystylus* spp. (25%), *Dalbergia oliveri* (22%); all sawn wood	LA (56%), MY (35%)	CN (37%), VN (20%), JP (19%)
Oceania	8.1 million	Scleractinia spp. (19%), *Acropora* spp. (12%)	FJ (58%), AU (39%)	US (48%), GB (11%), FR (11%)	10.5 million	Scleractinia spp. raw corals (60%) and live (34%)	FJ (93%)	US (63%), DE (7%)	640	*Swietenia mahagoni* sawn wood (41%) and logs (34%), *Dalbergia* spp. timber (24%)	PW (75%), SB (24%)	US 75%), PH (24%)

[10] CITES source codes W, R, U, X, or unreported.
[11] Based on whole organism equivalent terms reported by unit 'number of specimens': bodies, fingerlings, live, skeletons, skins, skulls, and trophies.

Trade during the previous CoP triennium (2017-2019)

1.1 MILLION shipments of CITES-listed species

8,015 species reported in trade

25% of species traded as wild-sourced

Approximately 38% of the global trade reported in terms of number of individuals over the last decade occurred during the previous CoP triennium (2017-2019) and amounted to 504 million plants and animals (12% wild-sourced). In total, trade over the triennium involved 8,015 species and 1.1 million shipments, including trade in 74 million kg of mostly plants (39 million kg) and timber (13 million kg), just over 44% of which was wild-sourced, and 2.6 million m^3 of largely wild-sourced (86%) timber. The top wild-sourced taxa over the triennium included *Galanthus woronowii* (39 million individuals; 63% of wild-sourced trade by number of individuals), *Strombus gigas* (5.9 million kg; 18% of wild-sourced trade by weight), and *Pterocarpus erinaceus* (814,000 m^3; 36% of wild-sourced trade by volume).


Pterocarpus erinaceus


Galanthus woronowii


Strombus gigas

Species listed at CoP18

Of the 134 species added to the CITES Appendices at CoP18, 33 have been reported by exporters in direct international trade since the listings entered into force (November 2019). Global direct exports of newly listed species were predominantly wild-sourced, and totalled 3.2 million individuals and 2.3 million kg. Most of this trade consisted of tokay geckos (*Gekko gecko*; ~3.1 million geckos) and shortfin mako (*Isurus oxyrinchus*; 1.9 million kg).

The top taxa and commodities traded are summarised below; 'individuals' refers to quantities aggregated by whole organism equivalent terms.

Gekko gecko

Tokay gecko (*Gekko gecko*)

3.1 million individuals, 97% wild
258,000 kg of meat, 100% wild

Top exporter: Indonesia
Top importer: China

Shortfin mako (*Isurus oxyrinchus*)

981,993 kg of bodies, 97% wild
545,925 kg of meat, 100% wild

Top exporters: Namibia, Japan
Top importers: Portugal, Taiwan Province of China

Sea cucumber (*Holothuria* spp.)

45,251 kg of specimens, 100% wild
2,207 kg of bodies, 100% wild

Top exporters: Papua New Guinea, Seychelles
Top importer: Hong Kong SAR of China

Giraffe (*Giraffa camelopardalis*)

1,674 individuals, 90% wild

Top exporter: South Africa
Top importers: Austria, United States of America

Bloodwood (*Pterocarpus tinctorius*)

6,053 m^3 of sawn wood, 90% wild
1,768 m^3 of timber, 50% wild

Top exporters: United Republic of Tanzania, Zambia
Top importer: China

III. Conservation impacts of legal trade in CITES-listed species

Introduction

Wildlife trade, conservation and CITES

International wildlife trade involves thousands of wild species. Its impacts on conservation are, however, not straightforward. Depending on a complex mix of biological, socio-economic and governance factors, harvest and trade can sometimes benefit both wildlife populations and people, but at other times can drive biodiversity loss (Cooney *et al*., 2015).

Wildlife trade has been described as "a powerful nature-based solution for meeting the twin challenges of enhancing rural livelihoods and conserving biological diversity" as long as it is sustainable, legal and equitable

Wildlife trade has been described as *"a powerful nature-based solution for meeting the twin challenges of enhancing rural livelihoods and conserving biological diversity"* as long as it is sustainable, legal and equitable (Inger Andersen, then Director General of IUCN in Cooney *et al.* 2015). The recently published Sustainable Use Assessment of the Intergovernmental Science Policy Platform on Biodiversity and Ecosystem Services (IPBES) notes that "sustainable, legal and traceable trade of wild species is important for biodiversity-dependent communities, especially indigenous peoples and local communities and people in vulnerable situations in developing countries and has the potential to contribute to reversing biodiversity decline" (IPBES 2022). Where trade is not legal and sustainable, however, it can be a driver of biodiversity loss (IPBES 2020). Nevertheless, determining overall conservation impacts – and hence sustainability – of wildlife trade, is hindered by a lack of data as well as a lack of knowledge about the population dynamics of many traded taxa (IPBES 2020).

That trade can pose a threat to biodiversity is not a new finding. Indeed, CITES arose from concerns about the over-exploitation and unregulated trade of wildlife species in the 1960s. The Preamble of the Convention recognises that "international co-operation is essential for the protection of certain species of wild fauna and flora against over-exploitation through international trade"[12]. It was recognised that without regulation, harvest and extraction of wild species for trade could indeed contribute to population depletion and - in extreme circumstances – bring a risk of extinction. This is particularly the case for rare or threatened species but equally, for more common species. CITES-regulated trade is currently dominated by non-threatened species (Morton et al. 2022), the Convention thus playing an important safeguarding role for these common species as well as for threatened species.

At the same time as recognising that wildlife trade should not pose a conservation threat to wild species, CITES also recognises that regulated trade can be a positive force for conservation. Specifically, Resolution Conf. 8.3 on *Recognition of the benefits of trade in wildlife* adopted in 1992 recognises that **"commercial trade may be beneficial to the conservation of species and ecosystems and/or to the development of local people when carried out at levels that are not detrimental to the survival of the species in question"** (Res. Conf 8.3, Rev. CoP13, paragraph 1). The case of local harvest of the eggs of saltwater crocodiles (*Crocodylus porosus*) in Australia's Northern Territory provides a good example of how regulated trade can provide the incentives to conserve species and even reverse the threat of extinction (Fukuda and Webb 2019).

This chapter explores both the positive and negative conservation impacts of international trade in CITES-listed species (while Chapter V explores the socio-economic impacts, many of which are interlinked with the conservation impacts). It is not intended to be a definitive global assessment of the conservation impacts of international trade in CITES-listed species – such a task would be a major endeavour well beyond the time and resources of this pilot study if even feasible, noting the information challenges highlighted by IPBES (2020). The chapter should therefore be considered illustrative only. It does, however, provide insights into the key types of impacts that legal regulated wildlife trade generates – both positive and negative. These include impacts on the traded species but also on other species and on habitats.

[12] https://cites.org/eng/disc/text.php

Methodological approach

The main content of this chapter (and Chapter V on socio-economic impacts) is based on a rapid literature review. In the interests of time and resources, we focussed on the **most traded species** – by number and by weight (in kg) - based on data from the CITES Trade Database covering the period 2011-2020 (for consistency with the data range covered in Chapters II and IV). We recognise that by focussing on the most traded species the chapter is *not* representative of the conservation impacts of trade in all CITES-listed species, particularly those that are globally threatened and where even low levels of trade may pose a risk. This is an issue that future issues of the World Wildlife Trade Report may wish to take into account. Nevertheless, our final selection of species does include some where there have been concerns over the sustainability of the trade and that have been subject to the CITES Significant Trade Review process (see Box). Our approach does not therefore only cover species for which trade is not a risk.

If the CITES Trade Database is queried to identify the most traded species, the majority are plants which are artificially propagated (e.g. snowdrops, orchids or cyclamen). We therefore also generated a separate list of the most highly traded species that were wild caught, collected, or ranched. To make the scope of the review manageable we developed a short list of species to review by only including those where levels of trade were 1,000,000 individuals/year or more or 1,000,000 kg/year or more unless they were wild caught, collected or ranched species in which case we dropped the thresholds to 500,000 when traded by number or 500,000 kg when traded by weight. Even with these different thresholds we found very few birds or mammals on our shortlist and so we then also identified the top five traded mammals and birds - identified again by number and by weight and for both the wild caught and all sources' categories.

This initial screening gave us a list of 181 'most traded' species. To facilitate the literature search process, where possible we grouped some species together - for example our group "orchids" included a wide variety of different types of orchid such as moth orchids, dendrobiums, and orchid hybrids; "corals" include various species of stony corals, brain corals. This process led to the final inclusion of 47 species/species groupings within our study representing a diverse but manageable set to interrogate (See Annex A for full list).

We searched for documented evidence on the impacts of trade in these species through two key mechanisms – a key-word based search of academic literature listed in the Web of Science database, and a targeted search for grey literature from the websites of key international wildlife trade (including CITES) and conservation organisations (full details of the key word search and website search are provided in Annex A). We focussed on literature published in the last 10 years (since 2011) in order to keep the scope manageable. Our key word search and screening process resulted in 50 out of the 100 "most relevant" academic documents being included in the analysis. Our targeted website search identified a further 30 technical reports, case studies or other "grey" literature . Our exploration of impacts of wildlife trade is thus based on a review of 80 studies. Full details of the methodology are provided in Annex A.

Iguana iguana

[13] Repeating this study over a longer time frame would allow for a more exhaustive systematic review of the literature. Our approach of sorting by relevance and reviewing the top 100 "hits" reflects the time available for this study.

Overview of evidence included in this analysis

Of the 80 studies in our dataset, 65 included information on conservation impacts. The 65 studies covered 23 of the 47 species/species groups from our focal list (11 reptiles, 3 plants, 3 invertebrates, 2 fish, 2 timber, 1 bird, and 1 mammal) with more studies focussing on trade in reptiles (23 documents) and plants (14 documents) than other taxa (Figure 3.1). The studies covered trade in wildlife for a wide variety of end uses – food, ornamentals, medicines, skins, fibres and pets. We found more studies focussing on trade in South Asia and Latin America than other regions (Figure 3.2).

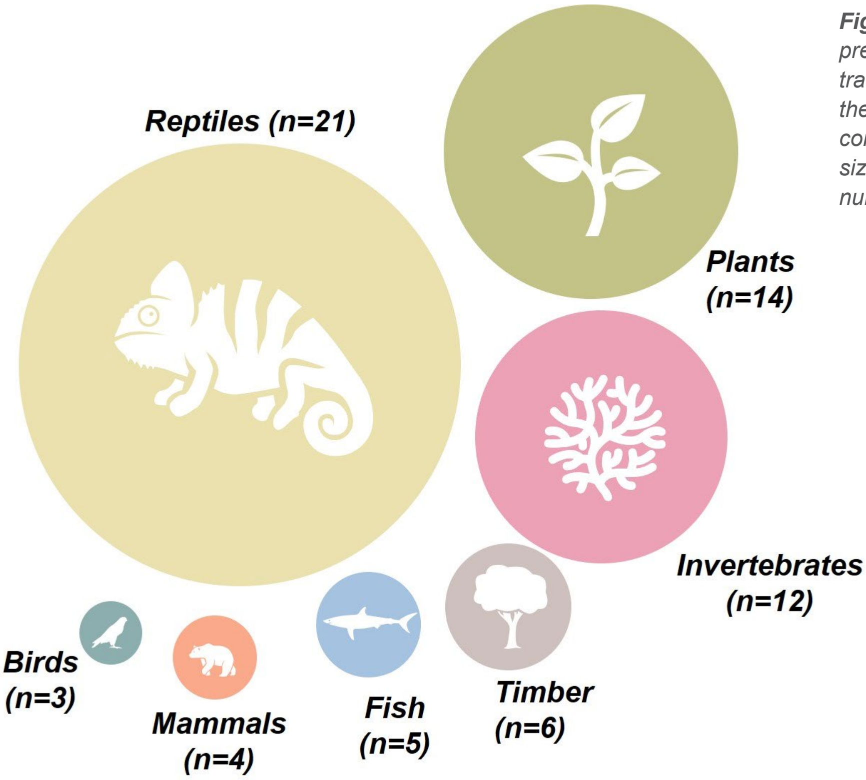


__Figure 3.1.__ Relative prevalence of studies on trade in different taxa across the 65 studies that listed conservation impacts. Circle sizes are proportional to the number of studies.

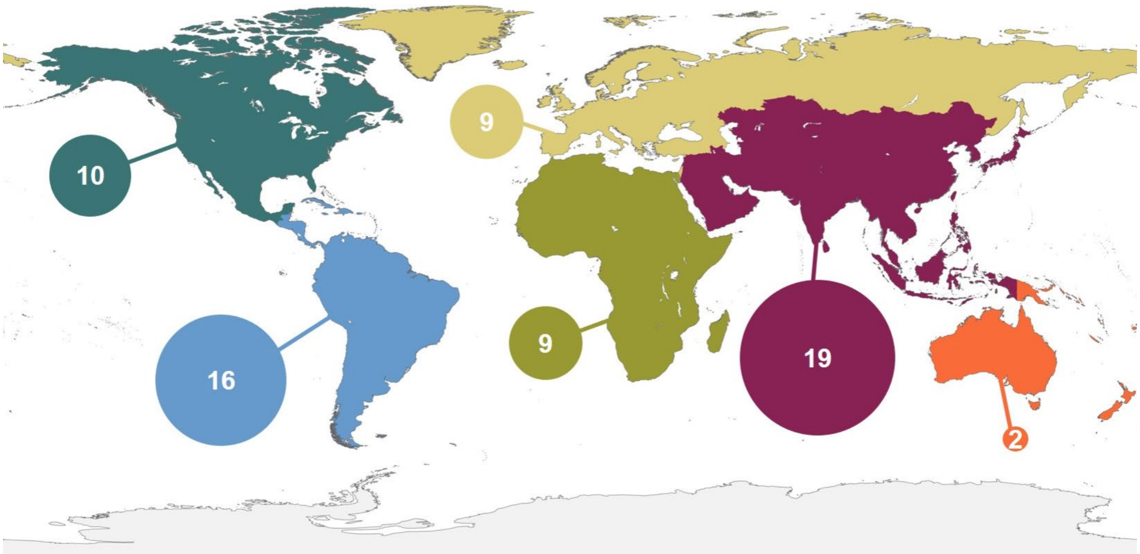


__Figure 3.2.__ Map displaying the number of studies by region.

Nardostachys jatamansi

What kinds of conservation impacts have been documented?

Various types of conservation impact arising from trade in CITES-listed species have been documented – both positive and negative. These include:

- impacts on the species in trade,
- impacts on other species; and
- impacts on habitat.

We found evidence for impacts (positive and negative) on traded species, non-target species and habitat, with more studies focussing on traded species (64 studies) than on other species (7 studies) or on habitat (11 studies). We found more evidence for positive impacts (45 studies) compared to negative (25 studies). A more detailed review would no doubt identify many more studies documenting conservation impacts for each of the listed species/species groups. Nevertheless, our review of 80 studies provides insights into the type and relative prevalence of documented impacts. These are summarised in Table 3.1.

Table 3.1. *Positive and negative conservation impacts of trade in CITES-listed species*

	Traded species	Non-target species	Habitat
Positive	Population recovery/increase Population stabilisation Population maintenance Reduced pressure on wild populations (due to captive production/propagation)	Population increases/ maintenance due to reduced pressure	Protection of intact / semi-intact habitat Restoration of degraded habitat.
Negative	Population declines Local extirpations	Population declines Genetic dilution due to breeding with traded species released outside natural range Disease spread	Habitat degradation due to destructive harvesting practices Ecosystem service/function disruption due to loss of key species

Positive conservation impacts

Impacts on traded species

We identified four different (albeit overlapping) types of positive impact on traded species:

- **Population increase** - a rise in population of a traded species facilitated by legal regulated trade. This was the most commonly documented type of positive impact for the taxa covered by our analysis and often associated with a recovery from an earlier decline driven either by unsustainable or illegal harvest and trade, or for other reasons (such as persecution in retaliation for, or to prevent, human wildlife conflict). In these cases, the introduction of legal, regulated harvest and trade has helped to reverse the decline, restore the population, or sometimes even increase it. Examples include vicuña (*Vicugna vicugna*) and Yellow spotted river turtle (*Podocnemis unifilis*) - see Spotlight boxes – and a number of crocodilians such as the American alligator (*Alligator mississippiensis*). Populations of the alligator had been decimated by the 1960s due to hunting and over-exploitation. The species was officially protected in 1967 and the only option for producing alligator leather was farming. This has proved a huge business success, but also a conservation success with populations recovering to such an extent that they are now classified on the IUCN Red List as "Least Concern" (Nickum *et al*. 2018).
- **Population stabilisation** – a declining population no longer declining (even if not increasing) due to regulated trade. For example, in the case of snowdrops traded from Georgia, legal, regulated trade has ended a previously chaotic, unmanaged harvest, and resulted in the stabilisation of a previously declining population (Karchava, 2019). The key to this success has been the extensive support that the Georgia CITES authorities have received from the international community, to regulate the trade and make robust non-detriment findings.
- **Population maintenance** - population of a traded species maintained despite trade. For example, Arida *et al*. (2020) discuss the consumption and trade of Asian water monitor (*Varanus salvator*) in and from Indonesia. While the Asian water monitors are used widely as a local food source, their skins are also collected and subsequently supplied for the international legal skin trade. The international demand for their skin, alongside the local demand for their meat has led to people in the region ensuring adoption of sustainable harvest practice. This has resulted in the population of Asian water monitors being relatively stable, even with a 25-year history in them being hunted for the international trade from the region (Arida *et al*. 2020). Numerous studies indicated a mixed conservation impact on traded species. Cape aloe (*Aloe ferox*) - a tall and long-lived aloe species that is endemic to South Africa – is another example of a highly traded species remaining common and abundant throughout its distribution range, with limited evidence of threat from harvest and trade (albeit with some need for improved management in some specific locations (Kumalo, 2019)).
- **Reduced pressure on wild population** – previous threats to a traded species in the wild are reduced as a result of legal trade of captive-bred/born or artificially propagated specimens. For example, Cruz-Garcia *et al.* (2015) document the wild orchid trade in Mexico. While this trade is predominantly domestic, there is also an international component. A key factor that is likely driving the conservation of wild orchids in the region involves an ex-situ management programme. This is based on the extraction of wild plants and subsequent cultivation in orchards. Similarly, captive breeding of pythons (*Python bivittatus* and *Python reticulatus*) in Viet Nam has removed the need for farmers to source wild pythons for their operations (Natusch & Lyons, 2014).

Spotlight on yellow-spotted river turtles

Yellow-spotted river turtles (*Podocnemis unifilis*) are predominantly found in the Amazonian and Orinoco basins of South America. Although they are generally widely distributed they have faced population declines driven predominantly due to habitat loss and fragmentation along with widespread harvest of eggs and adults for food (Harju *et al*., 2018) and for the international pet trade.

Various interventions have been undertaken to address the declines including protecting adult turtles and nests from harvest, relocating turtles or their eggs, as well as controlling the trade and transport of turtle products (Mogollones *et al.* 2010; Miorando *et al*. 2013). In Peru, for example, a pioneering sustainable use ranching programme promotes conservation of the turtles while at the same time delivering local social benefit from harvest and trade. The legal trade is based predominantly on eggs collected from the wild which are subsequently incubated in artificial or protected beaches by local people. Some hatchlings are released into the wild to reinforce the population, while some are exported for the pet trade (predominantly to mainland China and Hong Kong SAR of China) and also consumed for food. As indicated by nest counts, such ranching programmes have resulted in an increase in turtle populations. For example, in the Reserva Pacaya Samiria in Peru, numbers increased five-fold in five years, from nearly 14,000 individuals in 2012 to nearly 69,000 individuals in 2017 (Galvez-Durand Besnard 2019).

Podocnemis unifilis

Spotlight on Vicuñas

Vicuñas (*Vicugna vicugna*) are a well-known example of positive impact of legal trade on species conservation. At the beginning of the twentieth century, there were alarms about their possible extinction (Yacobaccio 2009), which almost became a reality in the mid-century when the global vicuña population in the Andes was calculated to be below 10,000 individuals (Wheeler and Hoces, 1997). The reasons behind the population declines were an illegal trade driven by the high price of vicuña fleece and high demand for it from an international market. In 1969, Peru and Bolivia agreed to ban all hunting and sale of vicuña for a period of ten years and in 1975 all vicuña were listed on CITES Appendix I. In 1979 the range States agreed the *Convention for the Conservation and Management of Vicuña* and national laws were passed to protect the species. These included declaring conservation areas and establishing punishments for illegal harvest/trade but also providing for community-based management. As populations started to recover, they were gradually downlisted to Appendix II allowing for a resumption of sustainable use and trade. This legal trade is predominantly in wild caught vicuñas where a traditional technique of capture, shearing and release called *Chaku* is utilised under the management of local communities.

Vicugna vicugna

After 30 years of proactive, effective protection and management supported predominantly by the legal trade in vicuña fibre, vicuña populations have not only recovered from an extinction threat but continue to increase (Vila and Arzamendia 2020). Vicuña have been categorised on the IUCN Red List as "Least Concern" since 2008. Nevertheless, illegal trade remains a threat and Res. Conf. 18.8 on *Conservation of vicuña (Vicugna vicugna) and trade in its fibre and products* urges range States to take action against poaching and for all Parties involved in the trade to ensure appropriate traceability.

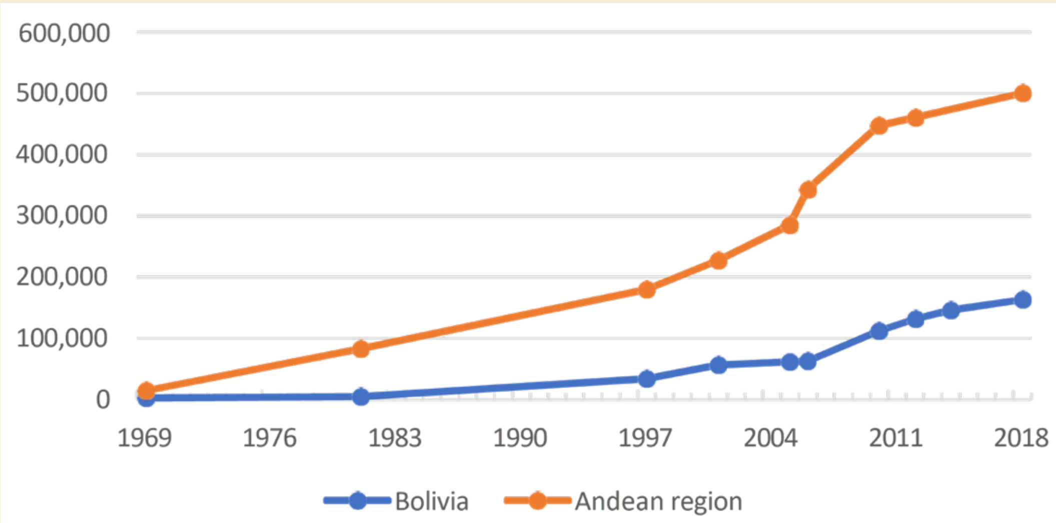


Figure 3.3. *Vicuña population trends in Bolivia and other Andean countries by year (1969 to 2018) (source: Cooney 2019).*

Wildlife trade – and other forms of use of wildlife – does not deliver these positive impacts itself. Many of the examples cited above highlight the critical role of ***management*** of harvest and trade in delivering conservation benefits. For example: caiman ranching in Argentina where eggs are collected, ranched and then yearlings returned to the wild sufficient to increase the wild population (Gelabert *et al*. 2017); or red tegu (*Salvator rufescens*) skin trade in Argentina and Paraguay where the population was threatened by over-exploitation, but stabilised with tighter management of the trade chain (Mieres and Fitzgerald 2006). Graaf *et al*. (2014) suggest this is also the case for some populations of queen conch (*Strombus gigas*). Although decimated across vast parts of its range due to unsustainable trade (and subject to CITES Review of Significant Trade process – discussed below under negative impacts) the imposition of strict management measures has resulted in the stabilisation of the population in some regions (notably the former Netherlands Antilles).

