THE TRADE IN WILDLIFE

A FRAMEWORK TO IMPROVE BIODIVERSITY AND LIVELIHOOD OUTCOMES

International Trade Centre

IUCN

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Abstract for trade information services

ID=43146 2015 SITC-941 CON

International Trade Centre (ITC)
The Trade in Wildlife: A Framework to Improve Biodiversity and Livelihood Outcomes
Geneva: ITC, 2015. xii, 29 pages (Technical paper)
Doc. No.: SC-15-311.E

This paper provides an analytical framework for assessing the impact of international trade in wildlife and wildlife products on conservation and local livelihoods. It also explores the role of factors related to particular species and their habitat, governance settings, the supply-chain structure, and the nature of the end market. The framework is relevant for importers and exporters, regulators, policymakers, non-governmental organizations, community representatives and researchers seeking to improve the sustainability of international wildlife supply chains.

Descriptors: **Endangered Species, Biodiversity, Sustainable Development, Economic Development.**

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English, French, Spanish (separate editions)

The International Trade Centre (ITC) is the joint agency of the World Trade Organization and the United Nations.

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Suggested citation: Cooney, R., Kasterine, A., MacMillan, D., Milledge, S., Nossal, K., Roe, D. and S.,'t Sas-Rolfes, M. (2015). The trade in wildlife: a framework to improve biodiversity and livelihood outcomes, International Trade Centre, Geneva, Switzerland.

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Contents

Contents iii
Acknowledgements v
Foreword from A. González, ITC vi
Foreword from I. Andersen, IUCN vii
Abbreviations viii
Executive summary ix

Chapter 1 Impact of wildlife trade 1

Chapter 2 International wildlife trade, conservation and livelihoods 2

1. Background and key concepts 2
2. Conservation impacts of wildlife trade 3
   - 2.1. Negative impacts 3
   - 2.2. Positive impacts 3
3. Local livelihood impacts of trade 4
   - 3.1. Positive impacts 4
   - 3.2. Negative impacts 5

Chapter 3 Analytical framework 6

1. Species factors 7
   - 1.1. Resilience to harvest 8
   - 1.2. Accessibility 9
2. Goverance factors 11
   - 2.1. Property rights 11
     - 2.1.1. Strengthening private/communal property rights 12
   - 2.2. Policy settings 13
   - 2.3. Broader governance context 15
3. Supply-chain factors 15
   - 3.1. Cost and scale of production 16
   - 3.2. Stockpiling 16
   - 3.3. Participation of poor communities in supply chains 16
   - 3.4. Concentration of market power 17
4. End-market factors 18
   - 4.1. Market size 18
   - 4.2. Demand elasticity 19
   - 4.3. Consumer preferences 19

4.3.1. Natural vs synthetic 19
4.3.2. Wild sourced vs intensively managed 20
4.3.3. Abundant vs rare/regulated 20
4.3.4. Legal vs illegal products 20
4.3.5. Shifting consumer preferences 21

Chapter 4 Challenges ahead 22

References 23

Tables, Figures and Boxes

Table 1. Examples of the scale of trade in different wildlife products 2
Table 2. Ecological characteristics of wildlife affecting resilience to harvest 9
Table 3. Property-rights regimes and their implications for sustainable harvest 12

Figure 1. Interactions between conservation and livelihood outcomes 6

Box 1. Key points 7
Box 2. Factors affecting resilience to harvest 8
Box 3. Moving from wild to intensive management systems 10
Box 4. Key points 11
Box 5. Legal framework for international wildlife trade 14
Box 6. Key points 16
Box 7. Key points 18

Acknowledgements

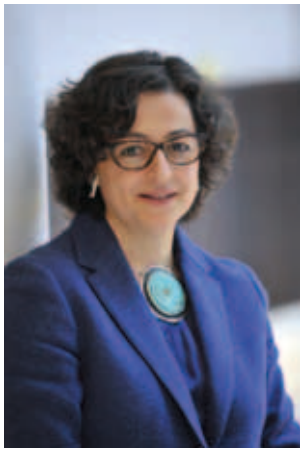
The paper was co-authored by Rosie Cooney, Alexander Kasterine, Douglas MacMillan, Simon Milledge, Katarina Nossal, Dilys Roe and Michael ’t Sas-Rolfes.