Three key (but again overlapping and inter-linked) mechanisms for delivering positive conservation impacts can be identified:

- **Improved protection of species** – this included but was not restricted to better law enforcement and improved knowledge of the species. It also included reduced human wildlife conflict due to increased tolerance of dangerous, but valuable, species such as crocodile. Habitat protection (listed separately below), also contributes to improved species protection.
- **Improved management practices** – this mainly entailed the adoption of more sustainable practices and the prevention of over-exploitation of the species. This predominantly referred to an already legal practice ameliorated through better management practices (hence also different from driver 3 below)
- **Reduced illegal/unregulated harvest and trade** – this entailed a clear decrease in illegal/unregulated use of a species due to the possibility of legal trade.

These findings are consistent with broader analyses that have recently been undertaken. Indeed, a review of global vertebrate population trends by McRae *et al* (2022) showed that utilised (which includes traded) populations declined by 50% on average between 1970 and 2016 – significantly faster than non-utilised populations. However, if those populations are well managed (including through regulated harvest for trade) they show a stable or positive trend. Marsh *et al* (2021) also found that "managed, sustainable use has the potential to forestall extinction, aid recovery and meet human needs" and that for very many species use is sustainable. The IPBES Sustainable Use Assessment notes, similarly, that, unless well managed across the supply chain, "global trade in wild species generally increases pressure, leading to unsustainable use and sometimes to wild population collapses (e.g., shark fin trade)". But equally, that "sustainable, legal and traceable trade of wild species is important for biodiversity-dependent communities, especially indigenous peoples and local communities and people in vulnerable situations in developing countries and has the potential to contribute to reversing biodiversity decline" (IPBES 2022).

Wildlife trade does not just affect the species being traded. The use and trade of one species can often have knock-one effects on another.

Positive conservation impacts on non-target species

Wildlife trade does not just affect the species being traded. The use and trade of one species can often have knock-one effects on another. In particular, the income generated by involvement in harvest and trade appears to be able to reduce hunting pressure on other species. Examples highlighted in our analysis include the managed harvest and trade of red tegu in parts of Argentina which is thought to have played a part in reducing the need to hunt other species. The Chacoan peccary (*Catagonus wagneri*) is one species for which the population seems to have recovered partly as a result of this (Aust *et al*., 2022). Similar effects have also been recorded in the case of Nile crocodile (*Crocodylus niloticus*) in Kenya's Tana Delta where involvement in the egg collection for sale to crocodile farms has generated income and reduced dependence on poaching of other species (Obare 2019).

Positive conservation impacts on habitat

Two key types of positive impact on habitat arising from legal trade emerged from our analysis: habitat conservation – whereby the habitat was maintained in its natural state due to the legal trade in a particular species; and habitat restoration which indicated a habitat that had deteriorated from its natural state was improved back towards it incentivized by the legal trade in a species living within that habitat.

Habitat conservation was noted in the cases of crocodiles, caimans, American alligator, and queen conch. For instance, de Graaf *et al*. (2014) discuss how the trade in queen conch from the former Netherlands Antilles has contributed to the conservation of the *Thalassia* spp. sea grass meadow - the conch's habitat (although trade is both domestic and international so it is hard to attribute this impact solely to international trade). Local managers in the area believe that conserving the habitat is key in conserving the queen conch and thus maintaining a viable trade. Similarly, in Argentina, the ranching of the yacare caiman (*Caiman crocodilus yacare*) and broad-snouted caiman (*Caiman latirostris*) have resulted in the local people conserving the source areas of these caimans – the natural wetlands of the region – which they had historically converted to livestock grazing areas (Gelabert *et al*. 2017).

In Australia, the conservation incentives generated by the ranching of saltwater crocodiles (*Crocodylus porosus*) have resulted in both retention and protection of the crocodiles' wetland habitat in order to ensure an annual supply of eggs, but also its active management and restoration by removing damaging species such as feral pigs and invasive plants (Fukuda and Webb, 2019). Meanwhile, Barton *et al* (2017) highlight the potential of coral aquaculture to not just supply the international ornamentals trade but also to restore damaged reef ecosystems. A Solomon Islands' village at Marau Sound has been farming corals for nearly two decades now. This has provided an alternative model to wild harvest and, alongside farming the corals, the Marau Sound inhabitants protect the natural coral reef around them that provides the base material for their coral farms. There is evidence to show this approach not only benefits the conservation of the wild corals itself, but also the larger coral reef habitat that is often a mosaic of different coral species. Often, in the absence of this legal, regulated and well-managed trade in coral, coral reefs can be overexploited and damaged (Rhyne *et al*., 2014).

Spotlight on Nile crocodiles

The production of luxury leather from the harvest and trade of Nile crocodiles (*Crocodylus niloticus*) in Zimbabwe and Kenya not only resulted in positive impacts on the species itself, but also other species and the habitat in general. For instance, Nile crocodile numbers in the lower Zambezi valley in Zimbabwe were declining in the early 2000s, from 3 559 in 2000 to 2,214 in 2004 due to a mixture of habitat destruction affecting crocodile breeding areas and killing as a result of human-crocodile conflict (Wallace *et al*. 2011). Similarly in Tana County, Kenya, crocodiles were perceived as a dangerous predator and regularly killed through poisoning or other means. A lack of livelihoods options in the region was also driving significant hunting and poaching of other species. In both areas, crocodile ranching programmes were established to generate incentives for crocodile conservation, and livelihood benefits for local people but have also had the effect of decreased poaching pressure on other sympatric species in the landscape – including small antelope and other common species poached for bushmeat but also commercially valuable species such as elephants poached for income (Utete 2021).

Crocodylus niloticus

In both areas, there is a strong belief that removal of crocodile trade would lead to increased development rates and significant habitat modification along rivers and wetland ecosystems. There have been suggestions of various land-uses such as development of new or more lucrative fisheries, improved access to semi-aquatic grazing areas, increased livestock densities, higher rates of human activity in close proximity to water's edge. These have not materialized as the legal trade in crocodiles has incentivized the conservation of the rivers and wetland ecosystems in the area (Obare 2019; Utete 2021).

Negative conservation impacts

Negative impacts on traded species

Poorly managed trade can clearly have a negative impact on traded species, resulting in local or widespread population declines. Such declines are generally driven by over-harvesting as a result of inadequate regulation. In some cases, this extends to use of legal trade as a cover for illegal trade.

Taxa included in our analysis for which negative impacts were reported include: African cherry (*Prunus africana*), red sandalwood (*Pterocarpus santalinus*), brown sea cucumber (*Isostichopus fuscus*), orchids, queen conch, sturgeon, tokay gecko (*Gekko gecko*), sharks, corals, false map turtle (*Graptemys pseudogeographica*) and Horsfield's tortoise (*Testudo horsfieldii*). In the majority of cases, the population decrease was driven by unsustainable harvesting but to a lesser extent it was also due to inadequate regulations of trade. For example, sturgeon populations have been decimated in the wild due to unsustainable fishing for the caviar trade and most wild populations are now globally threatened. This is driven by high prices and a demand for wild sourced caviar (Tavakoli *et al*., 2021). Similarly, high levels of demand for false map turtles, primarily from Asia, have driven over-harvesting in the US (Lee, 2012). In the case of African cherry, where population declines have been noted across many countries such as Burundi, Cameroon, Democratic Republic of Congo (DRC) and Madagascar - including in several protected areas – Ingram *et al* (2015) point to a wide variety of issues including poor governance, damaging harvesting practices, and weak regulation. They query whether wild harvest is sustainable in any context due to a complex mix of biological, geographical, practical and governance issues.

CITES recognises the potential for negative impacts, hence its requirement for exporting countries to conduct non-detriment findings and its Review of Significant Trade (RST) process (see box). This has highlighted major problems with a number of taxa. A recent review (Foster and Vincent 2021) highlighted that as of July 2020, 660 species and three entire genera had been subject to RST processes with 20 Parties subject to recommendations to suspend trade involving 39 species. For example, Beluga sturgeon (*Huso huso*) were subject to a trade suspension in Kazakstan and Russia in 2013. Similarly the RST process led to a long-term recommendation to suspend trade in queen conch from Haiti and Grenada which has been in place since 2006. There have been notable improvements for some species going through the RST process but for others, a worsening conservation status has continued (Foster and Vincent 2021).

The CITES Non-Detriment Findings and Review of Significant Trade Processes

Article IV of the Convention requires Parties to maintain exports of Appendix II species within sustainable levels and to conduct "non-detriment findings" prior to exports - i.e., to demonstrate that the export will not be detrimental to the survival of the species. Resolution Conf. 16.7 (Rev. CoP17) recommends that the non-detriment findings and subsequent advice are based on consideration of a range of factors including species biology, species range, population status and trends, threats, management measures in place, harvest patterns and trade information.

Various guidance documents exist on how to conduct non-detriment findings for different species. IUCN published a standard reference work (Rosser and Haywood 2002) which provides a checklist based on 26 indicators to help determine if exports are not detrimental to the species' survival. Since then, various other guidance documents have been developed to adapt the process to specific taxa (e.g., sharks) or practices (e.g., trophy hunting).

Concerns that some countries were allowing exports to exceed sustainable levels prompted the introduction of the Review of Significant Trade (RST) process. Resolution Conf. 12.8 (Rev. CoP18) gives a mandate to the Animals and Plants Committees to identify Appendix II species that are subject to significant levels of trade and to consult with exporting countries to check if Article IV is being implemented correctly. Where they have ongoing concerns, the Secretariat undertakes studies to compile information on biology, management of and trade in the species. The process generates recommendations for the Parties in question to take remedial action if required. In some cases, if Parties fail to take appropriate action to address conservation concerns, the CITES Standing Committee can recommend a temporary suspension of trade in the species from the concerned Parties until measures have been put in place to ensure sustainability of the trade.

Spotlight on orchids

Orchids are the largest family of CITES-listed plants and are widely used and traded for various purposes, both legally and illegally, sustainably and unsustainably (Fay 2015). A large portion of the global orchid trade consists of artificially propagated cut flowers and plants that are grown under controlled conditions. In a global review of orchid trade, Hinsley *et al* (2018) note that between 1996-2015, legal commercial trade reported from artificially propagated sources accounted for over 99% of the over 1.1 billion live orchid plants in trade and over 31 million kg of stems. Trade in wild-sourced plants was much lower at around 375,000 plants at its peak in 1996.

Despite this large legal trade, orchids are often traded illegally from the wild at local, regional and international levels with reports suggesting this is threatening wild orchid populations in various areas (eg. Phelps & Webb, 2015). Hinsley *et al* (2018) highlight widespread, but anecdotal, evidence for population declines, but also in some cases local extirpations and extinctions as a result of intensive harvest. For example, “chikanda” an edible orchid dish is in such demand in Zambia that it has resulted in overharvesting to the extent that populations of the 85 orchid species that are eaten have been severely depleted and traders are now importing tubers from Tanzania and other neighbouring countries. Hinsley *et al* (2018) suggest that this means that, even in cases of CITES Appendix II listed species, for which international trade might be legal, trade is frequently occurring without the requisite permits and CITES non-detriment findings (see Chapter VI for more detail on the links between legal and illegal trade in the context of Appendix II species). Hinsley *et al* (2018) also point to major data and knowledge gaps which hinder efforts to determine sustainable harvest levels. They note: “in particular, these gaps hamper the work by CITES Scientific Authorities to conduct the necessary non-detriment findings (NDFs) to ensure that international trade in Appendix II listed species is not having a negative impact on wild populations, and should be legally permitted.”

Hinsley *et al* (2018) conclude that although legal sustainable trade in some wild orchid species may be possible, propagation is likely to be a more effective conservation strategy. Nevertheless, careful management is required to ensure that trade in artificially propagated plants does not provide a cover for illegal trade in wild plants (Phelps, 2015). Sound traceability processes – an issue CITES is exploring – will thus be critical. Hinsley *et al* (2018) note that “implementing robust traceability systems could also underpin other conservation action, such as the development of certification schemes for sustainably produced orchids, a model that is already applied to certain plant products in the medicinal and aromatic trade via the FairWild standard (http://www.fairwild.org).”

Oncidium sphacelatum

Negative conservation impacts on non-target species

We identified a limited amount of evidence pointing to population declines in non-traded species as a result of legal trade in other species. In most cases the non-target species are not identified beyond a general reference. In the case of coral reef fish, for example, Dee *et al* (2014) note that unsustainable practices to capture some ornamental fish can threaten other non-target fish species, as well as the coral ecosystem. Similarly, in the case of trade in orchids for medicinal use, Hinsley *et al* (2018) highlight how "as an effect of growing demand and reduced wild supply of some orchid species, there is evidence that some products are being both substituted and adulterated with other, non-target species... Increased use of substitutes is potentially shifting the impact of unsustainable wild harvest onto a broader range of orchid species and onto other taxonomic groups, with potential cascading conservation effects." Meanwhile, Bodeker *et al*. (2012), highlight that poor regulation of the harvest of *Prunus africana* has led to overexploitation of not only this species for timber, but also other sympatric tree species. This has led to deforestation in African cherry harvesting areas across Equatorial Guinea, Cameroon, Kenya, Uganda and the Democratic Republic of Congo.

In some cases, trade has resulted in either accidental or deliberate releases of wildlife outside of the natural species range, with negative consequences for other, native, species. For example, there have been cases of releases of pet false map turtles (*Graptemys pseudogeographica*) that have subsequently bred with other *Graptemys* species and sub species, affecting the genetic purity of each individual species (Lee, 2012). Similarly, escape or release of pet iguanas, traded internationally from ranches in Argentina has led to the spread of disease and genetic mixing in the sink countries (e.g. Mexico, Spain, Italy and South Korea) (Debrot *et al*., 2022).

Spotlight on Monk Parakeets

Monk Parakeets (*Myiopsitta monachus*) are native to South America, ranging from Southern Brazil to Central Argentina and are legally traded in large numbers for pets. Accidental escapes or local intentional releases have resulted in the establishment of alien invasive populations in parts of Europe, North America, Asia and Maghreb (Reino *et al*. 2017). Currently, there are at least c. 23,758 invasive monk parakeets, across 179 municipalities in eight European Union (EU) countries (Souviron-Preigo *et al*. 2018). Across its invasive range, Monk Parakeets are considered to be a crop pest, and they also have the potential to spread diseases to other native bird species (Postigo *et al*., 2018).

Myiopsitta monachus

Negative impacts on habitat

Unsustainable harvest of wildlife for trade can both directly and indirectly affect habitat. For example, the tools and techniques used to harvest wildlife can contribute to habitat loss and degradation. Examples include the use of cyanide or dynamite to capture ornamental or food fish (Mous *et al*., 2000), or conversion of natural habitats to more intensive artificial production systems. Dee *et al*. (2014) highlight that in some parts of their range, harvesting corals can lead to habitat destruction. This impacts not only other coral species, but the coral reef ecosystem as a whole.

Impacts on habitat may, be more indirect than physical damage or degradation. For example, over-exploitation of mammalian and avian seed dispersers can affect forest composition and ecosystem functioning (Effiom *et al*., 2013; Harrison *et al*., 2013).

Discussion: Is trade in CITES-listed species good or bad for conservation?

The conservation impacts of legal international wildlife trade are mixed and context specific. As noted by Challender *et al.* (2022) while harvest and trade can sometimes benefit wildlife populations and people, at other times it can drive biodiversity loss. Morton *et al.* (2021) note, for example, traded bird, mammal and reptile species show a decline in abundance of over 60%, while Cardoso *et al*. (2021) highlight that "with each species traded, comes a cascade of incidental effects on other species within impacted ecosystems".

The same species can be affected both positively and negatively depending on the specific context.

Our analysis certainly supports these findings from other studies. We find evidence of impacts not just on traded species but also on non-target species and on habitats. We also find evidence of both positive and negative impacts – even the same species can be affected both positively and negatively depending on the specific context. Whether or not conservation impacts are positive or negative depends on appropriate governance of varying interactions between biological, economic, and social factors (Cooney *et al*., 2015).

From a biological perspective, one possible explanation as to why some species are more resilient to harvest and trade than others is their life history strategies. Animals such as crocodiles and turtles often produce lots of offspring and provide limited parental investment in hopes of a few making it to adulthood (so-called "R-selection"). Alternatively, animals such as elephants or parrots only have a small number of offspring but invest lots of time and resources into helping their offspring make it to adulthood (so-called "K-selection"). In nature these strategies can have similar outcomes in terms of reproductive success since environmental factors often mean that very few of the many offspring produced by an R-selected species make it to adulthood, while the investments made by K-selected species often increase the survival chances of their limited number of offspring. Yet in the case of wildlife harvest and trade programmes, human intervention can greatly affect this balance. For R-selected species, harvest programmes such as egg collection and ranching can increase reproductive success. In these cases, eggs and hatchlings are artificially protected from the influence of negative environmental factors allowing for far larger quantities of the young to survive. This increase in in survivorship means that far larger quantities of individuals are produced than the ecosystem would be able to produce naturally. Furthermore, when these programmes include release protocols for hatchlings or yearlings, even in small quantities, they are able to generate increases in overall wild populations due to increasing the survivorship of the hatchlings. By contrast, human exploitation of K-selected species, unless very carefully managed, can have a detrimental effect, leading to population declines. Many of the examples we found of population increases linked to wildlife trade related to R-selected species including crocodilians and turtles.

Another issue affecting conservation impacts is whether the species in question are wild-sourced or captive-bred/artificially propagated. Over the last 20 years there has been a gradual shift in production of wildlife for trade, from largely wild-sourced to captive-bred or artificially propagated. As discussed in Chapter II, Harfoot *et al* (2018) found the volume of trade has increased ten-fold since 1975 with a large proportion of the increase accounted for a change in production systems towards captive bred animals and artificially propagated plants. The analysis of CITES trade data over the most recent decade described in Chapter II shows a more nuanced picture but, for plants particularly, shows the same downward trend in wild-sourcing. This shift in production has a number of implications for conservation.

Sinovas *et al* (2017) note that in some cases trade from these captive/propagated sources can help reduce pressure on wild populations, but warn that it can also remove incentives for local communities to conserve wildlife and manage it sustainably. Webb *et al* (2012) suggest that this dilemma has been recognised since CITES was first established, noting that, in the case of reptiles, captive production is often preferred because the quality of the skins can be better controlled and also because consumer perceptions are that "farmed" is better than "wild-caught". They warn, however, that captive production can also deplete wild populations when these provide the stock for the farms. Citing the example of the Siamese crocodile (*Crocodylus siamensis*), they highlight that the wild population is at extremely low levels (and essentially extinct in Thailand and Viet Nam), yet the farmed population is over 1 million. For other species though, farming seems to proceed smoothly without depleting wild populations. For example, captive breeding of pythons in Viet Nam has removed the need for farmers to source wild pythons for their operations (Natusch & Lyons, 2014). Whether or not captive production helps reduce pressure on wild populations or increase it –

either directly in order to supply farms or indirectly by removing local conservation incentives gained from wild-sourced trade – depends very much on governance including how wildlife populations are managed, by whom and with what benefit flows (see for example Challender *et al* 2019). The socio-economic aspects of a shift towards captive breeding are discussed further in Chapter V.

Overall, our analysis supports the findings of previous studies – that legal wildlife trade can have both positive and negative conservation impacts depending on various factors – the species characteristics, the harvest and trade system, the governance - both of species protection and of wildlife trade - and consumer preferences. A clear finding though is that there is actually very little systematic documented evidence on conservation impacts. More systematic monitoring and reporting on a species-by-species basis would be required to fully investigate the circumstances under which positive impacts can be amplified and negative impacts avoided or mitigated.

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IV. Financial value of trade in CITES-listed species

Wildlife trade provides a wide range of contributions to national and local economies. The financial value of wildlife trade is just one aspect of its overall socio-economic value. Its contributions to other dimensions such as job creation, health and food security are discussed in Chapter V.

The legal international trade in all wildlife commodities (including fisheries and timber) is worth billions of dollars annually. Most previous attempts to quantify the overall financial value of this global industry have been based on the declared value of all wildlife-related imports reported within the UN Comtrade database. Global estimates based on this approach range from USD 332 billion in 2005[14], to an average annual value of USD 220 billion over the period 1997-2016[15]. The analysis presented in this chapter focuses exclusively on the international trade in CITES-listed animal and plant taxa, which represents a distinct subset of the larger legal wildlife trade. Specifically, this analysis estimates the average annual financial value of direct exports of CITES-listed species, as a first step towards examining the economic benefits of CITES trade to producer countries. As such, the estimated value presented here is not intended to provide the full value of all CITES trade throughout the supply chain.

Considerations for estimating the financial value of CITES trade

Accurately quantifying the financial value of CITES trade requires representative and up-to-date price information. Price data must also be available at sufficient taxonomic resolution to reliably estimate the financial value of the trade for a given species-term combination. While comprehensive datasets reporting the economic value of international trade flows do exist (e.g., UN Comtrade), trade is rarely reported at the resolution that would be required for CITES purposes – the species or genus level[16]. Additionally, the codes assigned to different commodity types (i.e. HS codes) within most datasets are seldom specific enough to allow wild-sourced and captive-origin products to be distinguished. This distinction can be useful when estimating the financial value of wild-sourced trade on its own, which has a more direct impact on wild populations, and is likely to be more relevant to sustainability considerations. These drawbacks limit the usefulness of such datasets in estimating the value of the international trade in CITES-listed wildlife.

The approach to valuing CITES trade adopted in this chapter relies on two separate sources of available taxon-specific price information: animal price data at the point of export/import reported in the United States' annual reports to CITES, and plant price values collected from a range of retail and wholesale websites. Due to these differences in the underlying price data, estimates of the value of CITES exports are presented separately for animals and plants. It is important to note that the financial value of animal commodities declared at the United States border may not reflect their value across diverse global consumer markets, and the species and commodities reported in the United States' annual reports do not reflect all of the taxa involved in CITES trade. Additionally, for plants, there are likely to be gaps in price data for plant groups that are less commonly sold online, such as timber species, and thus the overall value of the trade in timber species is likely to be an underestimate. Median unit prices for a given commodity were based on species-level price information, where available. While the methodology used in the analysis was designed to mitigate against the impact of missing species-level price data by making use of proxies at higher taxonomic levels, reliable price data were not available for all commodities, resulting in some gaps in data coverage. Further details on the specific methodology for the value estimation can be found in Annex A.