Feedback and editorial comments were kindly received from Anders Aeroe, Brian Belcher, Duan Biggs, Martina Bozzola, Dan Challender, Sarah Doornbos, Sarah Ferguson, Gabriela Lichtenstein, Dan Natusch, Kate Schreckenburg, Rob Skidmore, Grazia Piras and Jon Paul Rodriguez and Ann-Kathrin Zotz. We also thank Serge Adeagbo (ITC) and Franco Iacovino (ITC) for providing graphic and printing support and Natalie Domeisen, Jennifer Freedman, Hyesu Cho and Maximillian Thompson (all ITC) for editorial and production support. Katarina Nossal (ITC) managed the research project and edited the paper. The research was directed by Alexander Kasterine, Head, Trade and Environment Programme at ITC.

This publication represents the collective effort of many members of the IUCN Sustainable Use and Livelihood Specialist Group (SULi) of the Species Survival Commission (SSC) pertaining to the Commission on Environmental, Economic and Social Policy (CEESP) and the International Trade Centre (ITC). However, the views expressed in this publication do not necessarily reflect those of IUCN, SULi, ITC or other organizations affiliated to the authors.

The financial contributions of Denmark, Germany and Norway are gratefully acknowledged.

Foreword



The world's biological resources are under threat from climate change, urbanization, invasive species and the increasing demand from mankind for food and fibre.

Biodiversity provides vital goods and services for mankind and, in particular, for rural communities that depend on natural resources for shelter, food and cash income. The Economics of Ecosystems and Biodiversity (TEEB) report describes nature as the 'GDP of the poor' given the strong contribution of forests and other ecosystems to the livelihoods of poor rural households.

In response to rising consumer incomes and a growing population, the demand for natural resources is steadily increasing. Hence, concerns are arising that many aspects of this trade are not sustainable. There is a need for policymakers, project designers, communities and the private sector to understand how trade has an impact on the world's wildlife and how these impacts can be mitigated.

This study provides a framework to enhance the understanding of the factors determining sustainable use of natural resources. It outlines the role of policies, property rights, supply-chain governance and consumers in fostering a more sustainable use of the world's biodiversity and greater income streams to the communities involved in its management.

ITC carried out this analysis as part of its commitment to mainstream sustainability into Aid for Trade programming. Notably, ITC designs Aid for Trade projects that enable poor communities to derive income from the sustainable management of their biodiversity resources. In Zambia, for example, ITC has supported women's collector associations to strengthen the sustainability of the collection of devil's claw. In Madagascar, ITC supports women's associations of raffia producers to improve climate-adaptation measures, product quality and business capacity. Furthermore, ITC is working with the International Union for Conservation of Nature (IUCN) and the private sector to strengthen sustainable sourcing of python and crocodile skins for the luxury fashion industry.

In closing, I gratefully acknowledge the fruitful collaboration with the IUCN's Sustainable Use and Livelihoods Specialist Group (SULi). We look forward to continuing the partnership that combines ITC's knowledge of markets with IUCN's scientific and conservation expertise.

Arancha González
Executive Director, ITC

Foreword

Sustainable, legal and equitable wildlife trade can be a powerful nature-based solution for meeting the twin challenges of enhancing rural livelihoods and conserving biological diversity. 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. It can support the survival of traditional knowledge and culture, return equitable benefits from nature conservation to local communities, and help finance basic needs, such as healthcare and education. For communities empowered by effective and equitable governance systems, the benefits derived from trading wildlife products can catalyse community investments in nature conservation, law enforcement and stewardship of wildlife. Wildlife trade can enhance the way societies and communities value nature, tipping the balance in favour of protecting it and against converting it for 'economically productive' uses.

On the other hand, trading wild species and their products internationally can pose serious threats. The ever-escalating prices of wildlife products in international markets can drive a vicious vortex of illicit harvesting and trafficking, species decline, and the impoverishment both of ecosystems and of local livelihoods. Poor governance and weak stewardship rights of indigenous peoples and communities can undermine local support for conservation and render ineffective attempts to counter increasingly organized and well-armed poaching. Efforts to tighten enforcement can, in turn, drive prices up and heighten demand. Currently, elephants, rhinos, tigers, pangolins, several valuable timber species and a host of lower-profile species of plants and animals face serious threats due to uncontrolled trafficking.