Including price as a requested data field within CITES annual reports could increase the availability of representative and comparable price data, particularly by expanding the range of countries regularly providing this information, which would be important steps towards addressing these limitations. With better availability of price data, it is envisaged that future analyses of the average annual financial value of direct exports

[14] Engler, M. (2008). The value of international wildlife trade. *TRAFFIC Bulletin* 22(1), 4-5. According to this analysis, the value of wildlife commodities excluding timber and fisheries was USD 60.9 billion in 2005.
[15] Andersson, A. A., Tilley, H. B., Lau, W., Dudgeon, D., Bonebrake, T. C. & Dingle, C. (2021). CITES and beyond: Illuminating 20 years of global, legal wildlife trade. *Global Ecology and Conservation* 26, e01455.
[16] Chan, H. K., Zhang, H., Yang, F. & Fischer, G. (2015). Improve customs systems to monitor global wildlife trade. *Science* 348(6232), 191-292.

could ultimately be considered in discussion of the contributions of CITES trade to exporter economies and overall GDP. By focussing on direct exports, this analysis generally does not capture the value added to products which undergo further processing or modification (e.g. a reptile skin transformed into a luxury manufactured product), which are most often reported as re-exports. For this reason, in addition to the data limitations described above, the valuation provided here does not represent the overall value of CITES trade, but is currently the best estimate for the value of CITES direct exports based on available data.

Global estimated financial value of CITES exports

Between 2016 and 2020, direct global exports of CITES-listed animal species are estimated to be worth an average annual value of approximately USD 1.8 billion[17]. The estimated average annual value of global exports of CITES-listed plant species over the same period was approximately five times this figure, at USD 9.3 billion (Figure 4.1)[17].

Captive-produced commodities accounted for approximately two-thirds (65%) of the average annual value of direct global exports of CITES-listed animals, with wild-sourced animal products representing just under one quarter (24%) of the trade by estimated value. In contrast, for plants, wild-sourced trade accounted for the majority (58%) of the estimated average annual value, with artificially propagated plants comprising one third (34%) of the estimated value.

Since the estimated value of animals and plants derive from different datasets and different places along the supply chain (see Annex A for full methods and data considerations), they are not considered directly comparable and so are discussed separately below.

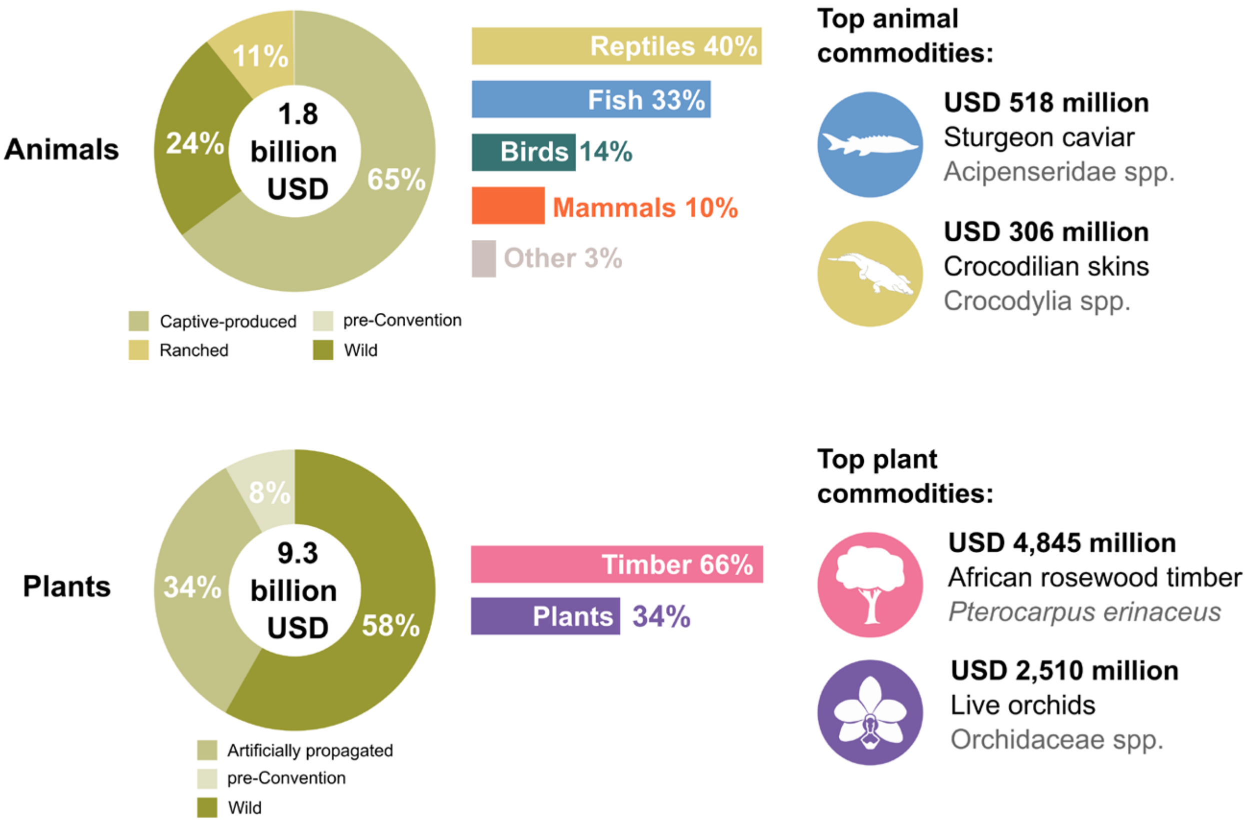


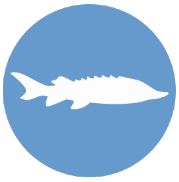
Figure 4.1. *Overview of the estimated average annual value of global direct exports of CITES-listed animals and plants, including the proportion of the estimated value attributed to different sources: captive-produced animals (sources 'C', 'D' and 'F'), artificially propagated plants (sources 'A', 'D'), pre-Convention (source 'O'), ranched (source 'R') and wild (sources 'W', 'U', 'X' and no source specified).*

[17] Financial values were estimated for 70% of all CITES-listed animal taxon, term, unit and source combinations (3,538 of a total 5,060 taxon, term, unit and source combinations) and 88% of all CITES-listed plant taxon, term and unit combinations (7,868 of a total of 8,933 taxon, term and unit combinations) comprising global direct exports 2016-2020.

Animal exports

Across all animal commodities, exports of **reptiles** and **fish** accounted for over two thirds (~72%) of the average annual value of global CITES-listed exports 2016-2020 (USD 727 million and USD 602 million, respectively).

The CITES-listed animal commodities with the highest estimated average annual export value 2016-2020 are shown in Figure 4.2. The majority (72%) of the financial value generated by these commodities was from captive-produced animals, and included:



Sturgeon (Acipenseridae spp.) caviar (USD 518 million): exports accounted for over one quarter (28%) of the average annual global export value for animals, and were almost entirely from captive-produced specimens. Over 80% of the value of sturgeon caviar was exported from the Republic of Korea to China.

Crocodilian (Crocodylia spp.) skins (USD 306 million) and small leather products (USD 127 million): the combined value (USD 433 million) of these commodities represented just under one quarter (24%) of the average annual value of global animal exports. Approximately two-fifths (42%) of the value of these exports were from wild sources, almost entirely from American alligator (*Alligator mississippiensis*). Major exporting countries included the United States and Australia.

Live *Macaca fascicularis* (long-tailed macaque) (USD 177.8 million): exports accounted for a further 10% of the average annual value of global animal exports. Live exports of this species were primarily exported as captive-produced by China and Cambodia and imported by the United States.

Of the top exported animal commodities ranked by estimated value (Figure 4.2), live humphead wrasse (*Cheilinus undulatus*)[18] had the highest estimated unit price (USD 5,035 per individual), followed by live long-tailed macacques (*Macaca fascicularis*) (USD 2,825 per individual) and live falcons (Falconidae) (USD 2,744 per individual)[19].

There was considerable overlap between the animal commodities with the highest estimated average annual value (Figure 4.2) and the most highly traded taxa over the period 2011-2020 (Chapter II). Sturgeon (Acipenseridae spp.) caviar was among the top exported parts and derivatives (Figure 2.2), while crocodilian (Crocodylia), python (Pythonidae) and turtle (Testudines) species were among the most highly traded wild-sourced taxa (Figure 2.4). Despite being traded in high quantities, taxa such as queen conch (*Strombus gigas*) and stony corals (Scleractinia spp.) did not feature among the most valuable commodities (Figure 2.5), due to the relatively low estimated unit prices for commodities involving these taxa.

It is important to note that the estimated values for a given commodity presented in Figure 4.2 cannot be obtained by simply multiplying average unit prices with the trade volumes reported in Chapter II. Direct comparisons between the quantity (Chapter II) and value (this chapter) of trade are not possible as the two chapters consider different time frames and focus on different sources (many of the analyses presented in Chapter II focus on wild-sourced trade specifically). Additionally, the value analysis accounts for missing annual reports when calculating the annual average value of exports. Incomplete value data also mean that comparisons between the two chapters must be treated with caution. As not all taxon-term-unit combinations could be assigned a unit price, the absence of highly traded taxa from the list of most valuable commodities may reflect a lack of reliable price data for this particular group. These considerations also apply to the top ten plant commodities presented in Figure 4.3.

[18] Classified as Endangered by the IUCN Red List of Threatened Species.
[19] The average of five estimated unit values, ranging from USD 833 - USD 5,165.
[20] The mean estimated unit prices for queen conch (*Strombus gigas*) meat and shells were USD 14.02 per kg and USD 16.35 per kg respectively. For live or raw stony corals (Scleractinia spp.), the mean estimated unit prices were USD 12.41 per specimen and USD 5.25 per kg.

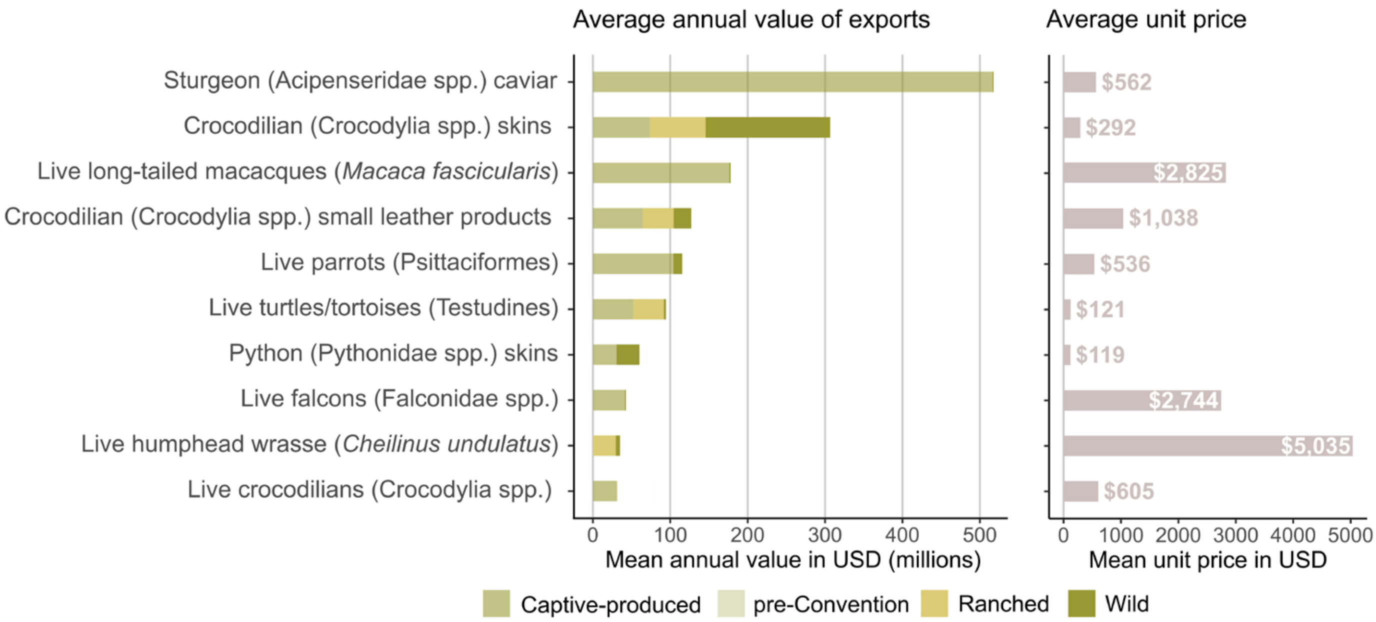


Figure 4.2. *Top ten* ***animal commodities*** *ranked by the estimated average annual value of global direct exports (together accounting for 82% of the total average annual value of global direct exports of animals), with corresponding average prices per unit. Stacked bars indicate the estimated value in USD (millions), coloured by source: captive-produced (sources 'C', 'D' and 'F'), pre-Convention (source 'O'), ranched (source 'R') and wild (sources 'W', 'U', 'X' and no source specified). Value estimates for each commodity were obtained by multiplying reported trade volumes for a given taxon-term-unit combination by the corresponding unit price (see Annex A for further details of the methodology used).*

Acipenser baerii

Plant exports

Across all plant commodities, approximately two thirds (66%) of the estimated average annual value of global CITES-listed exports was attributed to **timber** exports (USD 6.2 billion), with exports of **non-timber plants** (USD 3.17 billion) accounting for the remaining third (34%) of global exports by value.

The CITES-listed plant commodities with the highest estimated average annual export value 2016-2020 are shown in Figure 4.3 and include:

Timber[21] derived from African rosewood (*Pterocarpus erinaceus*) (USD 4.84 billion): exports represented over half (52%) of the average annual global value of export value for plants, and were predominantly sourced from the wild. All direct exports of African rosewood timber were from seven West African countries: primarily Nigeria, but also Ghana, Mali and Sierra Leone and, to a lesser degree, Burkina Faso, Guinea Bissau and Ghana. The majority of African rosewood timber was imported by China.

Live orchids (Orchidaceae spp.) (USD 2.51 billion): exports accounted for just over one quarter (27%) of the average annual value of global plant exports, and were almost entirely artificially propagated. Almost two thirds (63%) of the value of live orchid exports was attributed to exports from China, with exports from Thailand accounting for a further 25%. Major importing countries included Germany and Viet Nam.

Timber[21] obtained from *Guibourtia* spp. (USD 561 million): exports of this commodity accounted for an additional 6% of the average annual global export value for plants, and were primarily from a pre-Convention source. Most of this value was in *Guibortia tessmannii* timber (93%), with the rest deriving from *Guibourtia demeusei*. A substantial proportion (83%) of the value of timber derived from *Guibourtia* spp. was exported from Gabon to China.

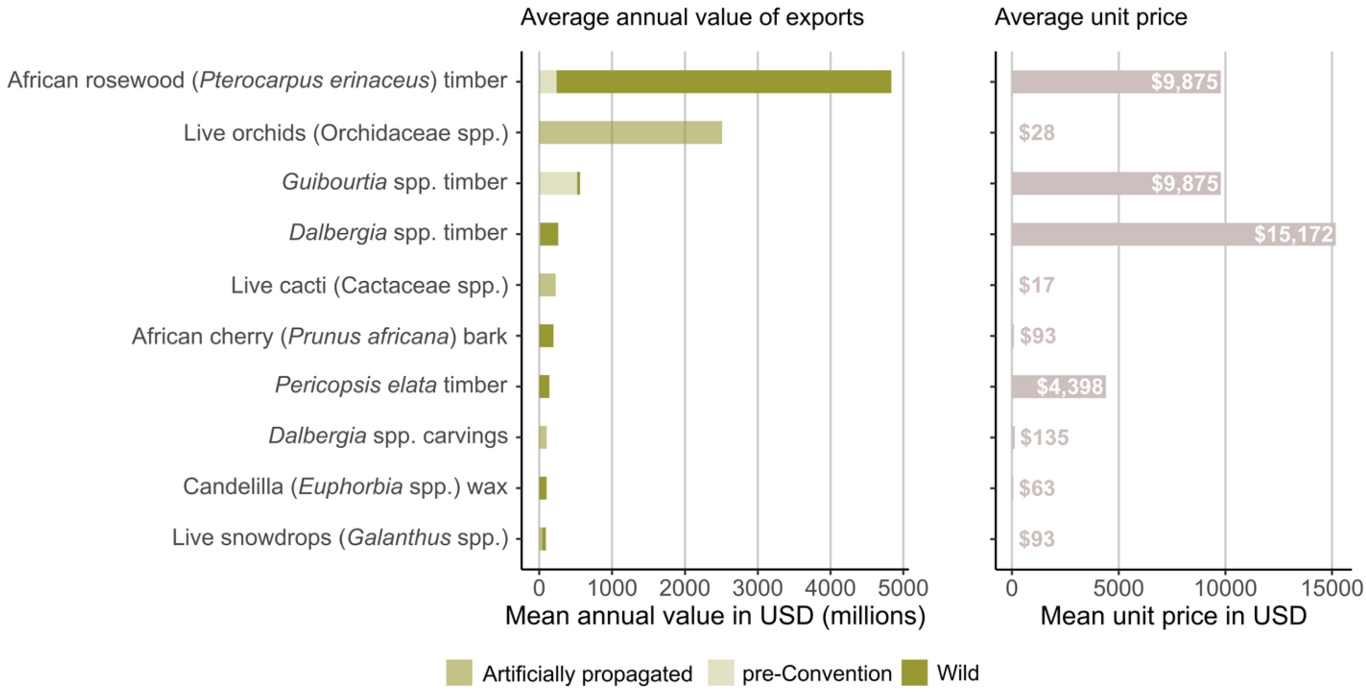


Figure 4.3. *Top ten* ***plant commodities*** *ranked by the estimated average annual value of global direct exports (together accounting for 96% of the total average annual value of global direct exports), with corresponding average prices per unit. Stacked bars indicate the estimated value in USD (millions), coloured by source: artificially propagated (source 'A' only), wild (source 'W' only) and assisted production (source 'Y'). The commodity 'timber' corresponds to CITES trade terms logs, sawn wood, and timber. Value estimates for each commodity were obtained by multiplying reported trade volumes for a given taxon-term-unit combination by the corresponding unit price (see Annex A for further details of the methodology used).*

[21] Encompassing the following CITES trade terms: logs, sawn wood and timber.

Of the top exported plant commodities ranked by estimated value (Figure 4.3), timber[22] derived from *Dalbergia* spp. had the highest estimated unit price (USD 15,172 per m^3)[23], followed by timber[22] obtained from *Pterocarpus erinaceus* or *Guibourtia* spp. (both valued at USD 9,785 per m^3)[24].

Among the top plant commodities ranked by estimated value, African rosewood (*Pterocarpus erinaceus*), cacti (Cactaceae spp.), orchids (Orchidaceae spp.) and snowdrops (*Galanthus* spp.) all featured prominently within the most highly traded taxa between 2011-2020 (Chapter II, Figure 2.2)[25].

Regional estimated financial value of CITES exports

Over the period 2016-2020, the estimated financial value associated with direct exports of CITES-listed species was distributed unevenly across the six CITES regions. For both the trade in animals and plants, Asia and Africa emerged as the two CITES regions accounting for the highest proportion of the estimated value of global exports (Figure 4.4). Approximately half (49%) of the estimated annual average value of global CITES-listed **animal** exports originated from Asia, with Africa and North America each accounting for a further 13%. Sturgeon caviar dominated exports of animal products from Asia by value (generating 51% of the estimated annual average value of exports from this region). For Africa and North America, Nile crocodile (*Crocodylus niloticus*) and American alligator skins (*Alligator mississippiensis*) accounted for the largest share of regional export values (21% and 67%, respectively).

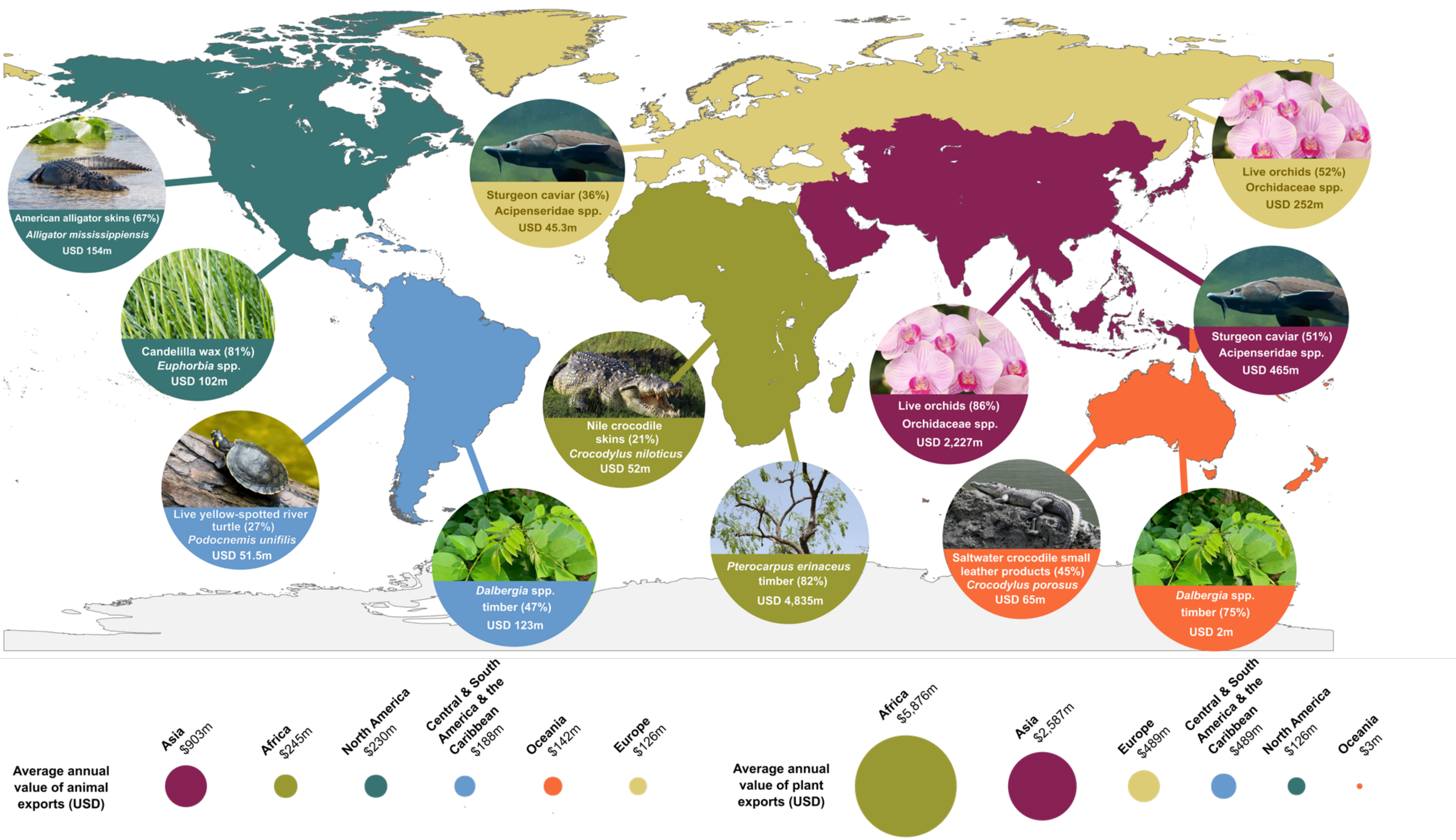
Asia and Africa emerged as the two CITES regions accounting for the highest proportion of the estimated value of global exports

Almost two thirds (63%) of the estimated annual average value of global CITES-listed **plant** exports was attributed to exports from Africa (estimated to be worth USD 5.88 billion). Exports from Asia (USD 2.59 billion) represented a further 28% of global CITES-listed plant exports by value. For both of these CITES regions, single commodity groups were responsible for generating a substantial share of the average annual value of regional exports. *Pterocarpus erinaceus* timber[26] accounted for 82% of the value of plant exports from Africa (USD 4.84 billion), and live orchids (Orchidaceae spp.; USD 2.23 million) accounted for 86% of the value of plant exports from Asia.

For some but not all CITES regions, there was alignment between the top exported taxa (Chapter II, Figure 2.7) and the most valuable exported commodities (Figure 4.4). While both analyses emphasise the importance of exports of orchids (Orchidaceae spp.) from Asia, Nile crocodile (*Crocodylus niloticus*) skins from Africa, and sturgeon (Acipenseridae spp.) caviar from Europe, differences in the taxa highlighted by the two maps should be treated with caution. Rather than necessarily indicating that the most highly exported taxa are not the most valuable, differences may reflect the impact of missing unit price data for both animals and plants.

[22] Encompassing the following CITES trade terms: logs, sawn wood and timber.
[23] The average of three estimated unit values, ranging from USD 12,724 - USD 17,620.
[24] The same family-level (Leguminosae) unit price proxy was used for timber from both *Pterocarpus erinaceus* and *Guibourtia* spp., as no price information was available for these taxa at the species or genus levels (see Methodology). Despite being included within the same family, separate unit prices were assigned to timber from *Dalbergia* spp., as species- and genus- level unit prices were available for these taxa.
[25] Different time frames and incomplete value data coverage mean that a more detailed comparison between the quantity (Chapter II) and value (this chapter) of trade was not possible.
[26] The commodity 'timber' encompasses the CITES trade terms logs, sawn wood and timber.

Top taxa directly exported based on financial value



Data source: CITES Trade Database (trade.cites.org). Base layers: United Nations Geospatial, 2022. Projection: WGS84. The designations employed and the presentation of material on this map do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

***Figure 4.4**. The estimated **average annual value of direct animal and plant exports** from each of the six CITES regions 2016-2020, and the top animal and plant commodities exported from each region based on the estimated average annual values of direct exports. Global direct exports of CITES-listed animals and plants were estimated to be worth USD ~1.8 billion and USD ~9.4 billion, respectively. Percentages reflect the value of the top-ranked animal and plant commodities within each region as a proportion of the estimated value of all regional exports. The commodity 'timber' encompasses the CITES trade terms logs, sawn wood and timber.*


Foxthon

V. Socio-economic impacts of trade in CITES-listed species

Introduction

Socio-economic aspects of wildlife trade

As discussed in the previous chapter, direct global exports of CITES-listed species are currently estimated to be worth an average annual value of approximately USD 1.8 billion for animals and USD 9.3 billion for plants. This is not high compared to globally important commodities such as coffee (global exports totalled USD 36.3 billion in 2021[27]) or cocoa (global exports USD 49.2 billion in 2020[28]) but it is certainly not insignificant, meaning the socio-economic implications of the trade, from national to local levels, can also be significant.

Socio-economic impacts of international wildlife trade include macro-economic impacts such as export earnings, GDP contributions, job creation and so on. But also local level livelihood impacts. Indeed, the UN Conference on Trade and Development (UNCTAD) highlights that because of the rural location of much wildlife trade and the opportunities for low-skilled workers as well as women and youth, it offers the opportunities for economic diversification, job creation and poverty reduction in economically marginalized rural areas of developing countries (UNCTAD undated). Similarly, the recently concluded IPBES Sustainable Use Assessment highlights that "sustainable use of wild species contributes to the livelihoods of indigenous peoples and local communities through subsistence, as well as trade in informal and formal markets" (IPBES 2022). As noted by Cooney (2015) "At best, wildlife trade can link consumers in the more developed parts of the planet with rural indigenous and local communities for which natural resources constitute their main wealth."

Although it was established to ensure the survival of internationally traded species, CITES recognises the potential for well-regulated trade to have positive socio-economic impacts, particularly for local people and that implementation of CITES-listing decisions should take into account potential impacts on the livelihoods of the poor (Resolution Conf. 8.3 (Rev. CoP13)). Res. Conf. 16.6 on *CITES and livelihoods*, subsequently, recognises the need for "maximizing the benefits for rural communities of CITES implementation and trade concerned, in particular, to support poverty eradication".

> ***Sustainable use of wild species contributes to the livelihoods of indigenous peoples and local communities through subsistence, as well as trade in informal and formal markets***

Socio-economic impacts extend beyond the monetary values discussed in Chapter IV and include cultural, health, nutritional and other associated costs and benefits – indeed, many of the development aspirations that are enshrined within the Sustainable Development Goals (SDGs). This chapter seeks to document this range of impacts.

Methodological approach

The main content of this chapter (and Chapter III on conservation impacts) is based on a rapid review of 80 studies drawn from the peer reviewed and grey literature. Please see Chapter III for details of the methodological approach and Annex A for full details of the methodology.

[27] https://www.worldstopexports.com/coffee-exports-country/
[28] https://oc.world/en/profile/hs/cocoa-and-cocoa-preparations

Overview of evidence included in the analysis

Out of the 80 studies reviewed, 63 (79%) of them included some information on socio-economic impacts. The 63 studies covered 22 species/species groups from our focal list of most traded species/taxa (10 reptiles, 3 plants, 3 invertebrates, 2 fish, 2 timber and 1 mammal). Figure 5.1 highlights the distribution of evidence amongst these taxa, with most evidence relating to trade in reptiles (21 studies) and plants (14 studies). Most of the studies described trade in species originating from Asia (19 studies) or South American (17 studies). By contrast only two studies described trade from Oceania. Figure 5.2 summarises the geographic distribution of the studies.

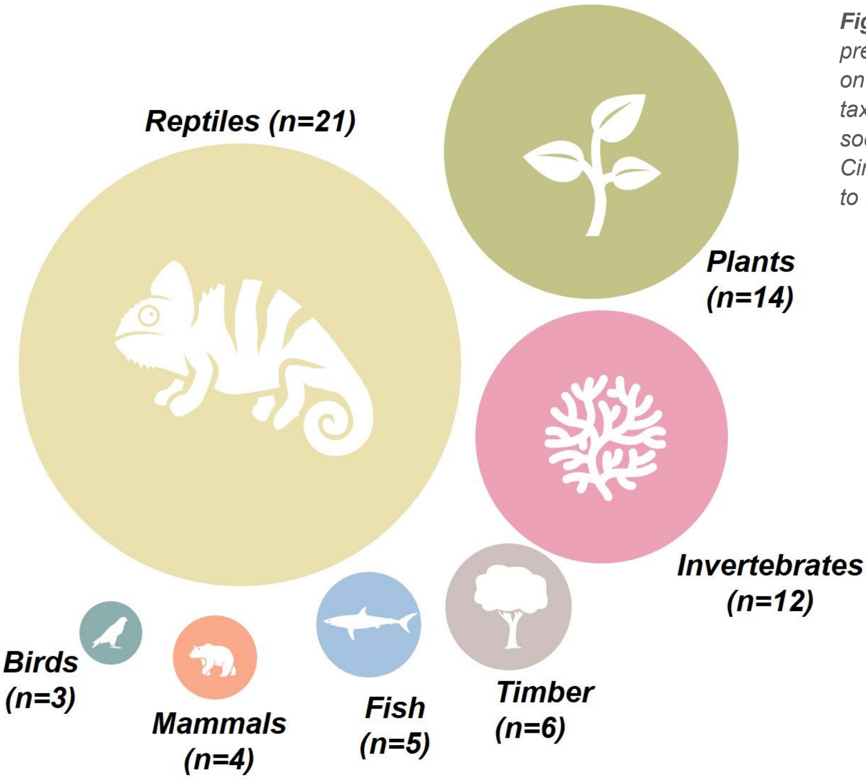


***Figure 5.1.** Relative prevalence of studies on trade in different taxa with information on socioeconomic impacts. Circle sizes are proportional to the number of studies.*

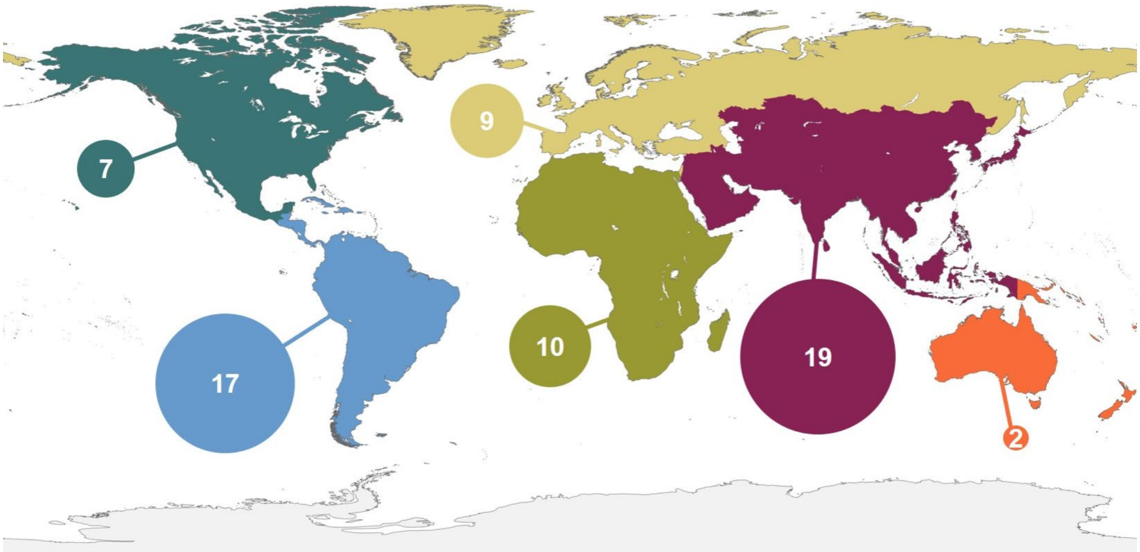


***Figure 5.2.** Map displaying the number of studies documenting socioeconomic impacts by region.*

What kinds of socio-economic impacts have been documented?

We identified a wide variety of socio-economic impacts. These ranged from macro-economic impacts such as contributions to GDP, to local level impacts such as improved nutrition or strengthened rights. More evidence was found on economic impacts than on other social aspects, likely due to the very direct linkages of the trade with impacts such as income generation and job creation. Overall, we noted information on nine types of impact:

- Macro-economic impacts, such as GDP contributions
- Income generation
- Job creation
- Market integration, enterprise development and local economic development
- Food security and nutrition
- Improved health
- Strengthened rights and empowerment (including gender equality)
- Improved skills, capacity and education
- Reduced human-wildlife conflict

Income generation was the most frequently documented impact, mentioned in nearly half of the studies that referred to socio-economic impacts (30 of the 63 studies) (Figure 5.3). Strengthened rights or other local empowerment effects were also commonly mentioned (22 of the 63 studies), whereas there was less of an emphasis on skills development and human-wildlife conflict. As with the description of conservation impacts in Chapter III, however, it should be stressed that this review is by no means comprehensive and the impacts described - as well as the relative prevalence – should be treated as illustrative only.

Figure 5.3. *Number of studies documenting each type of socio-economic impact. Circle sizes are proportional to the number of studies.*

The documented socio-economic impacts were nearly all described as positive. Where negative impacts were recorded these were better described as limitations rather than purely negative outcomes – particularly in terms of how benefits are distributed and to whom. For example, while jobs are created and income is generated, these jobs and income often accrue to limited numbers and segments of the population and are not evenly distributed along the wildlife trade value chain. Furthermore, the income associated with wildlife trade can be seasonal, risky and unreliable compared to other sources of income, even if profitable (Robinson *et al* 2018). Non-economic impacts also sometimes included negative aspects – for example, while the majority of the studies documenting health impacts were positive, we also found cases where, for example, cleanliness of captive breeding facilities posed health risks to employees.

Macro-economic contributions

The extent to which trade in different wildlife species generates GDP contributions and export earnings varies hugely from species to species and country to country. Some examples of high value contributions include:

- Agarwood: USD 30 billion annually[29]
- Python skin trade: USD 1 billion annually in SE Asia[30]
- Trophy hunting: USD 341 million for South Africa annually[31]

In the Bahamas the queen conch (*Strombas gigas*) fishery is an important industry with exports going to both other Caribbean nations and to countries such as the United States and France. The trade is based on small boat fishing which provides jobs and income for many local fishermen. In 2015 this created an export value of USD 2.3 million for the country (Stoner *et al*. 2019). However, as queen conch meat is also a staple food item domestically hugely important for domestic food security fisheries on the island are experiencing overexploitation, with large decline in conch stock. Therefore, improved management measures are needed to ensure the sustainability of conch stocks (Higgs 2021).

By contrast, a study of exports of Horsfield's tortoises (*Testudo horsfieldii*), from Central Asia noted that the majority of earnings are captured by the pet industry in importing countries rather than in the exporting countries. Countries which export them accrue an income of less than USD 40,000 for exporting around 80,000 live individuals. These tortoises are then destined for markets in the United States, Europe, and Japan, where and individual can sell for 25 to 100 USD – income which accrues to pet shops. This is a massive increase in commodity value over the income generated by the source countries, creating limited GDP gains despite the international value (Smith and Porsch, 2015).

Income generation

Incomes generated from wildlife trade vary greatly based upon the species being traded, the quantities at which that species is traded and the structure of the wildlife trade chain – as highlighted above. Macdonald *et al* (2021) note that wildlife trade involves diverse supply chains "from subsistence hunters lacking alternative sources of income to highly organized international corporations that distribute and market a diversity of wildlife products" (p 847).

Incomes accruing to harvesters may appear low but may still be locally significant. For reticulated pythons (*Python reticulatus*) in Indonesia, for example, each individual captured python can earn the hunter USD 25-30. This is a large sum compared to average monthly wages in the region, but it must be noted that most python hunters also work other jobs and will capture pythons opportunistically making the pay-outs more infrequent than a full-time job within the trade (Nossal *et al*. 2016). In Georgia, harvesters of snowdrop bulbs earn USD 1.60 per 1,000 snowdrop bulbs. In this case, however, seasonal harvesters work full time to harvest the bulbs creating a steadier flow of income when compared to the python hunters. Throughout the harvesting season a total income of around USD 24,000 will be generated between 200+ harvesters. In the region of Georgia where the snowdrop harvest takes place there is limited economic opportunity, so this additional flow of income can be critical for the survival of many families (McGough *et al*. 2014).

[29] https://cites.org/eng/news/towards-sustainability-one-worlds-valuable-essential-oils
[30] Stahl J and De Meulenaer T (2017). CITES and the international trade in wild- · life. Unasylva. 2017;68(1):17–26. 276
[31] https://cites.org/sites/default/files/articles/CITES_SG_Higuero_presentation_RtR_IUCN_SustainableUse.pdf

Who benefits from wildlife trade?

There is limited information regarding the socio-economic implications of wildlife trade (Robinson, Fraser *et al* 2018). Supply chains vary in form and in distribution of benefits from species to species, trade to trade and county to country. Various analysts of wildlife trade supply chains (Webb *et al* 2012, Timoshyna and Drinkwater, 2021) have noted that they:

- are typically long and complex – particularly for international trade
- are rarely linear and stable – more often convoluted and dynamic
- often have multiple strands running in parallel
- frequently feature prices that vary significantly from harvesters to consumers, with very limited efforts to ensure equitable sharing of benefits through the value chains.

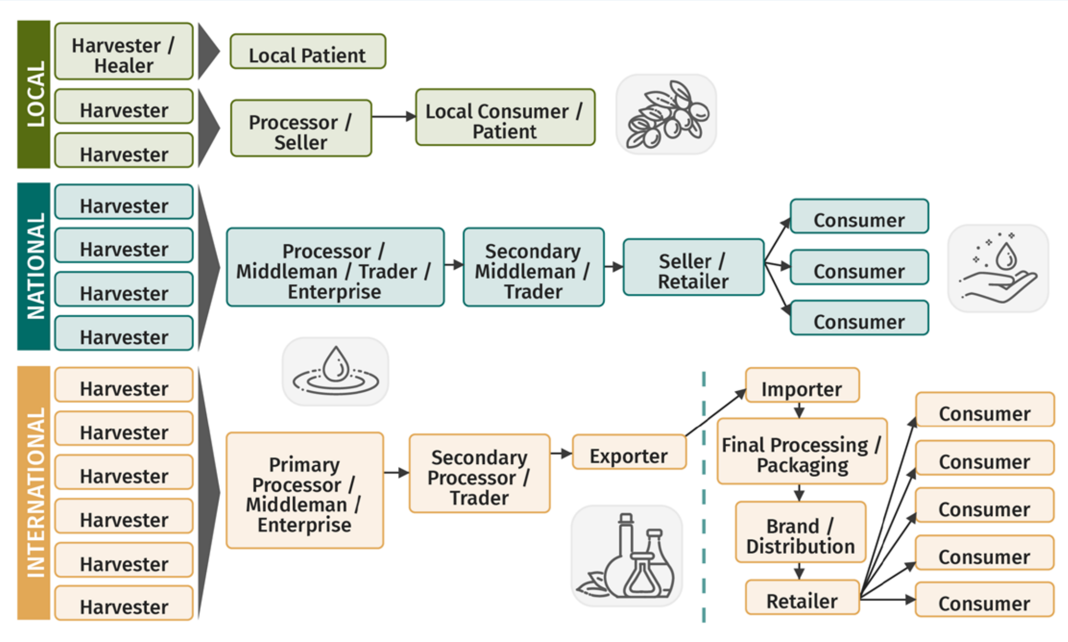


Figure 5.4. *Illustration of the varying complexities of wildlife trade chains based on the scale of trade – from local to international (Source: Timoshyna and Drinkwater 2021).*

In a detailed value chain analysis of wildlife trade in Madagascar, Robinson *et al* (2018) found live animal exports - particularly of CITES-listed reptiles and amphibians generated at least USD 230,795 per year and that the economic benefits were dispersed to a wide range of actors, from local collectors, to intermediaries, exporters and national authorities. Exporters captured over 90% of the final export price while local collectors captured less than 1.5% but they note that exporters also bore the highest costs and risks. Similarly in the case of snowdrop harvesting in Georgia, middlemen capture a large proportion of the value of the trade, but they also pay the cost of the permit for wild harvesting which is expensive and would be beyond the reach of most local harvesters (McGough *et al*. 2014). Unequal power relations along the chain also affect the distribution of benefits. In the case of vicuña, for examples, a limited number of buyers limits the bargaining power of local communities involved in harvesting (Lichtenstein, 2010) and the major beneficiaries are traders and international textile companies (IPBES 2022).

Cooney *et al* (2015) note that the benefits often vary with the number of stages in the supply chain. Longer supply chains frequently mean the benefits of trade are more widely distributed, potentially reducing benefits at the start of the chain. Nevertheless, even low levels of benefits may be significant compared to other options in some rural areas. A report on livelihoods issues prepared by the CITES Secretariat for 74th meeting of the Standing Committee (SC74 Doc. 21.2) includes a draft guidance document setting out multiple strategies for maximising the socio-economic benefits to local communities from legal wildlife trade, including strengthening their organisation and integration at higher levels of the trade chain, through partnerships, cooperatives and producer associations.

Lama guanicoe

Job creation

As with income generation, the number of jobs created varies widely for different forms of wildlife trade based upon international demand, processing capacity, and the intensity of the work. For example, in Georgia, the snowdrop trade supports around 200 workers (Karchava, 2019), while a projected 190,000 Indonesians are involved in the reticulated python skin trade (Aust and Natusch, 2022).

The job generation for most species tends to be more moderate within the range of 1,000 direct jobs, but supporting remote industries often creates a larger employment pool. In the Yacare caiman (*Caiman yacare*) trade in Argentina, for example, it is estimated that the existence of the trade has linkages to 1,200 additional jobs outside of those directly employed to harvest the Caimans (Aust *et al*., 2022).

Wildlife trade can often mean that jobs are available to poorer or more marginalised groups – for example, in the saltwater crocodile trade in northern Australia, indigenous communities make up a large share of the workforce and accrue many of the benefits (Fukuda and Webb, 2019). But all too often local people are by-passed. In the case of the trade of *Prunus africana* in Cameroon, for example, while many jobs are created, those jobs tend to be given to outside workers rather than to local peoples (Bodeker *et al*. 2014).

Market integration, enterprise development and local economic development

Small scale enterprise development and market integration occurs on varying scales within wildlife trade. In some cases, enterprises can be informal and ad hoc but in other cases, significant industries have developed at a regional or even national scale. In Viet Nam, for example, it was estimated in 2016 that 1000 households farm pythons for skins for the luxury leather trade in response to high international demand. Python farming is seen as a good business opportunity compared to other farming options (although it does leave farmers vulnerable to the vagaries of market disturbance such as trade bans). Nevertheless, python skins from Viet Nam are more highly prized by the industry than those from wild-sourced snakes due to their more consistent skin quality and this high level of demand has encouraged more and more families to set up python farming businesses (Nossal *et al* 2017).

In the case of sturgeon, high demand for caviar has stimulated the development of aquaculture enterprises and their integration into the global sturgeon supply chain (Reinartz and Slavcheva, 2016). As aquaculture has expanded to meet demand, global trade in caviar substitutes has also developed, with products from at least 38 non-sturgeon fish and aquatic animal species being traded (Tavakoli *et al*., 2021).

Socio-economic implications of shifting from wild-sourcing to captive production

The criteria associated with import and export requirements for CITES-listed species encourage replacement of wild collected specimens with captive-bred or cultivated ones. While in some cases this may reduce the pressure on wild-sourced populations (although see Chapter III for insights into whether this is indeed the case), such production systems can have mixed socio-economic effects.

At the local level, one concern is that a shift from wild sourcing to captive production can squeeze out local people. One advantage the wildlife trade presents to local people is the low barrier to entry – many people harvest, hunt or collect wild resources which subsequently enter the wildlife trade value chain with little or no requirement for equipment or capital assets. Their involvement in captive production can therefore be constrained by the requirement for capital investment which is beyond the reach of many poor people. This is not always the case, however, and much depends on the species involved and the capital equipment required. In China, for example, wildlife farming for trade was introduced as a deliberate poverty alleviation strategy, specifically because of the low capital costs (Roe and Lee 2021). Similarly, small-scale farming of pythons and other reptiles in Viet Nam has provided a sustainable income stream for hundreds of households, while mitigating pressure on wild populations (Natusch and Lyons, 2014). Nevertheless, examples of successful and effective (from a rural household perspective) ex-situ production schemes are rare.

Beyond the local level implications, captive breeding and artificial production can also result in a reduction of benefit flows to the countries where species originate. Fischer's Lovebird (*Agapornis fischeri*) provides a clear example. Endemic to Tanzania, Fischer's Lovebirds were traded in large numbers until 1992 when a ban was imposed due to concerns about widespread population declines. The continued international demand for the birds was subsequently filled by captive-bred birds, with major industries in China, South Africa, US and Europe (Roe *et al* 2002). Similarly, Cooney *et al* (2015) highlight how wild harvest and trade of the blue-fronted parrot (*Amazona aestiva*) from Argentina to Europe generated significant local benefits - and hence conservation incentives - but once imports were banned into the EU the trade was largely replaced by trade from European captive-bred sources thus removing the local benefits.

An alternative option for some species is ranching – whereby eggs are collected in the wild thus maintaining income and employment for local people and incentives for conservation – while rearing takes place in captivity. Even in the case of small-scale python farming, Natusch and Lyons (2014) note that the benefit to wild python populations remains to be understood and that in the long term, ranching or wild harvest may provide greater incentives for broader biodiversity conservation and thus greatly outweigh the conservation benefit of purely closed-cycle python farming. TRAFFIC (2008) suggests that to maximise the benefits of intensive production while minimising the negative effects of ex-situ production and/or cultivation there is a need for further exploration of *semi*-intensive production mechanisms that do not present barriers to entry for poor people and suggests this might mean coupling new production technologies with access to credit and training.