Given this complex backdrop, the global community must seek solutions that protect and conserve nature while respecting human needs. We must understand where and how to support legal and sustainable wildlife trade, and where trade should be simply closed down. This report, 'The Trade in Wildlife: A Framework to Improve Biodiversity and Livelihood Outcomes' seeks to help address this challenge. The report is the result of a partnership between the International Trade Centre and IUCN's Sustainable Use and Livelihoods Specialist Group (SULi) – a joint initiative of IUCN's Commission on Environmental, Economic and Social Policy (CEESP) and Species Survival Commission (SSC). It provides a structure that will help us understand the opportunites and threats posed by specific wildlife trade value chains, which vary enormously in their potential to make positive contributions to conservation and local livelihoods.

This framework draws attention to ecological, economic and social factors within an integrated methodological approach to wildlife trade. Wildlife trade interventions cannot be based on conservation biology, on the analysis of markets, or on meeting human needs alone. As for so many of today's global problems of sustainability, it is necessary to draw together diverse sources of expertise both to understand the problem and to craft solutions. This understanding shapes all of IUCN's work.

I am pleased to introduce this framework and to recommend it to all those seeking to understand the impacts of wildlife trade on conservation and local livelihoods locally and globally – from researchers to government decision-makers, and from community organizations to multilateral conventions. I hope it will become a useful and inspiring tool that will help achieve IUCN's vision of 'a just world that values and conserves nature'.

Inger Andersen
Director General, IUCN

Abbreviations

Unless otherwise specified, all references to dollars ($) are to United States dollars, and all references to tons are to metric tons.

The following abbreviations are used:

CAMPFIRE	Community Areas Management Programme for Indigenous Resources
CBD	Convention on Biological Diversity
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
EU	European Union
ITC	International Trade Centre
IUCN	International Union for Conservation of Nature
NGO	Non-governmental organization
NTFP	Non-timber forest products
RONAP	Organisation of Organic Brazil Nut Gatherers of Peru
SANParks	South Africa National Parks
TRAFFIC	Trade Records Analysis of Flora and Fauna in Commerce
UNCTAD	United Nations Conference on Trade and Development
UNEP	United Nations Environment Programme
USA	United States of America
WTO	World Trade Organization

Executive summary

Biodiversity conservation risks

The international trade in wildlife has complex interactions with people and the environment which are often poorly understood. Plant, animal and fungi resources support millions of people in both developing and developed countries. In particular, the harvest and trade of wildlife products is a major component of the livelihood strategies for many poor communities in rural and remote areas. However, many wildlife species are vulnerable to harvest and trade, which means trade can pose a significant risk to biodiversity conservation.

Global concern about biodiversity loss and widespread illegal trade in several threatened species has raised the potential for further restrictions on international wildlife trade. However, a range of policy options could support a move towards legal and sustainable trade that supports both conservation and livelihoods. For most species, there is a need to increase understanding of the risks and opportunities presented by trade in order to improve the management of its impacts on conservation and livelihoods. This report provides a framework to strengthen the understanding and assessment of the impact of trade in wildlife products on conservation and local livelihoods. It explores the role of interrelated factors related to particular species and their habitat, governance settings, the supply-chain structure and the nature of the end market. Combined, these factors strongly influence the incentives for conservation and the livelihood outcomes of trade.

Trade, conservation and livelihoods

International commercial trade in wildlife and its parts and derivatives is estimated to be expanding, in both volume and value terms. For each species, trade may have positive and negative consequences for conservation and the long-term survival of species and biological diversity. For example, benefits from trade can provide incentives for sustainable use and management of species, but can lead to overharvest and broader negative impacts on the ecosystem.

Similarly, trade may have positive or negative consequences for the local livelihoods of the poor, specifically their income source, assets and wellbeing. International demand for wildlife products and services has provided numerous livelihood opportunities for poor communities, because many wildlife resources are in developing countries. However, high-value trade may marginalize poor communities or create dependence on an unsustainable level of harvest. For some species, widespread illegal trade also poses a security threat.

Joint consideration of factors

In effect, trade in wildlife may have positive outcomes for conservation and livelihoods, negative outcomes for conservation and livelihoods, or both positive and negative outcomes.

This paper develops an analytical framework for practitioners to use in exploring these impacts. The framework comprises four groups of factors, each addressing one aspect of the trade with implications for conservation and livelihoods:

- Species-level factors
- Governance factors
- Supply-chain factors
- End-market factors

These factors interact, and therefore require joint consideration to assess likely outcomes of trade in a particularly species. Such analysis can provide insights into the opportunities to improve conservation and livelihood outcomes, and potential risks for conservation and livelihoods associated with policy or managerial changes along the value chain.