Food security and nutrition

Many CITES-listed species are traded specifically for food (e.g, sturgeon and queen conch). In some cases this can contribute positively to food and nutritional security – for the end users of these products but also, indirectly, for those who earn money from the trade and are therefore able to purchase different types of food. On the other hand, where international trade occurs in a species that is important for domestic food security (as is the case for queen conch) there can be a trade-off and unsustainable exploitation for trade and undermine availability for domestic consumption.

In some cases food is a by-product of the trade in other wildlife products and provides an additional benefit to harvesters or employees. For example, many skin trades generate large amounts of animal by-product that can be highly useful in improving local nutrition and helping provide a cheap source of food. This by-product tends to come from reptile species such as Asian water monitors, crocodilians, and pythons. In many cases these meats are both nutrient dense and low in saturated fats. This is true in the case of Yacare caiman where the meat is becoming an increasingly important food generated as a co-product of the international skin trade (Aust *et al*., 2022). The Kazuri London Crocodile Farm took this a step further through partnering with the World Food Bank, a food security focused NGO. In this partnership the farm directly gives their crocodile meat to the World Food Bank; where they then process and package the meats into free packed lunches for school children (Obare and Cooney, 2019).

Health contributions

The positive health contributions generated by international wildlife trade tend to be sorted into two key categories. The first is direct medicinal use of the traded species (such as with some orchids and other medicinal plants, Hinsley *et al*. 2018); the second is the income generated by the trade or its by-products leading to the secondary benefit of increasing local health outcomes.

Medicinal plants form the basis for the traditional health care systems around the world. Wild species also provide the basis for many modern drugs. Over 800 medicinal plants are listed in the CITES Appendices[32]. Plants such as African cherry (*Prunus africana*) are traded for multiple medicinal uses associated with the bark, berries, and leaves. Studies have indicated the bark's efficacy in treating a variety of health conditions, and the market for these products is likely to expand with the increasing popularity of herbal remedies (Ingram *et al.* 2015). Other traded species are used as specific sources for medicinal compounds. In the case of snowdrops, they are a key source of Galanthamine which is currently being used in Alzheimer's drug development (Cozanitis, 2021). The range of direct medicinal uses of these plants and plant compounds can provide key health outcomes globally as they contribute to treatments. Many medicinal species are used locally as well as being traded globally. In addition, income generated from wildlife trade can diversify livelihoods,[33] support increased access to healthcare as well as improved food and nutritional intake – resulting in improved health.

As well as the direct contributions to health of the use and trade of medicinal plants, there are also cases where wildlife trade businesses have voluntarily invested in community health infrastructure in order to build positive relationships with local people. For example, in Zimbabwe the Nile crocodile processing companies made key investments into improving women's health outcomes (Obare, 2015). The region in which they operated had high maternal mortality rates and a lack of locally available medical treatment centres requiring mothers to go long distances to receive care. After identifying this issue, and in order to foster good will with the local community, the companies provided funds to the local government to assist in the construction of a local women's health clinic. Along with the increase in quality of maternal healthcare, the clinic also helped create more jobs for local people.

Not all health outcomes related to international trade are positive, however. Wildlife trade brings humans into close contact with wild species and, unless well regulated, provides risks of spillover of zoonotic diseases to humans (see Box). Poor sanitary conditions in some wildlife production facilities can also pose health risks. In the case of captive-bred pythons in Viet Nam some have raised concerns over the health conditions created through captive breeding facilities (Nossal *et al*., 2017). The farms are often run by poor families with limited access to healthcare and the facilities themselves are often very dirty creating a risk for disease. It is a key reminder that conditions of harvest, processing and transport must be factored in when considering the health-related impacts generated by global wildlife trade.

[32] https://cites.org/sites/default/files/eng/com/PC/24/Inf/E-PC24-Inf-12.pdf
[33] https://cites.org/sites/default/files/eng/cop/18/doc/E-CoP18-055.pdf

Wildlife trade and zoonotic disease control

Following the COVID-19 outbreak, the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) held an expert workshop to explore the links between pandemic risk and nature. The workshop report (IPBES 2020) notes that “There is significant evidence that the wildlife trade is involved in the emergence of a range of diseases, particularly where the trade is poorly regulated, and concerns mammals or birds (the most important reservoir hosts for emerging zoonoses). The legal regulated trade in wildlife has also led to the spread and emergence of diseases.” Trade in live animals and meat are two aspects of international wildlife trade that have been identified as having particularly high zoonotic risk, and CITES-listed taxa are associated with 23 out of the 25 zoonotic diseases that are considered by the World Organisation for Animal Health to have the highest risk to human health (UNEP-WCMC and JNCC, 2021).

A situation analysis conducted by IUCN (Kock and Caceres-Escobar 2021) notes, however, that the evidence linking wildlife trade with zoonotic disease outbreaks is weak and restricted to a few events. They acknowledge, though, that even single events can have major consequences. They suggest that the highest risk of zoonotic disease outbreaks is from unregulated trade and that “the degree of regulation and application of safe practices tends to be higher in sophisticated high-volume legal trade than illegal low volume trade for obvious reasons”. Nevertheless, the authors note that there is still a risk associated with legal regulated trade.

Kock and Caceres-Escobar (2021) suggest that the risk of zoonotic disease transmission is largely dependent on the specific processes and conditions involved in the trade rather than a particular species or group of species. Thus, identifying high-risk practices and improving sanitary and animal welfare conditions along supply chains are fundamental to reducing the likelihood of spillover events and only possible for well-regulated trade that offers the possibility for scrutiny and intervention. Kock and Caceres-Escobar (2021) note that there is no consistent surveillance of the disease and public health aspects of the wildlife trade, internationally or in many cases at national level, but they suggest that countries with high levels of sanitary and hygiene control built into their wildlife trade measures run a lower risk of disease outbreak.

Rights and empowerment (including gender equality)

Rights of local communities can be bolstered through international wildlife trade and the opportunities it provides. It can strengthen land and resource rights through increased financing and knowledge. It can provide key economic opportunities for women allowing for progress on gender equality in remote regions. Additionally, it can empower local communities to make more decisions about their own resources and strengthen local institutions. For example, the implementation of spatial rights-based management and community exclusive fishing zones has helped improve local resource rights in tropical coral fisheries. When coral traders operate within these community fishing zones, they commit a portion of the profits to the community and fund activities, such as scholarships (Dee *et al* 2014). Through increasing local authority over their own resources, it allows for communities to ensure they benefit from the trade of local species.

As the trade provides increased opportunities for income within a community, it can also provide a chance for bolstering the economic equality of women. In the case of wild orchid markets in Mexico, for example, researchers found that 78.5% of traders were women (Cruz-Garcia *et al*., 2015). Similarly, women were found to be key leaders within the harvest of Cape aloe in South Africa. Out of 22 households surveyed, 21 of them were headed by women and they supported an average of 2.8 dependants each (Kumalo, 2019). In cases such as these, wildlife trade provides a key lifeline to empowering women by allowing them their own income source.

When wildlife trade becomes a significant export industry it can also enhance the political recognition of local people. In the case of the vicuña trade, local institutions and communities have been strengthened due to additional financial resources increasing their authority and capacity (Kasterine and Lichtenstein, 2018). The trade also has engrained cultural elements allowing for revitalization of traditions and placing an importance on local knowledge.

Skills, capacity and education

Wildlife trade provides both an influx of income and connections which can disseminate into skills development and support for education within communities. In some cases, this is the development of business-related skills to assist in the trade, but often it is a broader set of skills which can be developed through outside investment.

The expansion of management capacity and knowledge is one of the key skills gained by many involved in the trade. Amazonian indigenous communities have gained sustainable management skills through the process of ranching yellow-spotted river turtles (Besnard, 2019). Their expertise in sustainable management has led to both steady increases in the turtle population and key sources of income for the local community.

Sometimes it is even the community's knowledge of the species which they trade which leads to the increasing of local skills. This is true in the case of Yacare caiman in Argentina, where local harvesters (gauchos) are hired by research teams to conduct complex and detailed monitoring work and research (Aust *et al*., 2022). Through integrating research skills into their repertoire it allows gauchos to expand their potential income streams beyond the scope of the caiman skin trade.

Reduced human-wildlife conflict

Like many forms of sustainable use, legal wildlife trade can be a form of reducing the insecurity and fear that local people feel living with or near dangerous animals. This is not only good for conservation, as it increases tolerance for wild animals and reduces retaliatory killing, but it is also good for people, resulting in an increased sense of ownership and pride in wildlife rather than fear and anger. Regulated egg harvests for crocodile farms, for example, has changed the perspective people have of crocodiles from dangerous predator to valuable asset (Wallace *et al.* 2011; Fukuda *et al.* 2020).

Discussion: More than income - wildlife trade contributes to the broader sustainable development agenda

Chapter IV highlights the financial value of wildlife trade. The value of wildlife trade extends far beyond its financial value and the income it generates and includes jobs and enterprise opportunities, contributions to health and food security, contributions to skills and capacity development, strengthening of local rights, reduced conflict with, and negative impacts on life and livelihood, from wildlife. These contributions are delivered at both national and local levels and to both men and women. The specific distribution of benefits varies hugely from context to context, but very often the majority of benefits accrue to those at the top of, what are often long and complicated, value chains. Harvesters and collectors at the bottom of the chain often receive only a small proportion of the total value of wildlife trade – but nevertheless these can be critical contributions to livelihoods in some cases.

The conservation impacts described in Chapter III are deeply intertwined with the socio-economic benefits that are generated. As many of the examples highlighted in Chapter IV demonstrate, in many cases the reasons wildlife populations are conserved is because local people experience benefits from their use and trade. These benefits can be tangible – for example employment in a crocodile farm or income earned from sales of collected bulbs – or intangible – for example an enhanced sense of pride and identity.

Many of the socio-economic impacts of wildlife trade are encapsulated in the Sustainable Development Goals (SDGs). The recently concluded IPBES Sustainable Use Assessment (IPBES 2022) notes that "*The potential contributions from sustainable use of wild species to meeting the Sustainable Development Goals is substantial, but largely overlooked*". In this report, Chapter III on conservation impacts provides many examples of how wildlife trade can both help and hinder the protection of life below water (SDG 14) and on land (SDG 15).

Many of the socio-economic impacts of wildlife trade are encapsulated in the Sustainable Development Goals

In this Chapter, our analysis illustrates how wildlife trade can also contribute income generation and poverty reduction (SDG1); increased food security and reduced hunger (SDG2); health (SDG2); skills and education (SDG4); gender equality (SDG 5); jobs, enterprises and local and national economic development (SDG 8); rights and empowerment (SDG 10). Figure 5.5 provides an illustration of the contributions of wildlife trade to the different SDGs.

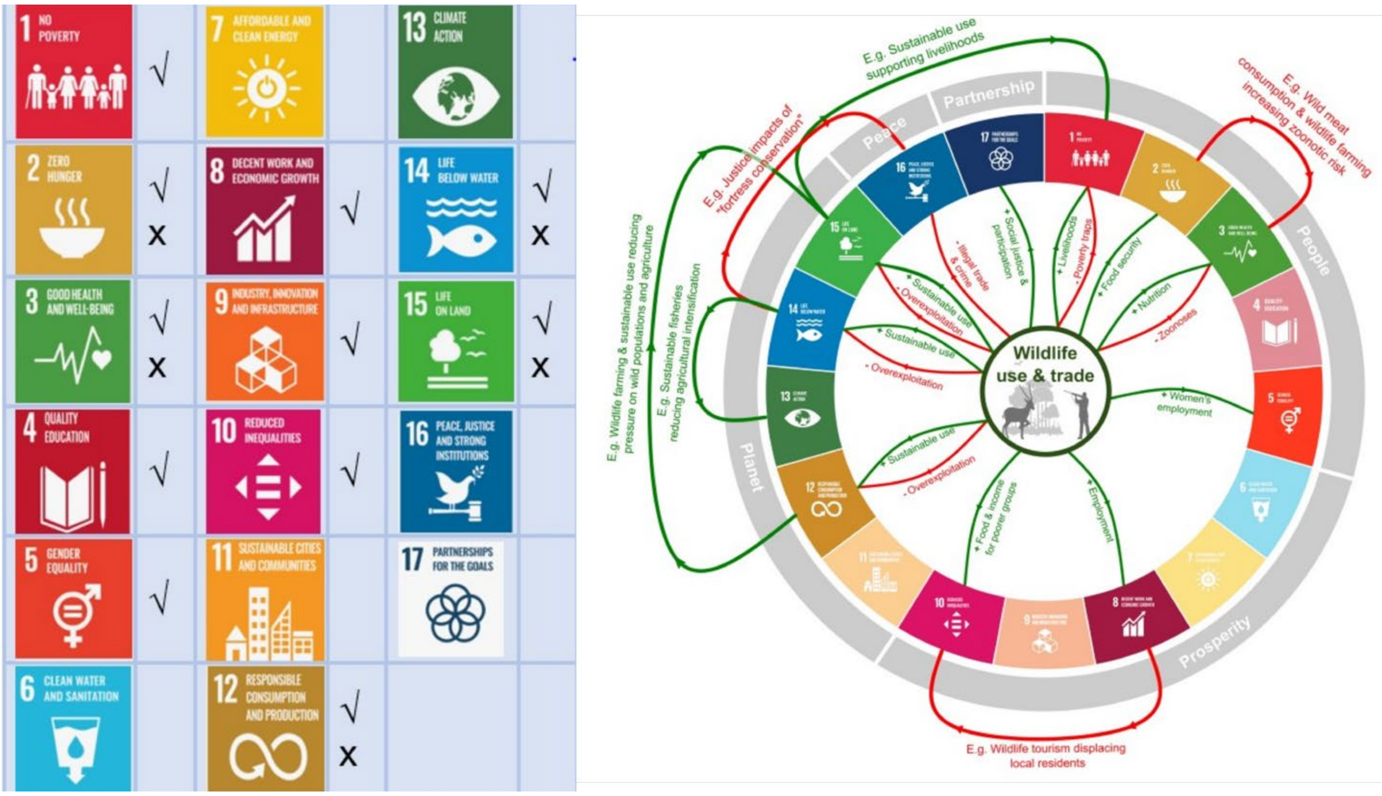


Figure 5.5. *Contributions of regulated wildlife trade to the SDGs. Panel on left shows the SDGs for which positive and negative contributions were identified in this analysis. Panel on the right is taken from Booth et al (2021) and provides "Illustrative examples of some general positive (green) and negative (red) contributions of wildlife trade to the Sustainable Development Goals (SDGs). Direct contributions are denoted by arrows in the centre of the diagram, while interactions between the SDGs are denoted by arrows around the outside (with trade-offs in red and synergies in green). Both panels are illustrative only and should not be interpreted as a definitive analysis.*

As has been highlighted in this chapter, however, little detailed information exists on the value chains of different species in trade in different countries. As with the analysis of conservation impacts in Chapter IV, it is thus not possible to produce a definitive global analysis of socio-economic impacts of wildlife trade. Furthermore, it should be noted that the impacts documented do not fully capture the multiplier effect of wildlife trade. For example, where wild species are traded as exotic pets, the consumer will spend money not just on the pet but also on equipment, food, housing, veterinary bills and so on. Wildlife traded for food will likely generate income and jobs in the restaurant business; exotic skins will generate jobs in tanneries, processing plants and fashion shops, and so on. A detailed analysis of the socio-economics of wildlife trade would need to map these multiplier effects in order to generate a full picture of the impact of the industry.

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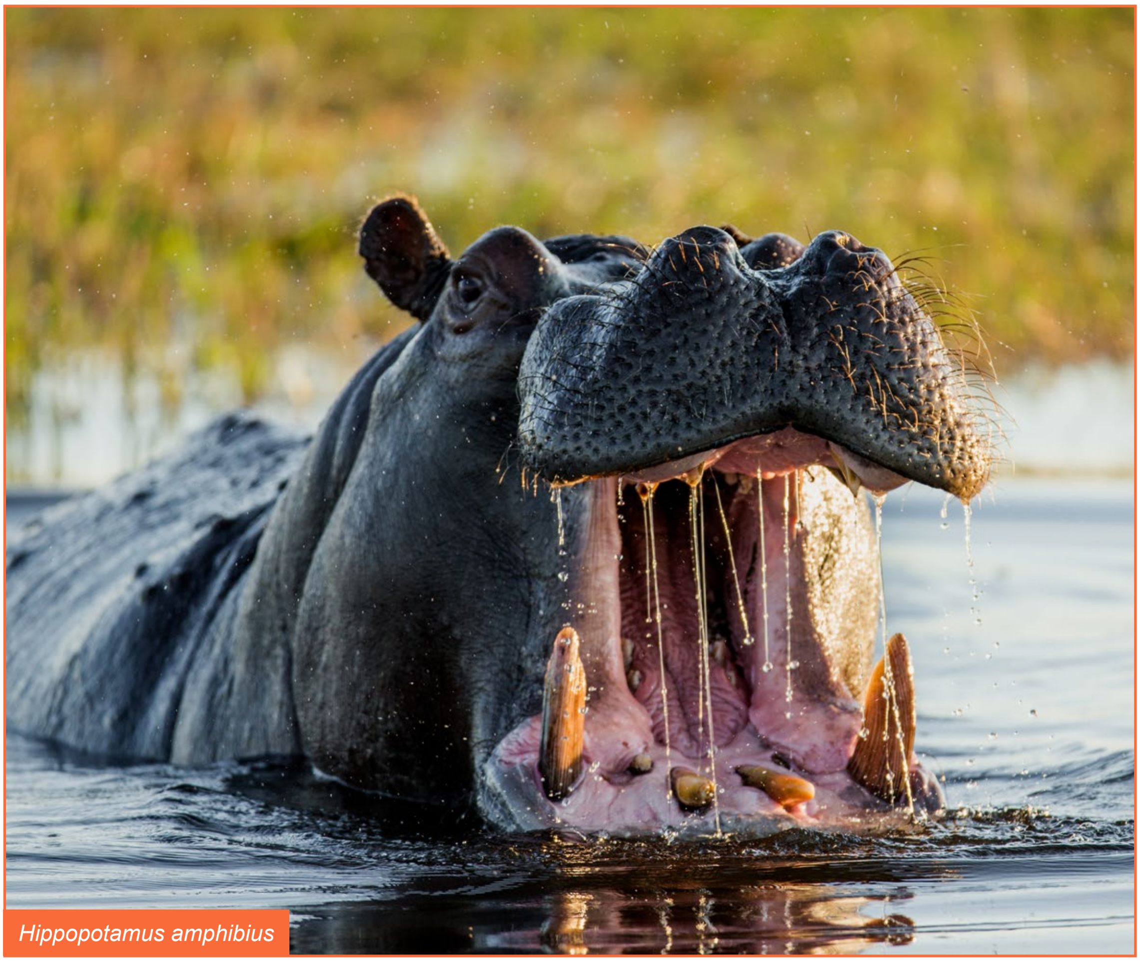
VI. Linkages between illegal and legal trade

As previous chapters have highlighted, the legal and sustainable trade of wild species, including those regulated by CITES, can have multiple benefits. This includes providing livelihoods for Indigenous peoples and local communities (IPLCs) and other stakeholders. Conversely, the illegal and unsustainable trade in wild species poses serious threats to biodiversity; it can cause species in trade to become threatened with extinction and can lead to ecosystem degradation (Wilson, 2014; Smith, *et al.*, 2009). This can impact access to ecosystem services, with significant social and economic consequences for the countries and localities involved, including the livelihoods and wellbeing of IPLCs that depend on natural resources.

This chapter focuses on the links between legal and illegal trade by summarising Appendix II listed species most evidenced in seizures and investigating the causes of these seizures. The rationale for the focus on Appendix II species is that these are the species that can be traded legally when fulfilling certain conditions according to CITES regulations. Understanding the causes of seizures of species that have the potential to be legally traded can provide an opportunity to better understand how to remove current barriers to legal trade for the benefit of communities and ecosystems.

A combination of wildlife seizure data from various sources were used and interviews with individuals from customs, law enforcement, and CITES Management Authorities were conducted to gain an understanding of taxa being seized and the causes and drivers of these seizures. It is well documented that there are significant biases in wildlife seizure data due to both enforcement and reporting efforts and under-representation of certain taxa (Paudel *et al.*, 2022). The seizure data presented is therefore intended to provide an insight into minimum volumes and commonly reported taxa in CITES Appendix II listed species, rather than a comprehensive overview of illegal trade.



Hippopotamus amphibius

Seizures of Appendix II listed species

An overview of seizures 2010-2020

Data on seizures of wildlife are one mechanism for analysing the dynamics of illegal trade. The CITES Annual Illegal Trade Report data, held in the CITES Illegal Trade Database and managed by UNODC on behalf of the CITES Secretariat, is one of the most comprehensive databases on global wildlife seizures. To compliment reporting gaps by Parties, which may lead to regional information biases, and because most data are reported from 2016 onwards[34], this report additionally used the Wildlife Trade Information System (WiTIS), a database of mainly open source reports of seizure data managed by TRAFFIC with records since 2011. It should be noted when interpreting the data presented that whilst seizure data is a vital source of information, it should not be inferred that there is a direct correlation between reported seizures and the overall illegal wildlife trade, or that information across locations, species or time is consistent. Whereas Parties report every seized specimen in CITES Annual Illegal Trade Reports, WiTIS data is predominantly sourced from open source data including media reports, which may be skewed towards particular species that generate public interest and locations over time. When interpreted with these caveats accounted for, together these two databases can still provide useful insights into the reported illegal wildlife trade in CITES-listed species.

Key definitions

Seizure

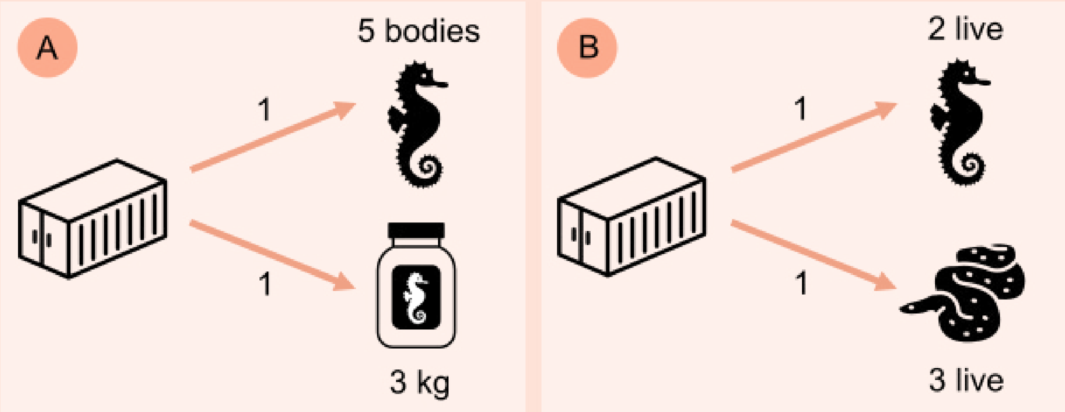
The taking by law enforcement officers of potential evidence (e.g., commodities) in a case of suspected illegal trade. In WiTIS, a seizure may encompass one or more commodity records

Commodity

A unique taxon and item combination; for example, a snakeskin and a live snake would be treated as separate commodities

Commodity record

A unique commodity linked to a seizure; for example, seizure 'A' of 5 seahorse bodies and 3 kg of powder derived from seahorses, or seizure 'B' of 2 live seahorses and 3 live snakes, would both be described as 2 commodity records per seizure



Confiscation

When an investigation confirms a seized commodity has been illegally traded and the commodity is no longer the property of the alleged owner

[34] Although CITES Parties were not required to submit annual reports on illegal trade until 2016, some Parties submitted information covering earlier years, dating back to 2010

CITES Annual Illegal Trade Reports

CITES Parties are expected to submit annual reports on domestic and international seizures (Res Conf. 11.17 (Rev. CoP18)) but this requirement is not subject to compliance procedures (CITES, 2022). As a result, seizure data are not consistently reported across all Parties and may be more representative of certain countries and regions that consistently report. On average, 63 out of 184 CITES Parties have reported between 2016-2021, with 72 reporting in 2020. Around 40% of commodity records reported in seizures were reported by Parties within Oceania, with a further 33% reported by Parties within Europe.