Species-level factors

Species-level factors consider whether a species is suitable for harvest and trade, and under what conditions. Both the resilience of a species to harvest and its accessibility have particular relevance for conservation and livelihoods. Specifically:

- Trade in wildlife is more likely to benefit conservation and livelihoods when species have high resilience to harvest.
- Both biological factors (such as species distribution and reproductive rate) and non-biological factors (such as whether harvest is lethal or non-lethal) affect species resilience.
- Readily accessible species – those that are easily visible, slow to move, abundant within close proximity to human habitation and/or with low harvest costs – may provide greater prospects for local livelihoods and sustainable use, but can increase the vulnerability of overharvest among some species.

Governance factors

Governance of wildlife resources includes two broad groups of factors: property rights and policy settings. However, the outcomes of governance on conservation and livelihoods are also strongly influenced by institutional arrangements, corruption, transparency and illegality, among other factors.

Well-defined and secure property rights governing the use of wildlife resources and trade are generally critical for sustainable use and for local livelihoods to benefit from trade. However, the type of property rights and their enforcement influence these outcomes.

Regulatory and market-based policies can also shift conservation and livelihood outcomes from trade. This includes the use of CITES-listings, trade bans, permits and quotas settings, as well as particular policies for species stewardship or habitat management. Governance shortfalls are a major constraint to achieving legal, sustainable trade that supports conservation and livelihoods. Increasingly, governance is influenced by a wide range of stakeholders including local communities, local, regional and national governments, NGOs and international organizations.

Supply-chain factors

The organization and operation of the supply chain for trade in a species is also relevant for both conservation and livelihoods. The structure of the supply chain has strong bearing on the incentives for conservation and the opportunities for poor people to participate and benefit from the trade. For example:

- costs of production may be a barrier to entry for the poor;
- longer supply chains may mean that benefits are more widely distributed, with fewer returns to communities involved in the early stages of harvest and processing;
- concentrated market power may favour or hamper community livelihoods, depending on which stage of the supply chain is monopolized.

Stockpiling products can serve to reduce conservation risks by smoothing prices and reducing incentives for overharvest. However, this practice may create challenges for effective monitoring of supply-chain impacts at the species level.

Developing locally managed wildlife enterprises, producer cooperatives and associations has been effective for some species in integrating poorer communities and improving conservation incentives.

End-market factors

The end market, including the returns from trade and the type of products demanded, influences the incentives for market entry and sustainable use.

Market size (or potential market size) will affect the number of harvesters and the extent of harvest for a particular species. Larger markets typically create greater incentives for harvest, and potentially greater livelihood opportunities as well. Large markets do not pose an inherent risk to conservation unless other factors – such as species, governance or supply chain – create incentives for overharvest. Small markets (or no markets) for wildlife may be a conservation risk, such as when there are inadequate incentives for a species to be sustainably managed or protected.

Demand elasticity – that is, the responsiveness of demand to changes in other factors, such as price – can also influence trade outcomes. Products with inelastic prices are typically more highly valued, as they have fewer substitutes. A sustainable supply of these products can bring about major benefits, but may pose a risk to conservation if demand creates incentives for poaching or illegal harvest.

Consumer preferences can influence harvest quantity and methods, including preferences for natural or synthetic, wild sourced or intensively managed, abundant or rare, and legally or illegally sourced. Preferences may vary significantly between countries and socioeconomic groups and be influenced by education, branding, marketing or other strategies.

The way forward

The analytical framework presented in this paper provides a reference for the taxon-specific assessment of conservation and livelihood outcomes associated with trade. It is intended to benefit policymakers, businesses and practitioners in the wildlife trade sector seeking an impartial approach to evaluating trade impacts.

The framework reveals that trade in a species or its products and derivatives may generate significant benefits for local livelihoods and strong incentives for conservation. However, it may also create disincentives and risks. A host of interdependent factors related to the species itself, governance, the supply chain and the end market for wildlife products affect these outcomes. A combined review of these factors can be used to increase understanding of the outcomes of wildlife trade and the potential for these to be improved.

While a comprehensive application of this framework is likely to require significant data and resources, it would provide the information necessary to improve decision-making on wildlife trade and strengthen international wildlife value chains. More importantly, it can support informed discussion to mitigate unforeseen consequences of trade, improve the Aid for Trade programme design and strengthen natural-resource management and the outcomes for biodiversity and the poor.