Data from the CITES Illegal Trade Database maintained by UNODC covered seizure information from 2010 to 2021, which revealed that there was a total of 94,478 commodity records in this period. More than half (51%) of these involved species currently listed under CITES Appendix II, with a further 32% of commodity records involving taxa from multiple appendices and potentially including CITES Appendix II listed species[35] (Figure 6.1). In total, this accounts for more than 48,500 commodity records from Appendix II species recorded in seizures between 2010-2021. Of these, the most reported were corals (29% of commodity records), followed by plants (22%) and other invertebrates (19%), with birds and reptiles accounting for around a tenth of all reports and much smaller volumes of mammals, fish and amphibians.

The most commonly reported reason for commodities being seized was the absence of a CITES permit, which accounted for close to 70% of all commodity records. Most of the remaining commodity records did not have a cause reported, with small volumes seized due to illegal border crossings or mis-declarations.

Wildlife Trade Information System (WiTIS)

While the CITES Illegal Trade Database contains official and verified seizure data reported by CITES Parties, WiTIS includes information from open-source media reports as well as CITES Management Authorities, government agencies, customs organisations, social media platforms and NGOS. Duplicate records between sources were identified and excluded from this analysis.

Between 2011 and 2020, WiTIS includes a total of 26,586 commodity records that were reported in 17,688 seizures. Of the 26,586 commodity records, 23% (6,051) were confirmed as involving taxa currently listed on CITES Appendix II, with a further 43% commodities from taxa assigned multiple Appendices and potentially including CITES Appendix II listed species (Figure 6.1).

Asia was the region in which seizures involving CITES Appendix II listed taxa were most frequently reported in WiTIS, with 2,752 seizures incorporating 3,935 commodity records while birds and mammals were the most frequently reported taxa.

When the data was analysed by volume of seizures, seahorses (*Hippocampus* spp.) were in the top three taxa seized by volume for five out of six regions, and eels (*Anguilla anguilla*) were in the top three taxa seized in three out of six regions (Figure 6.2). In most regions seahorses were reported seized as individuals, but Europe was an exception with derivatives reported in the highest volumes. Eels were mainly reported as individuals in Asia and Europe, and as meat in North America.

Asia and Oceania were the only regions in which plants were reported seized in the highest volumes. In Asia, commodities from rosewood (*Dalbergia* spp. and *Pterocarpus* spp.) were the most common with the majority (approx. 90%) in the form of raw timber. Aloes (*Aloe* spp.) were the most common reported in Oceania and also in the top three taxa seized within Europe, when analysed by volume.

When seizure data are analysed by frequency of seizures rather than by volume of commodities seized, rosewood (primarily *Pterocarpus* spp.) remains the most common in Asia, hippopotamus (*Hippopotamus* spp.) teeth in Africa; seahorse (*Hippocampus* spp.) derivatives in Europe; chameleon (*Chamaeleo* spp.) bodies in Oceania; live pythons (*Python* spp.) in North America and arapaima (*Arapaima gigas*) bodies in Central and South America and the Caribbean.

[35] Not all taxa in seizure records were identified to species level. Where this occurred, a CITES Appendix was assigned only if a higher level taxonomic listing was in place. Taxa were assigned multiple Appendices if, for example, they were listed to the genus level and species within this genus are listed on more than one Appendix.

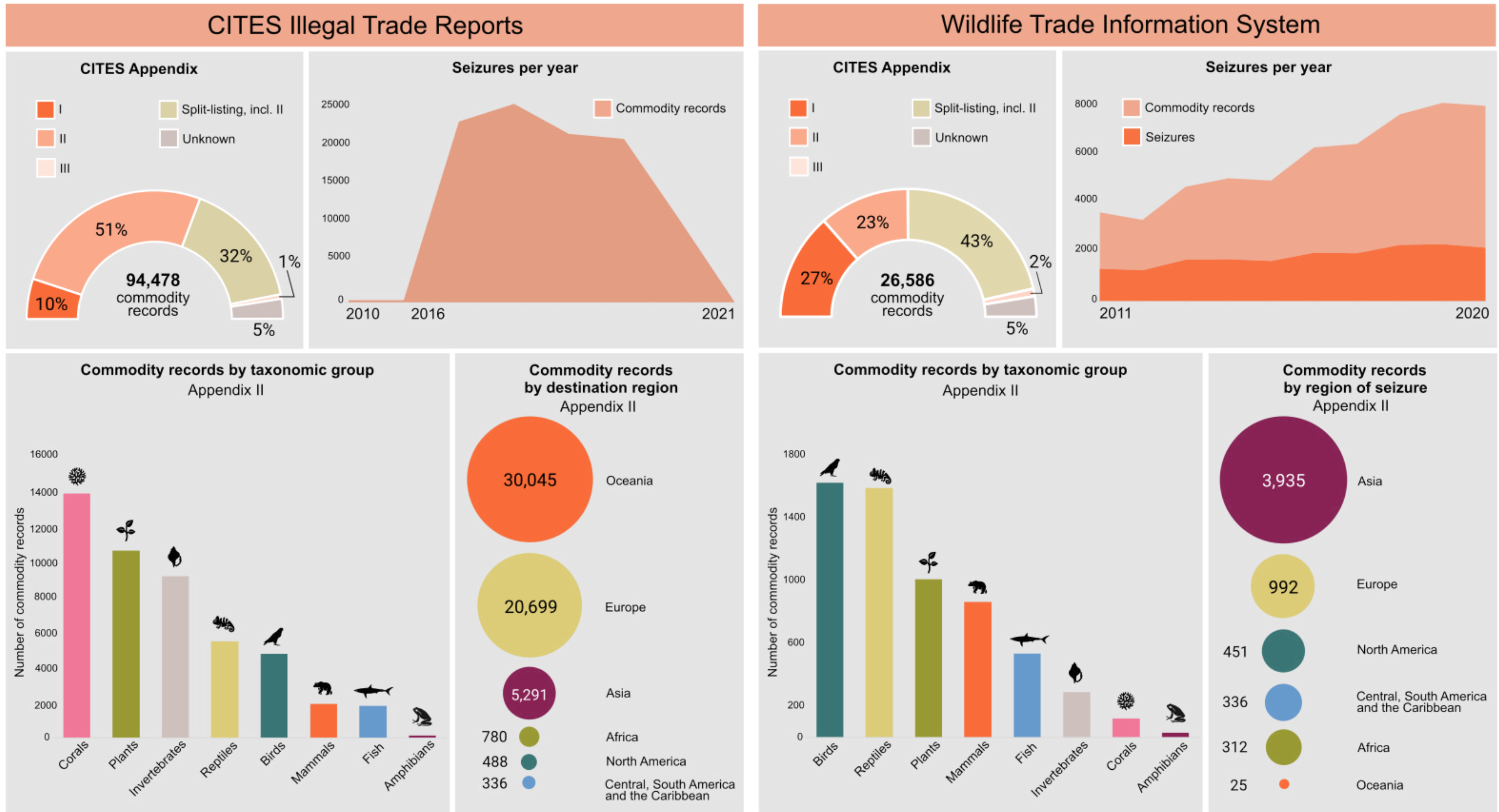


***Figure 6.1. Left:** Summary of global wildlife seizures held in the CITES Illegal Trade Database 2010-2021 (UNODC, 2022). **Right:** Summary of global wildlife seizures 2011-2020 recorded in TRAFFIC's Wildlife Trade Information System (TRAFFIC, 2022).*

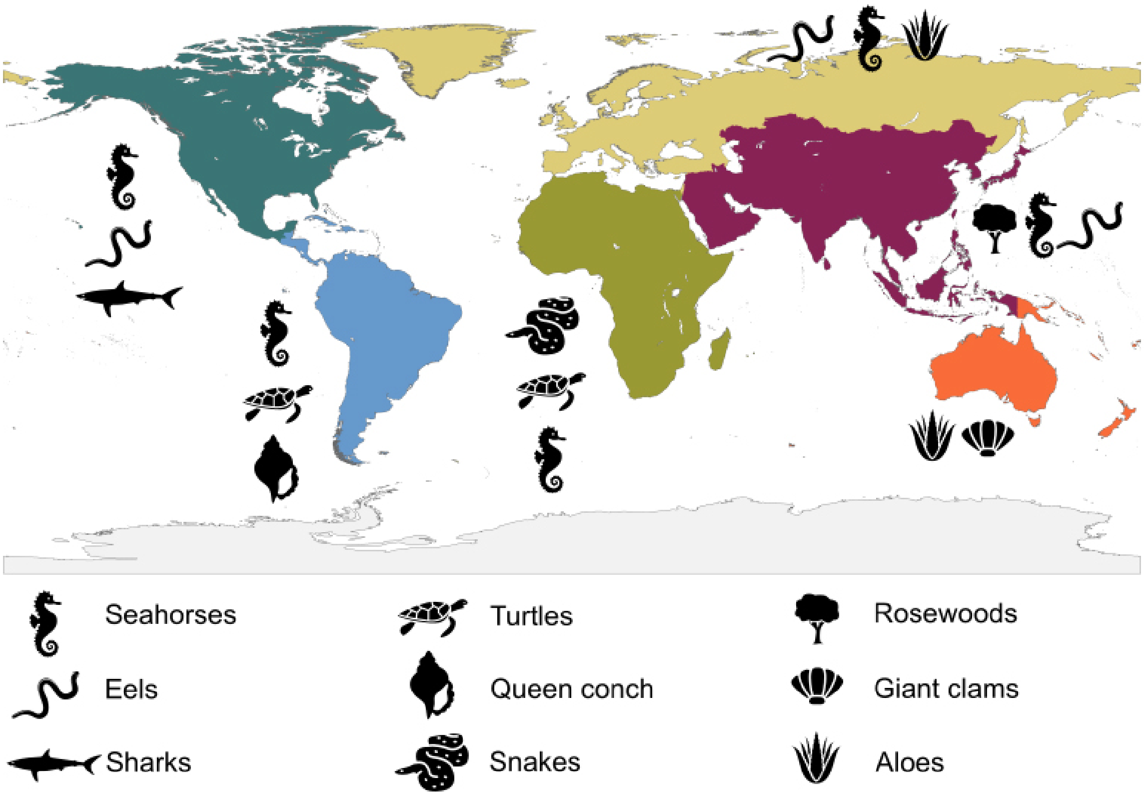


Figure 6.2. *Top CITES Appendix II-listed taxa reported in commodity records per CITES region, according to volume, 2011-2020 (TRAFFIC, 2022). Icons depict seizures in order of magnitude, decreasing from left to right when depicted horizontally, and from top to bottom, where depicted vertically.*

Legal trade in previously seized or confiscated commodities

Although seizures occur because the commodities being exported or imported are suspected of being illegal, illegality cannot be proven in some cases and those commodities are usually returned to the lawful owner. However, when investigations confirm the illegality of the seized commodities, they are usually confiscated and forfeited to the State. In some cases, the State can subsequently dispose of confiscated commodities by selling them, if this is legal according to national regulations. Parties use source code “I” to report legal trade in previously seized or confiscated specimens in the CITES Trade Database. The reasons for the subsequent legal trade include trade for law enforcement (for example for items that are part of an ongoing investigation), returning seized items to their country of origin, or commercial trade.

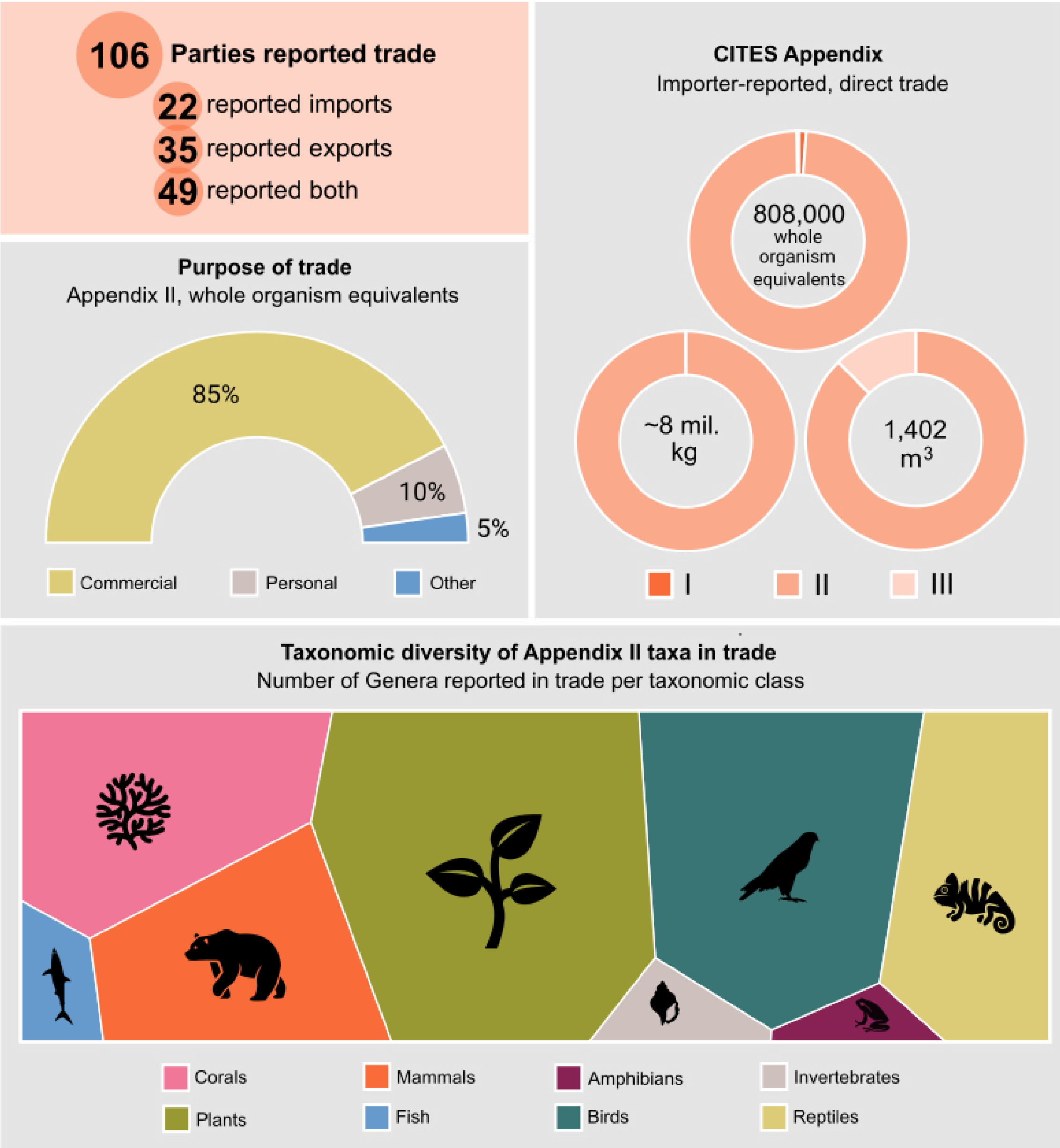


__Figure 6.3.__ Overview of direct importer-reported trade in previously seized or confiscated specimens, 2011-2020 (CITES Trade Database, 2022).

Between 2011 and 2020, a total of 106 CITES Parties reported legal trade in previously seized or confiscated commodities. Trade in Appendix II listed species of previously seized or confiscated origin were primarily traded for commercial purposes (Figure 6.3). In this period, importers reported trade in more than 800,000 whole organism equivalents, nearly 8,000 tonnes of parts and derivatives, and about 1,200 cubic meters of items (Figure 6.3). The trade involved a total of 655 different genera with the most diversity among plants (covering 192 genera), birds (141 genera) and corals (104 genera; Figure 6.3). The majority of plants traded were *Mammillaria* spp., totalling over 368 thousand live plants, followed by orchid hybrids (over 162,000, direct imports). Other plant genera reported in high volumes were predominantly cacti and orchids. Birds reported by importers in the highest volumes were live parrots (Order Psittaciformes) totalling 9,478 birds, and the New Guinea Hornbill (*Rhyticeros plicatus*¸ 2,514 live birds).

Pterocarpus santalinus

The main taxa traded varied by region (Figure 6.4). Orchids (Orchidaceae) were in the top three taxa imported by volume from Asia, South and Central America and the Caribbean, and North America, totalling more than 200,000 live orchids. Seized or confiscated live orchids from Asia and South and Central America and the Caribbean were subsequently legally imported primarily by North America, while previously seized or confiscated orchids from North America were reported as imports mainly by Europe.

Other high-volume imports of previously seized commodities included:

- Queen conch (*Strombus gigas*) imported into North American from Central and South America and the Caribbean and from within North America.
- Scalloped hammerhead shark (*Sphyrna lewini*) fins imported into North American from Central and South America and the Caribbean Seahorse (*Hippocampus* spp.) – imported into North America from Asia and within North America. Parties in North America reported importing 13,065 items from Asia, including medicine, extract, and derivatives, and 888 bodies from within North America. Rosewood (*Pterocarpus santalinus*), imported from within Asia
- Corals imported into North America from Oceania and within North America Cacti (Cactaceae) imported into North America from Europe and Africa
- Sturgeon (Acipenseridae) caviar and extract imported into North America from Europe
- Ball python (*Python regius*) imported into North America from Africa
- Bubinga (*Guibourtia tessmannii*) imported within Asia.

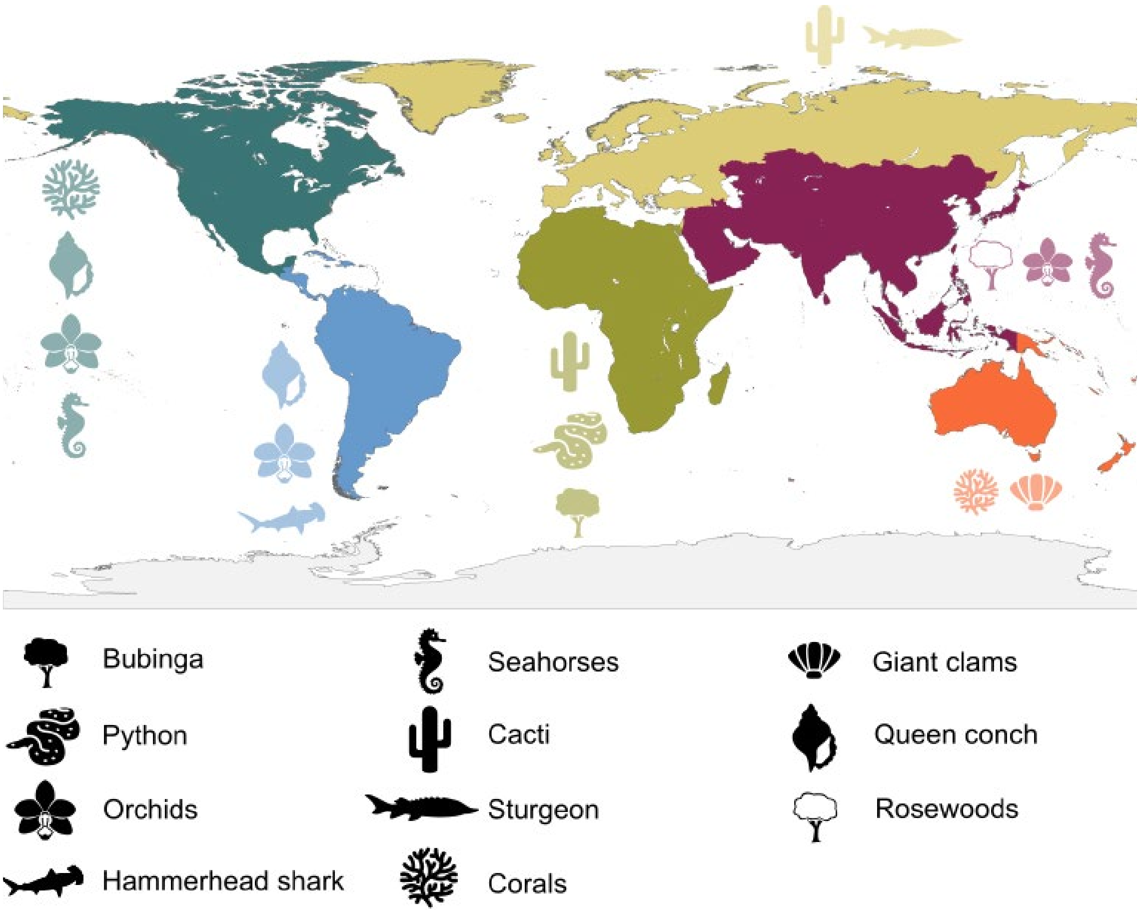


Figure 6.4. *Top CITES Appendix II taxa in direct trade by exporting region, reported by importers, from previously confiscated and/or seized sources and traded for commercial purposes, 2011-2020 (CITES Trade Database, 2022). Icons represent the top traded commodities alongside their origin region. The order of appearance of icons correspond to the highest to lowest volumes within these.*

Perceptions of illegality

A limitation of illegal trade data is that it only includes the items that get intercepted through seizures and confiscations, and subsequently reported. This can lead to bias in understanding which taxa and commodities are most commonly illegally traded. To supplement available data on illegal trade and trade in previously confiscated species, national authorities were contacted to gain insight into which Appendix II species and commodities are perceived as being traded illegally, and what the perceived drivers are of these seizures.

Seized species

The taxa mentioned most frequently by interviewees when referring to Appendix II listed species in seizures were plants, reptiles and birds (Figure 6.5). This finding is consistent with the seizures reported within WiTIS and sourced mainly through open-source media. Plants were most commonly mentioned by respondents in Europe and Africa, birds in Central and South America and the Caribbean and Asia, and reptiles in North America.

Many of the most mentioned species were consistent with those captured in WiTIS, and the CITES Illegal Trade Database. Orchids (Orchidaceae), Rosewoods (*Dalbergia* spp., *Pterocarpus* spp.), and agarwood (*Aquilaria* spp.) were most frequently mentioned in plant seizures, and turtles and snakes in reptile seizures.

Parrots (Psittaciformes) were the most frequently mentioned birds, followed by birds of prey (Falconiformes), while seahorses (*Hippocampus* spp.) and sharks were the most common fish, primates the most common mammals, and frogs the most common amphibians, with queen conch (*Strombus gigas*) the only invertebrate species mentioned.

Actions identified by interviewees as key to reduce the causes for seizures are highlighted in Figure 6.5.