Chapter 1 Impact of wildlife trade

Wildlife resources support millions of people in developing countries across Asia, Africa, Latin America, Oceania and the Caribbean, as well as many people (particularly, but not only, indigenous peoples and local communities) within developed regions. Harvest and trade in wildlife products is a major element of the livelihood strategies of many communities. For others, wildlife products provide a safety net in times of need or a supplementary or seasonal source of income. Trade in such resources can help reduce vulnerability and improve resilience among the poor, particularly in rural and remote areas.

However, many species of wildlife are threatened by unsustainable harvest and trade. The unsustainable use of wildlife creates a risk both for biodiversity conservation and for local livelihoods. Over time, depletion of wildlife resources may compromise economic and livelihood opportunities associated with them.

Conservation and livelihood outcomes from wildlife trade are interdependent. Economic and livelihood benefits from trade can provide an incentive for conservation, and this, in turn, can ensure that livelihood benefits associated with trade are maintained through a sustainable supply of wildlife. However, these outcomes depend on a host of interconnected factors related to the species and its habitat, the local governance regime and institutional settings, the supply-chain structure, and the nature of the end market.

Global concern about biodiversity loss and the recent surge of poaching and illegal trade in several threatened species has shifted the international policy focus towards additional trade restrictions, stronger enforcement measures and innovative demand-reduction strategies (see, for example, the Declaration from the 2014 London Conference on the Illegal Wildlife Trade).

While these may be the most effective policy options for a number of species, the potential for adverse effects on conservation and community livelihoods needs to be better understood. For many species, there may be alternative opportunities to move towards models of legal, sustainable trade that promote biodiversity conservation and generate economic returns for local communities. Given the potential benefits, it is critical these opportunities are further investigated.

This report provides an analytical framework for exploring and better understanding the impact of international trade in wildlife products on conservation and local livelihoods. The framework is relevant for importers and exporters, regulators, policymakers, non-governmental organizations, community representatives and researchers seeking to improve the sustainability of international wildlife supply chains. The framework provides a practical tool for species-specific evaluation and can be used to:

- explore likely implications of international trade for conservation and livelihoods;
- examine prospects for sustainable use and trade in a species;
- evaluate options for improving conservation and livelihoods outcomes associated with trade;
- better understand and predict the likely impacts of international wildlife trade policy reform; and
- develop responsible and sustainable sourcing policies.

Ultimately, the framework will support the International Trade Centre and other practitioners to minimize adverse consequences and improve the positive contribution of international wildlife trade to local community livelihoods and biodiversity conservation.

The report provides an overview of the international wildlife trade context and the conservation and livelihood impacts associated with trade. Four sets of factors are then outlined to provide a framework for species-specific analysis, drawing on recent examples, published literature and expert experience in sustainable use. Together, these factors can be used to reveal the likely opportunities and challenges for conservation and livelihoods associated with international trade in wildlife products.

Chapter 2 International wildlife trade, conservation and livelihoods

1. Background and key concepts

International commercial trade in wild resources – plants (including algae), animals and fungi – and the products derived from them takes place from or to virtually all regions of the globe. The products traded are diverse, ranging from live organisms to specific parts and derivatives such as bones, feathers, skins, leaves, fruits, seeds and oils. Similarly, the demand for these products spans several industries including food, healthcare, cosmetics, fibre, construction, luxury goods, pets and ornaments (Broad et al., 2003).

Domestic trade makes up a large (if uncertain) proportion of trade in wildlife. In line with the mandate of ITC, this report has been developed with a specific focus on international trade in wild resources. However, its findings are also likely to be relevant to and useful for the analysis of domestic trade.

Both the volume and value of international wildlife trade are expanding (Roe, 2008). While quantity and value are substantial (see Table 1), they are difficult to estimate. Customs data often exclude species type or numbers exported, and many species are exported as transformed goods. Further, wildlife is often traded illegally. TRAFFIC has estimated legal international trade, including timber and fisheries products, at US$ 323 billion in 2009 (TRAFFIC, 2014). Illegal trade has been estimated at up to US$ 20 billion (Wyler and Sheikh, 2013), although its value remains very uncertain.

Growing international wildlife trade has major conservation and livelihood repercussions. In this report, conservation impacts refer to impacts on both biodiversity and habitat conservation. Livelihood impacts include effects on people, specifically their capabilities, means of living, income, assets and wellbeing (Chambers and Conway, 1991). In this report, the livelihoods at the centre of discussion are those of the rural communities, particularly in developing countries, that live alongside wildlife and are most dependent on wildlife resources.