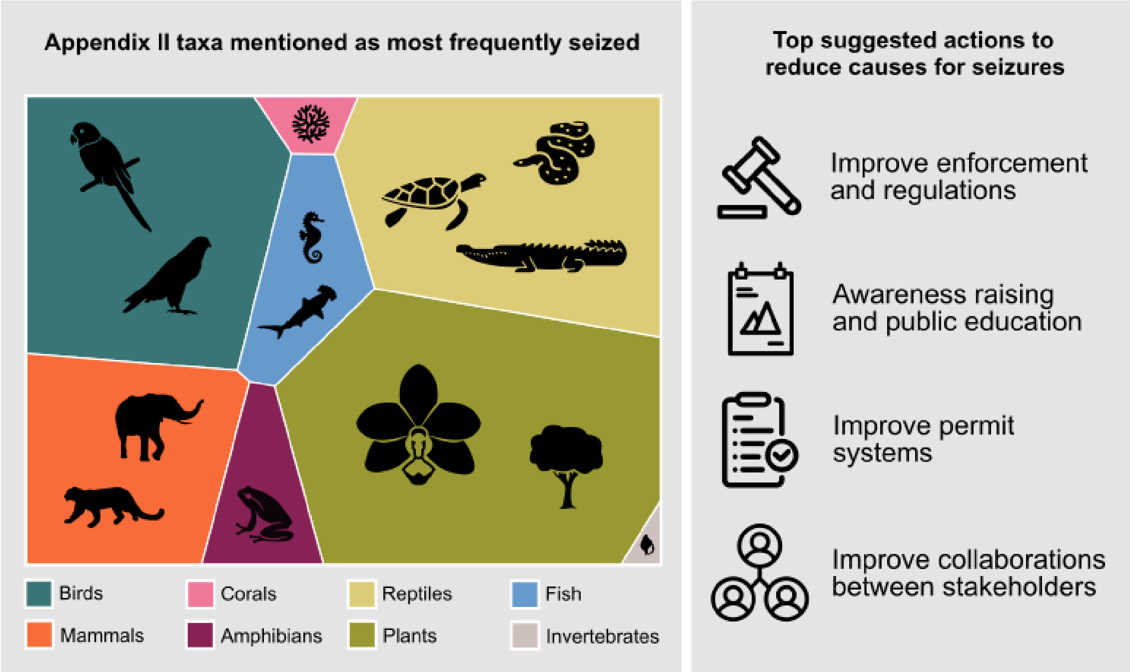


Figure 6.5. *Perceptions of illegal trade in Appendix II-listed species based on interviews. Taxa most frequently mentioned by interviewees as being seized often are depicted in a tree graph, with the size showing relative frequency per taxonomic grouping, and icons showing the top mentioned species within each group.*

Drivers of seizures involving Appendix II-listed species

A primary reason for commodities being seized – according to both WiTIS, the CITES Illegal Trade database and interviews with authorities – is the lack of relevant documentation or mistakes in the documentation. WiTIS data reveals that out of the over 6,000 commodity records involving Appendix II listed taxa, 84% were reported as having no documentation and a further 12% had incorrect documentation (e.g., misdeclarations or incorrect quantities). In the CITES Illegal Trade Database around 70% of the 48,000 Appendix II-species' commodities were reported to be seized due to being traded with no CITES Permits. Interview data suggested seizures included use of the wrong source code, mis-declarations of the taxa being traded, or missing permits. A range of underlying drivers were identified for trade in CITES Appendix II listed species with erroneous, fake or missing documentation. Although in some cases, there was criminal intent behind illegal trade in Appendix II listed species, the interviewees identified several other drivers. These include:

1. Lack of awareness: Exporters and importers are often genuinely unaware of CITES requirements. This was often the case when the importer was a tourist. In some cases, exporters may know they need an export permit or certificate from their country, but may not know that an import permit or certificate may also be required. In particular, the rise of e-commerce has introduced new and poorly regulated markets, often with traders who have not previously traded in CITES-listed species. Clear information on CITES requirements for specific taxa and for different exporting and importing countries were not easy for traders to source. Confusion may arise if some countries have stricter domestic measures meaning that national legislation may differ from CITES regulations. For example, some countries may prohibit trade in certain taxa even though trade is technically permitted under CITES or required import permits for Appendix II listed species, when this is not required by CITES.

A range of underlying drivers were identified for trade in CITES Appendix II listed species with erroneous, fake or missing documentation.

2. Costs and benefits of CITES compliance: In some cases, the effort to comply with CITES permitting processes is higher than the cost of non-compliance. Interviewees highlighted that a combination of very small fines for being caught illegally trading Appendix II listed plants and animals and a lack of legal consequences does little to deter trade without CITES permits. By contrast, the high cost of a permit may make legal trade in low-value products unviable. In other cases, the profits from illegal trade outweigh the punitive costs.

3. A lack of legal trade options: In some cases, illegal trade is the only trade channel, where legal trade is prohibited either by some countries or for some taxa. Sometimes trade in wild-sourced individuals or products is banned while captive-bred or artificially propagated is permitted. These requirements may be challenging for some producers in terms of technical equipment required, the cost, the necessary documentation – resulting in an incentive to mis-declare wild-sourced individuals as captive bred. For example, in a country in Central America where reptiles are collected for the pet trade, an interviewee explained that wild taken specimens are preferred by consumers as these usually have brighter colours than those that are bred in captivity, but to obtain permits to harvest them in the wild entail so many complicated requisites, that they end up being illegally harvested and traded.

Myiopsitta monachus

Conclusion

Anguilla anguilla

A prominent barrier to identifying the volumes of illegal trade in Appendix II listed species most seized is data availability, with reporting bias making it difficult to identify accurate trends. Although both the CITES Illegal Wildlife Trade database and WiTIS contain records on seizures reported globally, both are subject to reporting bias, or publicly available in the case of WiTIS. The CITES Illegal Wildlife Trade database includes data submitted by Parties through Annual Illegal Trade Reports, the majority of which have currently been submitted from Oceania and Europe. These show that corals, plants, and invertebrates are most frequently reported in seizures. The WiTIS database contains more seizure reports from Asia and it shows that birds, reptiles, and plants are the most frequently reported seizures. These two datasets also differ due to their sources of information; while the CITES Illegal Trade Database includes information reported by Parties, WiTIS information derives predominantly from open-source media reports, so the latter might be skewed to more charismatic and endangered species that generate public interest, whereas Parties report every seized specimen. The differences in most seized taxa between databases highlights the need for consistent enforcement efforts and annual illegal trade reporting by Parties to CITES as required by Resolution Conf. 11.17 (Rev. CoP18) on *National reports*. This will facilitate gaining an accurate understanding of the volume and frequency of illegal trade in CITES Appendix II listed taxa, drawing upon data that is verified and accurate. Despite limitations, the seizure data do highlight some common taxa and commodities identified in seizures and confiscations of Appendix II listed species.

The CITES Illegal Trade Database highlights that the most common cause of seizure is trade taking place without a CITES permit and this finding is supported by the personal experience of authorities in interviews. Prominent drivers appear to be a mis-match between the high transaction costs of obtaining a permit and the low risk of being caught and fined, and the challenges faced by traders when seeking user-friendly information on CITES permit requirements. These findings indicate that there is a need to make compliance with CITES regulations more straightforward in order to incentivise legal trade with the use of correct permits in CITES Appendix II listed species. This would reduce the burden on law enforcement officers, who could focus on CITES-listed commodities smuggled with criminal intent rather than those exported illegally due to a lack of trader awareness or motivation for use of permits.

Improve data availability by:

- Information sharing on seizures between Parties and agencies involved that can strengthen strategies for the reduction of illegal trade at the source.
- Consistent and continuous submission of annual illegal trade reports by Parties, ensuring more accurate information availability concerning seizures to inform more evidence-based and data-informed interventions.

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Annex A: Methodology and limitations of analyses

Chapter II: Overview of CITES trade

Methodology

This analysis is based on exporter-reported direct trade data in the CITES Trade Database for the most recent 10-year period (2011-2020) and includes trade on species listed in Appendices I, II, and III reported in CITES annual reports that were submitted by 16 February 2022[36]. The most recent year with near-complete data was 2020, as the deadline for annual report submissions is 31 October of the year following the year of trade (e.g. the deadline for annual reports for trade that occurred in 2021 is 31 October 2022). This analysis focused on direct trade only to avoid duplication when analysing volumes of trade, as indirect trade involves the re-export of trade that had previously been exported from a country of origin. Exporter-reported data are often more complete and thus used for this analysis, as some Parties do not report on imports of taxa listed in Appendix II. Trade reported as source 'I' (legal, permitted trade in items that have been previously been seized or confiscated) was excluded from this analysis to avoid duplication with the analyses presented in Chapter VI on *Linkages between illegal and legal trade*.

Where necessary, term codes and units of measure were standardised to facilitate analysis and to make trade data more comparable. This included conversion of redundant term codes to current CITES term codes, taxon-specific term conversions (e.g. shells to carapaces for Testudines spp.), and conversion of units of measure to standardised metric units (e.g. kilogram, cubic metres). Where timber densities were available, conversion factors were used to convert trade in timber species reported by weight (kg) to volume (m^3). Further details on term and unit standardisations can be found on the methods page of CITES Wildlife TradeView.

Several types of analyses were used to facilitate meaningful comparisons when examining CITES trade data. These included number of transactions (shipments), trade reported by number in terms equivalent to whole organisms[37] ('number of individuals'), trade reported by weight (kg), and trade reported by volume (m^3). Analysing the trade data in this way was necessary to avoid combining data across different terms and units of measure that are unlikely to be comparable; for example, one feather is not the same as one individual bird, or one live plant versus 1 kg of plants, so adding these together would be meaningless. Whenever multiple quantities of trade are presented in the results, it should be noted that these are additive rather than representing the same absolute quantities converted into different units.

To provide an overview of the patterns and trends in the reported sources of CITES trade, data from multiple source codes were grouped to represent wild-sourced versus artificially propagated/captive specimens. Specifically, the precautionary principle was applied for considerations of wild-sourced trade, which included source codes 'W' (wild), 'X' (introduction from the sea), 'R' (ranched), 'U' (unknown), or unreported source. Analysis of artificially propagated plants included source codes 'A' (artificially propagated plants) and 'D' (Appendix I artificially propagated plants for commercial purposes). Trade in captive-bred/born animals, referred to collectively in this report as 'captive-produced', included source codes 'C' (captive-bred), 'F' (captive-born), and 'D' (Appendix I captive-bred animals for commercial purposes). Further details on the definitions of CITES source codes can be found in the *Guidelines for the preparation and submission of CITES annual reports* (Notif. to the Parties 2021/044 Annex 1).

Considerations

The summary statistics provided in CITES trade analyses are dependent on the accuracy and timely submission of CITES annual reports. This is particularly the case for estimates of trade quantities for the recent triennium (2017-2019), for which any recent annual reports that have not yet been submitted may have a larger impact and result in underestimates of trade for the shorter time period. Analysis of regional patterns in trade may also be more susceptible to underestimates of the summary statistics due to missing data from any outstanding annual reports.

[36] The list of Party annual reports and submission dates can be found on the CITES website.
[37] Bodies, fingerlings, live, skeletons, skins, skulls, and trophies.

The trade levels presented in this analysis (and other analyses of CITES trade data) may be an overestimation of quantities depending on whether Parties have reported on permits issued or actual trade in their annual reports. The *Guidelines for the preparation and submission of CITES annual reports* (Notif. to the Parties 2021/044 Annex 1) recommends that, as far as possible, data provided in annual reports should record the actual trade that took place. This allows for more accurate analyses of the level of CITES trade, particularly when assessing the potential impacts of such trade on the survival of wild populations.

The collation, evaluation, and establishment of agreed species-specific conversion factors by CITES Parties would greatly benefit analyses of CITES trade data by enabling estimations of the numbers of individuals from trade reported by weight. While current analyses generally cannot compare trade across different terms and units of measure, incorporating the use of conversion factors would allow for more accurate estimation of the numbers of whole individuals in trade and consequently improve the assessment of the potential impacts of trade on wild populations. As an example, conversion factors derived through expert consultation and literature review were used in the FAO technical report CITES and the Sea[38] for a variety of marine taxa.

Chapter IV: Financial value of trade in CITES-listed species

Methodology

To estimate the financial value of global direct exports over the period 2016-2020 (Chapter IV), we use the methodology originally developed by UNEP-WCMC[39] for quantifying the value of EU imports and exports. The financial value of a given commodity was calculated by combining data on the median unit price with the corresponding volume of exported-reported direct exports. Trade for educational, law enforcement, scientific and reintroduction/introduction into the wild purposes (purpose codes 'E', 'L', 'S' and 'N') was excluded from the valuation, as it does not contribute to national economies in the same way as trade for commercial or similar purposes. Trade in scientific specimens (term 'SPE') with no purpose specified was also excluded, as this is usually indicative of trade for a scientific purpose. Confiscated or seized products (source 'I') were also omitted. The valuation analysis also excluded caviar extract, used in cosmetics. This commodity is imported in very small quantities, and it is unclear whether the declared prices in the dataset from the United States represent the actual price for the extract in its natural form or the luxury commodity containing the extract, both of which are traded. The sources of price data for plants and animals differ and are discussed separately in the chapter, as they are not directly comparable.

Animal price data

Financial values for animal products were obtained using species-specific values in United States dollars (USD) that are included in the United States annual report to CITES (as transmitted by the United States Fish and Wildlife Service). Annual reports from 2011 to 2018[40] were used to compile price data for the analysis, and prices were corrected for 2020 inflation[41]. The price data for animals are therefore based on the reported value at the point of export/import in the United States.

Plant price data

The United States annual reports do not report prices for most plant imports, so data for plants were collected from retail and wholesale websites from around the world. Google searches for the names of the main plant groups in trade (e.g. orchids, timber) plus the phrases 'for sale', and 'buy' were carried out to find plants and plant products for sale. In addition, eBay searches for the main plant groups and genera plus relevant terms were carried out. The process was repeated using a more targeted search for the names of some of the key genera, species and trade terms that lacked price data after the first, more general, search. All prices were recorded in EUR, converted to USD using exchange rates from the year the price data were collected. Prices in USD were then corrected for 2020 inflation, so that a consistent inflation adjustment was applied to both animal and plant prices[42]. Price data was primarily available for live ornamental plants, meaning value of plant and timber trade is likely to be under reported. Additional searches were carried out in 2018 for the prices of highly valued timber species in trade. The price data for plants are therefore based on the wholesale/retail value to the end consumer.

[38] Pavitt *et al.* 2021. *CITES and the sea: Trade in commercially exploited CITES-listed marine species*. FAO Fisheries and Aquaculture Technical Paper No. 666. Rome, FAO. https://doi.org/10.4060/cb2971en
[39] UNEP-WCMC. 2021. EU Wildlife Trade 2019: Analysis of the European Union and candidate countries' annual reports to CITES 2019.
[40] At the time of writing, the CITES annual reports for 2019 and 2020 had not yet been received from the United States.
[41] Value corrected for 2020 inflation (year of trade data). https://www.inflationtool.com/us-dollar
[42] Value corrected for 2020 inflation (year of trade data). https://www.inflationtool.com/us-dollar

Analysis

The two datasets (animals and plants) were used to calculate the median unit price for each combination of taxa/term/unit/source for animals and taxa/term/unit for plants (as the source could not be determined for the majority of plant retail products). For each exporting country reporting trade in a given taxa/term/unit/source combination, the total estimated value of exports was obtained by multiplying median unit price values by the reported trade volume. The estimated average annual value of exports for a given exporter was then calculated by dividing each total by the number of years during the study period in which exporting countries had submitted annual reports to CITES, thus ensuring the impact of years with missing trade data was taken into account. Global or regional annual average values for a given commodity were subsequently obtained by summing exporter-level averages.

Only median unit price values based on an underlying sample size of at least five prices were used in the final calculations. In cases where there was an insufficient sample size, a suitable proxy was used. For example, where the sample size at the species level was not large enough, a proxy at the next lowest taxonomic level for which there was a large enough sample size was used (up to order) (e.g. the median unit price for all live wild-sourced *Dendrobium* species was used as a proxy for live wild-sourced *Dendrobium officinale*). Medians calculated at the order and family level were only used as proxies in final calculations when they were based on price data from more than one taxon, and when the degree of variation in the underlying sample was relatively low (the ratio of the median absolute deviation to the median was less than one). In cases where no suitable proxy could be found, the data were excluded. For timber species, the terms sawn wood, logs, timber and timber pieces were all attributed the same price per unit. Value data from specimens, extracts, medicine, and derivatives were combined to calculate one median unit value across these commodities, as these terms are frequently reported interchangeably in annual reports. Throughout the analysis, the following sources were defined by grouping together multiple CITES source codes: wild ('W', 'U', 'X' and no source specified), captive-produced ('C', 'D' and 'F') and artificially propagated ('A' and 'D').

Limitations

The exclusion of some trade records will reduce the overall estimated value of trade, and this exclusion is likely to be biased towards taxa/term/unit/source combinations that are infrequently traded. In addition, the use of proxies at the family or order level may over- or underestimate the value of trade at the species level, depending on the representativeness of the taxa used to estimate the high-level proxies. Retail and wholesale prices for plants and import values for animals may also not be comparable, due to the different sources of these data. Overall figures should therefore be interpreted with caution.

Chapters III and V: Conservation and socio-economic impacts of trade in CITES-listed species

Methodology

Analysis of conservation and socio-economic impacts focussed on the most traded species – by number and by weight (in kg), based on data from the CITES Trade Database covering the period 2011-2020. This included species from "all sources" where levels of trade were 1,000,000/year or more when traded by number or 1,000,000 kg or more when traded by weight, and species coded as wild-sourced or ranched if they were above 500,000 when traded by number or 500,000 kg when traded by weight. In addition, we added the top 5 most traded mammals and top 5 most traded birds in order to maximise the diversity of species types included in the analysis.

This process generated a list of 181 species which were subsequently grouped where possible (eg we didn't search for information on every orchid species included in the list, simply for "orchids". Similarly with "snowdrops" "corals" "sturgeon" "cyclamen", "crocodiles", "lign aloe trees", "aloes", "pitcher plants" and "pythons"). This grouping process led to a list of 47 species and species groups for which we searched for information – summarised in Table A1.

Table A.1. *List of species/species groups included in the rapid evidence review*

Species Common Name	Scientific Name	IUCN Red List Status
Snowdrops	-	-
Cyclamens	-	-
Sturgeon	-	-
Orchids	-	-
Coral	-	-
Crocodiles	*Crocodylus* spp.	-
Pythons	*Python* spp.	-
Lign-aloes trees	*Aquilaria* spp.	-
Aloes	*Aloe* spp.	-
Pitcher plants	*Nepenthes* spp.	-
American alligator	*Alligator mississippiensis*	Least Concern
Spectacled caiman	*Caiman crocodilus fuscus*	Least Concern
Common water monitor	*Varanus salvator*	Least Concern
Tokay gecko	*Gekko gecko*	Least Concern
Red tegu	*Salvator rufescens*	Least Concern
Yellow-spotted river turtle	*Podocnemis unifilis*	Vulnerable
Hosfield's tortoise	*Testudo horsfieldii*	Vulnerable
False map turtle	*Graptemys pseudogeographica*	Least Concern
Javan spitting cobra	*Naja sputatrix*	Least Concern
Oriental ratsnake	*Ptyas mucosus*	Least Concern
Woolly fern	*Cibotium barometz*	-
Shortfin mako shark	*Isurus oxyrinchus*	Endangered
Silky shark	*Carcharhinus falciformis*	Vulnerable
Agarwood	*Aquilaria malaccensis*	Critically Endangered
Sandalwood	*Pterocarpus santalinus*	Endangered
Verawood	*Bulnesia sarmientoi*	-
African Blackwood	*Dalbergia melanoxylon*	Not Threatened
Sago palm	*Cycas revoluta*	Least Concern
Brown sea cucumber	*Isostichopus fuscus*	Endangered
Candelilla	*Euphorbia antisyphilitica*	-
Queen conch	*Strombus gigas*	-
African cherry	*Prunus africana*	Vulnerable
Spikenard	*Nardostachys grandiflora*	Critically Endangered
Green iguana	*Iguana iguana*	Least Concern
Venus flytrap	*Dionaea muscipula*	Vulnerable
Crown-of-thorns	*Euphorbia milii*	Least Concern
American ginseng	*Panax quinquefolius*	-
European eel	*Anguilla anguilla*	Critically Endangered
Cape fur seal	*Arctocephalus pusillus*	Least Concern
Bobcat	*Lynx rufus*	Least Concern
South American grey fox	*Lycalopex griseus*	Least Concern
Vicuña	*Vicugna vicugna*	Least Concern
Black bear	*Ursus americanus*	Least Concern
Muscovy duck	*Cairina moschata*	Least Concern
Indian peafowl	*Pavo cristatus*	Least Concern
Fischer's lovebird	*Agapornis fischeri*	Near Threatened
Monk parakeets	*Myiopsitta monachus*	Least Concern

We searched for documented evidence on the impacts of trade in these species through two key mechanisms – a key-word based search of academic literature listed in the Web of Science database, and a targeted search for grey literature from the websites of key international wildlife trade and conservation organisations. We focussed on literature published since 2010 in order to keep the scope manageable.

We sorted the results in Web of Science by "relevance" – a function which screens out studies unlikely to be relevant based on the type of journal they are published in. We then selected the top 100 hits, when organised by relevance.

We screened these 100 studies against the following inclusion criteria:

- Study must describe *legal*, international (cross-border) trade in species listed on CITES Appendix I or II
- Study may come from any country
- Study may cover any product in trade (live animals, skins etc)

And then filtered them based on the following screening criteria (applied in order):

Screening Criteria	Y/N
1. Does the document focus on LEGAL trade?	If no discard
2. Does the document focus on trade in one of more CITES-listed species?	If no discard
3. Does the document cover one or more of the short-listed "most traded" wild sourced species/taxa?	If no make a note and keep to one side
4. Was the document published between 2011 and 2021?	If no make a note and keep to one side
5. Does the document report, positively or negatively, on one or more conservation impact AND/OR one or more socio-economic impact?	If no discard

Conservation impacts searched for included:

1. Positive or negative impacts on target (traded) species/taxa
2. Positive or negative impacts on non-target species/taxa as a result of the trade in the target species/taxa
3. Positive or negative impact impacts on the target species' habitat

Socio-economic impacts searched for included:

1. Income generated (at any level – harvesters, traders, enterprises, government)
2. GDP/export earnings contributions
3. Jobs created (formal, informal, local, non-local)
4. Market integration for small enterprises
5. Contribution to food and/or nutrition security
6. Contribution to health – maternal, child, disease risk reduction
7. Contribution to education or skills development
8. Contribution to gender equality
9. Effects on land/resource rights
10. Effects on local empowerment/decision-making/authority
11. Effects on culture
12. Effects on social cohesion/conflict
13. Effects on human wildlife conflict
14. Effects on climate resilience

For the grey literature search we conducted a targeted search of the following websites – again looking for information meeting our inclusion and exclusion criteria:

- CITES
- CMS
- CBD
- IUCN
- TRAFFIC
- UNCTAD BioTrade Initiative
- International Trade Centre
- International Conservation Organisations
    - WWF
    - WCS
    - FFI
    - CI
    - TNC

We recorded all the relevant studies from the two search processes (n=80) in an excel spreadsheet and extracted data on each to document the type and nature of the impacts described. We then categorised the documented impacts (see Chapter details for the categories that emerged) and summarised the information linked to each described impact.

Limitations

Our literature search was constrained by the available time and resources. Our initial search strings generated thousands of "hits" which, in an ideal evidence review, would all be screened for relevance at title, abstract and full text stages. Sorting by relevance and selecting only the top 100 relevant titles was the best approach in the time available but we are aware that there is doubtless much more documented evidence available that we did not collect. A full systematic evidence review would require at least 12 months research time and this may be something that could be considered in future editions of the World Wildlife Trade Report. At the same time, it is clear that the impacts of wildlife trade are not monitored and recorded systematically on a species by species, country by country basis. Even with a full systematic review it would thus be possible to produce a definitive assessment of the impacts of the trade. Our analysis is thus able to reveal broad trends and provide key insights and examples only.

Chapter VI: Linkages between illegal and legal trade

Methodology

CITES Illegal Trade Reports

Data were supplied from UNODC in the form of aggregated data with the number of commodity records for each taxonomic group, year, reported cause of seizure and region broken down by CITES Appendix. UNODC categories for taxonomic category were converted into birds, reptiles, mammals, fish, invertebrates, amphibians, corals and plants to match categories used in other analyses in the chapter. Analyses were restricted to data on taxa confirmed as Appendix II only. The data provided included information for 2010-2021, and it was not possible to disaggregate these data to include only 2016-2021 in the analyses. Therefore, 252 records available for 2010-2015 are included in the analyses.

Wildlife Trade Information System

Data were downloaded for the period 2011-2020 and checked to remove duplicate records. All records were updated with current CITES Appendix listings of taxa based on the Checklist of CITES Species (checklist.cites.org). Approximately half of the records were recorded in WiTIS at species or subspecies level, with others at higher taxonomic classifications. For taxa listed at higher taxonomic levels with only some species within the genus, family or order listed by CITES, we assigned an 'unknown' category. Some taxa were assigned multiple Appendices, either because the species is split-listed, or because multiple Appendices are relevant to species within the genus, order or family. Taxa that were not listed in CITES Appendices were removed from the analysis.

Commodity types listed in WiTIS were assigned to categories of 'whole organism equivalents' or 'parts and derivatives'[43]. Where units of volume were available for seizure records, counts were preferred for whole organisms and a combination of weight and count for parts and derivatives; for example, count was preferred for gall bladders and weight for powder. All units recorded were converted to standardised units. A total of 518 out of 6,051 Appendix II listed items recorded in seizures did not have volumes for count or weight, with a further 290 only having accumulated counts or weights for all items in that seizure; these records were not included in further analyses of trade according to volume for Appendix II taxa. To identify taxa traded in the greatest volumes, total counts and weights were compared for all taxa in a region and weights were converted to whole organism equivalents where possible. The lowest consistently available taxonomic level was at the genus and was used in analyses of Appendix II listed taxa.

The ability and willingness of a country to target illegal wildlife trade may vary over time due to a variety of factors. There are additional biases in the data caused by the way the information is collected. Although TRAFFIC endeavours to only use reports it considers to be reliable, seizure data is collected from media interest in reports which may be skewed, as media reporting of seizures may vary by country, by species and over time. In addition, TRAFFIC focuses its collection efforts on specific geographical regions and target species, and its capacity to collect data and monitor information across different languages has changed over time. Reported seizures are therefore an imperfect proxy for the volume of illegal wildlife trade within a region, though they do give useful insights into what is being seized.

[43] 'Whole organism equivalents' include CITES term codes bodies, fingerlings, live, skeletons, skins, skulls, and trophies. 'Parts and derivatives' include all other term codes.

Around a third (31%) of all seizure records were classified as 'international', meaning that the commodity crossed at least one national border. The remaining were classified as 'unverified; these seizures involve commodities seized domestically, however, many of these cases may involve seizures at ports or airports, with the intent to cross national borders. It was determined to still be relevant to consider these data to contribute to an understanding of which Appendix II listed taxa are seized regardless of movement across borders, so all 'unverified' seizures feature in the analysis.

CITES trade data

This analysis is based on importer-reported direct trade data in the CITES Trade Database for the most recent 10-year period (2011-2020) and includes trade on species listed in Appendices I, II, and III reported in CITES annual reports that were available in the CITES Trade Database by 8th April 2022. The most recent year with near-complete data was 2020, as the deadline for annual report submissions is 31 October of the year following the year of trade (e.g. the deadline for annual reports for trade that occurred in 2021 is 31 October 2022). This analysis focused on direct trade only to avoid duplication when analysing volumes of trade, as indirect trade involves the re-export of trade that had previously been exported from a country of origin. Importer-reported data was used as some Parties use source code 'I' (previously seized and/or confiscated) to report seizures at import and therefore may not have an associated export-permit.

While discrepancies between importer and exporter reported trade data are to be expected with trade data (CITES Secretariat and UNEP-WCMC, 2022), large discrepancies between importer and exporter reported trade in source 'I' exist in the CITES Trade Database. This is possibly due to different applications of the source code between Parties. There are a larger number of direct imports both by volume (m^3), weight, and the number of items traded, to the extent they are approximately eight times greater in magnitude than exporter reported volumes. Due to these differences, a precautionary approach was taken, and trade data reported by importers is used in this section of the report.

Units were standardised to kilograms, meters, and cubic meters where possible. Trade terms were categorised as 'parts and derivatives' or 'whole organism equivalents'[44] to facilitate data analysis. 'Parts and derivatives' include all other term codes. Taxa were categorised into birds, reptiles, mammals, fish, invertebrates, amphibians, corals and plants.

Several types of analyses were used to facilitate meaningful comparisons when examining CITES trade data. These included trade reported by number in terms equivalent to whole organisms[44] ('number of individuals'), trade reported by weight (kg), and trade reported by volume (m^3). Analysing the trade data in this way was necessary to avoid combining data across different terms and units of measure that are unlikely to be comparable; for example, one feather is not the same as one individual bird, or one live plant versus 1 kg of plants, so adding these together would be meaningless.

Interviews with CITES enforcement agencies

A total of 73 authorities (including CITES Management Authorities and Scientific Authorities, customs agencies, and enforcement agencies) from 40 countries encompassing all CITES regions were contacted. Of these, 21 provided either written or verbal responses, 16 declined to be interviewed, and approximately half did not respond. Most respondents were from countries within Europe (53% of all respondents) and Central and South America and the Caribbean (29% of all respondents) with two from North America and one each from Africa and Asia (Figure A.1). Most interviews (47%) were with staff from CITES Management and Law Enforcement Authorities, with around 25% from law enforcement agencies, 14% from customs organisations and the remaining from NGOs.

We asked respondents a series of questions to elicit a further understanding of the most seized Appendix II listed species, the causes of these seizures, drivers, and recommendations for methods to reduce illegal trade in these species with the potential to be legally traded.

1. According to you, which CITES Appendix II listed species and are most seized in your country?
2. According to you, what are the main reasons that Appendix II listed species – that have the potential to be legally traded – are being traded illegally and/or are being seized?
3. What is being done to reduce seizures in Appendix II listed species?
4. What could be done in the future to reduce seizures in Appendix II listed species?

Respondents' privacy is highly valued and therefore a list of Parties or individuals that divulged information will not be made available.

[44] Bodies, fingerlings, live, skeletons, skins, skulls, and trophies.

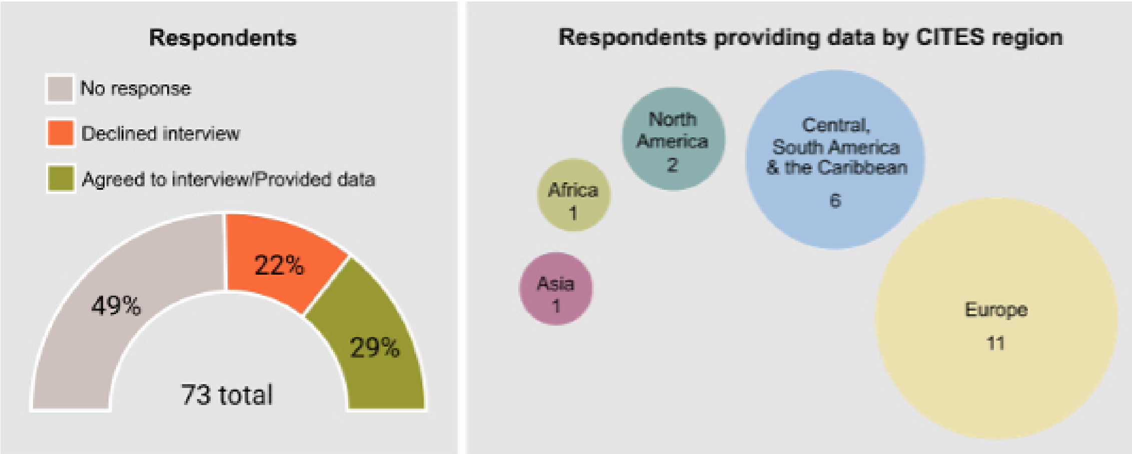

Figure A.1. *Interview respondent information and CITES region of the respondents providing information.*

Aloe hybrid

Annex B: Glossary of terms

Artificially propagated: Plants that are artificially propagated in accordance with Resolution Conf. 11.11 (Rev. CoP18), as well as parts and derivatives thereof, exported under the provisions of Article VII, paragraph 5 (specimens of species included in Appendix I that have been propagated artificially for non-commercial purposes and specimens of species included in Appendices II and III) (CITES source code 'A').

BioTrade Initiative: The BioTrade is a programme of the UN Conference on Trade and Development (UNCTAD) that supports developing countries to develop sustainable biodiversity-based products for export.

Captive-bred/captive-born: Animals bred in captivity in accordance with Resolution Conf. 10.16 (Rev.), as well as parts and derivatives thereof, exported under the provisions of Article VII, paragraph 5 (CITES source code 'C'). Those specimens which are born in captivity (F1 or subsequent generations) that do not fulfil the definition of 'bred in captivity' in Resolution Conf. 10.16 (Rev.), as well as parts and derivatives thereof, are considered ´captive-born´ (source code 'F').

Captive-produced: For the purposes of trade data analysis, trade in animals reported with CITES source codes 'C' and 'F' were referred to collectively as 'captive-produced'.

Commodity: Products and specimens reported in trade.

Comtrade database: United Nations Commodity Trade Statistics (UN Comtrade) Database, which provides data regarding international trade in a wide range of commodities.

Confiscation: When an investigation confirms a seized commodity has been illegally traded and the commodity is no longer the property of the alleged owner.

Previously seized or confiscated: Confiscated or seized specimens that are subsequently legally traded (CITES source code 'I').

Ranched: Specimens of animals reared in a controlled environment, taken as eggs or juveniles from the wild, where they would otherwise have had a very low probability of surviving to adulthood (CITES source code ´R´).

Seizure: The taking by law enforcement officers of potential evidence (e.g., commodities) in a case of suspected illegal trade. In WiTIS, a seizure may encompass one or more commodity records.

Wild-sourced: Specimens taken from the wild (CITES source code ´W´).

Annex C: Photo credits

Cover

Clockwise from top left: La vicugna, Sillustani, Peru by Sylvain Bourdos / Flickr Creative Commons Attribution-NonCommercial-ShareAlike 2.0 Generic cropped from original; *Dendrobium* orchid by chollacholla / Adobe Stock; Scleractinia spp. (stony corals) by damedias / Adobe Stock; Hunter and trader haggling over reticulated python skin in Indonesia by Patrick Aust.

Foreword

All photos credited to Grégoire Dubois with the exception of those on the bottom row, from left to right: *Galanthus* spp. (Zoe Stewart © RBG Kew 2020); *Rhynchostylis gigantea*, *Allobates* spp., and *Strombus gigas* (Shutterstock).

Executive Summary

Page v: *Cyclamen coum* by Marc / Adobe Stock.

Page vii: *Varanus salvator* by Nick Hobgood / Adobe Stock.

Introduction

Page viii: Aerial view of river in rainforest by gustavofrazao / Adobe Stock.

Page 1: *Python reticulatus* by Mark Kostich / Adobe Stock.

Chapter I: CITES at a glance

Page 2: *Poicephalus senegalus* by Vera NewSib / Adobe Stock.

Chapter II: Overview of CITES trade

Page 6: *Phalaenopsis* spp. by Nattha99 / Adobe Stock; *Galanthus* spp. by HildaWeges / Adobe Stock; Orchidaceae spp. by pixs:sell / Adobe Stock, *Gonopterodendron sarmientoi* [*Bulnesia sarmientoi*] by Pablo Preliasco / iNaturalist Creative Commons Attribution-NonCommercial 4.0 International; *Quercus mongolica* by irinabal18 / Adobe Stock; *Pterocarpus erinaceus* (ou Palissandre du Sénégal) au Bénin, dans l'Atakora, aux environs des chutes de Kota by Ji-Elle / Wikimedia Commons Creative Commons Attribution-Share Alike 4.0 International; *Fraxinus mandshurica* in Changgyeonggung, Korea by Dalgial / Wikimedia Commons Creative Commons Attribution-Share Alike 3.0 Unported; Fabaceae (pea, or legume family) > *Dalbergia latifolia* by Nukkam / Wikimedia Commons Creative Commons Attribution-ShareAlike 2.0 Generic; *Acropora* spp. by mauriziobiso / Adobe Stock; *Caiman crocodilus fuscus* by Chrispo / Adobe Stock; *Acropora digitifera* by Christian / Adobe Stock; *Strombus gigas* by GARSPHOTO / Adobe Stock.

Page 7: *Isurus oxyrinchus* by wildestanimal / Adobe Stock.

Page 10: *Swietenia macrophylla* by Cerlin Ng; *Alligator mississippiensis* by hakoar; Scleractinia spp. by damedias; *Podocnemis unifilis* by Rostislav. All photos from Adobe stock except for *Swietenia macrophylla* (Flickr Creative Commons Attribution-NonCommercial-ShareAlike 2.0 Generic).

Page 12: *Mammillaria geminispina* by kedsirin; *Panax quinquefolius* by Michael; *Cycas revoluta* by PIXATERRA; *Gonopterodendron sarmientoi* [*Bulnesia sarmientoi*] by Pablo Preliasco; *Acipenser baerii* by Vladimir Wrangel; *Crocodylus niloticus* by Christian; leaves [*Prunus africana*] by Scamperdale; *Phalaenopsis* spp. by Nattha99; *Acropora digitifera* by Christian; *Pocillopora damicornis* by Christian; *Dendrobium* hybrid by ajisai13; *Galanthus woronowii* by koromelena. All photos from Adobe Stock except for those by Pablo Preliasco and Scamperdale (iNaturalist Creative Commons Attribution-NonCommercial 4.0 International and Flickr Creative Commons Attribution-NonCommercial 2.0 Generic, respectively).

Page 14: *Pterocarpus erinaceus* (ou Palissandre du Sénégal) au Bénin, dans l'Atakora, aux environs des chutes de Kota by Ji-Elle / Wikimedia Commons Creative Commons Attribution-Share Alike 4.0 International; *Galanthus woronowii* by koromelena / Adobe Stock; *Strombus gigas* by GARSPHOTO / Adobe Stock.

Page 15: *Gekko gecko* by Cathy Keifer / Adobe Stock.

Chapter III: Conservation impacts of trade in CITES-listed species

Page 16: *Crocodylus niloticus* ranch in Zimbabwe by Patrick Aust.

Page 18: *Iguana iguana* by Lestari / Adobe Stock.

Page 20: *Nardostachys jatamansi* by ANSAB.

Page 22: Yellow-spotted river turtles (*Podocnemis unifilis*), Cristalino River, Southern Amazon, Brazil by Charles J. Sharp. Wikimedia Commons Creative Commons Attribution-Share Alike 4.0 International.

Page 23: Group of vicuña in Arequipa Region, Peru by Marshall Henrie. Wikimedia Commons Creative Commons Attribution-Share Alike 4.0 International.

Page 25: Nile crocodile head by Leigh Bedford. Wikimedia Commons Creative Commons Attribution 2.0 Generic.

Page 27: *Oncidium sphacelatum* by Yuttana Joe / Adobe Stock.

Page 28: Monk Parakeets or Quaker Parrots (*Myiopsitta monachus*) in Malaga, Spain by Daniel Capilla. Creative Commons Attribution-Share Alike 3.0 Unported.

Chapter IV: Financial value of trade in CITES-listed species

Page 32: *Macaca fascicularis* by Azmil / Adobe Stock.

Page 36: *Acipenser baerii* by Vladimir Wrangel / Adobe Stock.

Page 39: *Acipenser baerii* by Vladimir Wrangel; *Crocodylus niloticus* by Christian; *Crocodylus porosus* by AGAMI; *Euphorbia antisyphilitica* by brent coulter; *Dalbergia latifolia* by Mang Kelin; *Phalaenopsis* spp. by Nattha99; *Podocnemis unifilis* by Rostislav; *Pterocarpus erinaceus* (ou Palissandre du Sénégal) au Bénin, dans l'Atakora, aux environs des chutes de Kota by Ji-Elle / Wikimedia Commons Creative Commons Attribution-Share Alike 4.0 International. All other photos from Adobe Stock.

Chapter V: Socio-economic impacts of trade in CITES-listed species

Page 40: *Strombus gigas* fishing in St. Lucia by Alexander Girvan.

Page 46: *Lama guanicoe* being shorn and fibre collected by Federico Biesing.

Chapter VI: Linkages between illegal and legal trade

Page 54: *Hippocampus* spp. by Markus Bürgener / TRAFFIC.

Page 55: *Hippopotamus amphibius* by gudkovandrey / Adobe Stock.

Page 59: *Aloe ferox* / TRAFFIC.

Page 61: *Pterocarpus santalinus* by F. Noor / TRAFFIC.

Page 64: *Myiopsitta monachus* by Wirestock / Adobe Stock and *Anguilla anguilla* / TRAFFIC.

Annexes

Page 66: *Fungia* spp. by alonanola / Adobe Stock

Page 74: *Aloe* hybrid by Farknot Architect / Adobe Stock

Annex D: Suggested actions to reduce Appendix II seizures identified by interviewees

Awareness raising and education

Several interviewees mentioned a need for **campaigns** to raise awareness amongst the general public, with some stating that the majority of public consumers of wildlife products would follow the rules if they knew how. Some mentioned a lack of funding dedicated towards educational campaigns to raise awareness of CITES requirements in their country, with another stating that improved education would prevent seizures due to inadvertent administrative violations. One interviewee mentioned a need to **raise awareness of the consequences** of illegal trade in CITES listed species to deter consumers. A couple of interviewees in Europe mentioned a need for **education around CITES requirements** for plant species, with policy efforts often going towards megafauna and CITES Appendix I listed species, despite these being less commonly traded.

Making information as easily accessible as possible and using a variety of channels, inclusive of social media platforms, to advertise CITES requirements, was mentioned by several interviewees. One mentioned an article that raised awareness of the need for CITES permits for trading of instruments containing *Dalbergia* wood in a music magazine had a noticeably positive impact on increased permit use. Other interviewees mentioned a need for **banners in airports**, with one mentioning previous use of a large poster at an airport in a wildlife source country to provide visual clarification on the legality of exporting wildlife sourced from that country as an example of best practice in informing the public. One interviewee in Europe mentioned that an outreach campaign to educate traders on post-Brexit requirements for CITES permits, alongside an exemption period in which traders could request retrospective permits was successful. Some interviewees mentioned the need for **pop-ups on e-commerce platforms** and improved guidelines for consumers, to flag when something may be illegal to trade without CITES permits and to make it clear whose responsibility it is to apply for these and how to do so.

In addition to consumer education, some interviewees mentioned a need for **education within key industries**. One interviewee pointed out there were opportunities such as fashion weeks to have a stand with representatives from law enforcement organisations to educate brands on CITES permit requirements. Engagement with beauty industries was also recommended, with the use of **workshops** to educate stakeholders. One interviewee mentioned a newsletter used to be sent out to relevant industry partners by a governmental organisation but had since ceased; this interviewee stated that **an email newsletter** to disseminate essential CITES permit requirements and any changes to regulations would be a cost-effective and efficient mechanism to ensure consistent communication between management authorities and wholesale traders, particularly in industries with high staff turnover.

Awareness-raising and education actions

- Awareness-raising campaigns on CITES permit requirements for consumers and exporters employing Social and Behaviour Change principles
- Engagement among social media platforms and their users to make information on CITES legislation easily accessible and discourage the illegal sale of flora and fauna through their platforms
- A consistent approach towards the sale of Appendix II species online through the registration of more e-commerce platforms with the Coalition to End Wildlife Trafficking Online
- An explicit array of information on national legislation related to CITES-listed species that is easily retrievable to all relevant stakeholders

Improved enforcement of CITES regulations

Several interviewees pointed out that often enforcement efforts are not focused on CITES Appendix II listed species. This can prevent traders from feeling there is a need to trade with CITES permits, as they may consistently export CITES Appendix II listed species without being caught or fined, or perhaps being fined only small amounts when caught, not deterring them from doing it again. One interviewee pointed out that when targeting packages, customs had to prioritise drugs and ammunitions over wildlife. One stated **that targeted and regular controls** and an **increase in successful prosecutions** were needed to discourage illegal activity. Some interviewees mentioned a need for amendments to existing legislation to include **stronger penalties** to deter traders from exporting Appendix II listed species without relevant CITES permits.

One interviewee mentioned the SWiPE (Successful Wildlife Crime Prosecution in Europe) project, led by WWF with partners including TRAFFIC, which was stated to have been successful in raising awareness of wildlife crimes amongst enforcement authorities and the judiciary. Another pointed out a need for **identification materials for enforcement officers** to identify CITES Appendix II listed species, with a lack of expertise within border force agencies due to low levels of staff retention. There was said to be a need for better origin traceability measures to increase the rate of successful seizures in Appendix II listed species, such as use of DNA testing.

Capacity building and enforcement actions

- Regular training programmes for customs agencies that incorporate:
  - Verifying the legality of exports
  - Identifying Appendix II taxa
  - Updates regarding CITES regulations
- Strong communication between national agencies and customs organisations that better utilise the expertise of those on the front line

Stakeholder collaboration

Several interviewees mentioned a need to **improve collaborations between all relevant stakeholders** to ensure enforcement efforts were driven by evidence and that the experiences of law enforcement officers were fed back to CITES Management Authorities. Several mentioned that they had no knowledge of seizures in their own country's exports, which would prevent their governmental departments and law enforcement agencies from encouraging preventative actions. One interviewee mentioned that there needs to be a **shift towards seeing border agencies as wanting to help** facilitate legal trade, rather than increased volumes of items being unnecessarily seized. Another pointed out the need to **ensure Indigenous peoples and local communities had direct participation** in decision-making processes with other stakeholders. Several interviewees mentioned a need for **improved collaborations between CITES management authorities from different Parties** to share knowledge and best practices and focus enforcement efforts. One mentioned a successful collaboration between a country in Europe and Africa to share processes for awarding CITES permits and conducting Non-Detriment Findings. Another interviewee mentioned tools and research developed on a regional level, led by the EU, had been adapted to each country's specific situation and translated into national laws, with success in reducing illegal wildlife trade. Existing collaborations, such as the Coalition to End Wildlife Trafficking Online, were highlighted as useful mechanisms to encourage globally consistent best practices across industries such as e-commerce.

Collaboration

A strong collaboration and engagement between CITES authorities and:

- law enforcement and customs agencies; for example, through information sourced from customs seizures records that can inform awareness campaigns (e.g., at airports)
- key industries including fashion and traditional medicine, to inform prominent exporters on CITES permit requirements
- e-commerce platforms, to make CITES permit requirements clearer to consumers and exporters