Timber trade (© Sreejith P Chakkatu)

Table 1. Examples of the scale of trade in different wildlife products

Product	Details
Coral	In 2005, well over a million colonies of hard corals were traded internationally, with exports mainly to the European Union and the United States of America (Jones, 2008).
Marine ornamental fish	In just one year (2004–2005), over 11 million marine ornamental fish were imported into the USA alone for the aquarium trade (Rhyne et al., 2012), while a global analysis estimated around 27 million tropical ornamental marine fish are traded each year (Townsend, 2011).
Amphibians	Almost 15 million wild-caught amphibians entered the USA legally in 1998–2002 (Schlaepfer et al., 2005).
Reptiles	An average of 1.3 million crocodilian (alligator, crocodile, caiman) skins were exported globally per year in 2000–2009 (Caldwell, 2011). Lyons and Natusch (2011) suggest around 5,337 green pythons are illegally wild-caught for export from Indonesia each year (most 'laundered' as captive-bred; all crocodilians and green pythons are CITES listed).
Various CITES-listed species	For the period 1998–2007, some 30 million CITES-listed wild-caught butterflies, seahorses, other fish, reptiles, mammals and birds were exported from South-East Asia alone, along with 18 million pieces and 2 million kg of live corals (Nijman, 2010).

2. Conservation impacts of wildlife trade

The IUCN (International Union for Conservation of Nature) defines conservation as the 'protection, care, management and maintenance of ecosystems, habitats, wildlife species and populations, within or outside of their natural environments, in order to safeguard the natural conditions for their long-term permanence (IUCN, n.d.).

Harvesting of wildlife for international trade can have positive and negative impacts on conservation. These largely depend on whether harvest is consistent with 'sustainable use', that is 'the use of components of biological diversity in a way and at a rate that does not lead to the long-term decline of biological diversity', and thereby maintains their contribution to present and future generations (CBD, 1993).

2.1. Negative impacts

Many species harvested for international trade are extracted unsustainably (at rates faster than biological recovery). Overexploitation (including for trade) is a major driver of global biodiversity decline, although habitat loss and invasive alien species generally pose much more significant threats (see e.g. Kirkpatrick and Emerton, 2010). Those species valued on local or international markets for consumptive use may be at greater risk of overexploitation (e.g. for marine species, see Purcell et al., 2014; Darwall et al., 2009). While there do not appear to be any documented examples of species extinction driven by international trade, harvest for international trade (legal or illegal) has clearly led to the overexploitation of some species. For example, there are many documented cases of trade in non-timber forest products (NTFP) leading to resource depletion (Neumann and Hirsch, 2000; Belcher et al., 2005).

Beyond the direct threat to species survival, overexploitation can indirectly affect ecological processes such as nutrient flows, pollination or seed dispersal. For example, harvest of mammals and birds for bushmeat depletes critical seed dispersers in forests in Asia and Africa, affecting future forest composition (Effiom et al., 2013; Harrison et al., 2013).

Furthermore, techniques and processes used in the harvest and management of wildlife species (such as strategies to intensify production) 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 monoculture or other simplified farming systems. For instance, increased international demand for açai palm (Euterpe oleracea) in the Amazon has led to intensified production through enrichment of forests and, in some cases, thinning of competitors to plantation-like conditions (Weinstein and Moegenburg, 2004).

2.2. Positive impacts

Vicuña is a valued resource for Andean communities (© Alessandro Caproni)

Wildlife harvest for trade can be maintained at sustainable levels, consistent with biodiversity conservation. Beyond this, however, wildlife trade can have positive conservation impacts where it creates incentives for sustainable use and management of target species and their habitats. For example, developing a well-managed international trade in vicuña (Vicugna vicugna) fibre has led many local communities to view vicuña as a valued resource rather than – as previously – a pest and competitor for grazing land. Consequently, poaching has declined and populations have recovered in many areas (McAllister et al., 2009; Lichtenstein, 2011). Legal and sustainable trade has successfully replaced illegal trade in the crocodile industry (Hutton and Webb, 2003). Similarly, for certain ornamental fish traded from Barcelos in the Brazilian Amazon, the benefits from trade

have encouraged proper floodplain management and prevented destructive land-use change (Tlusty et al., 2014). In such cases, species and habitat conservation outcomes are more favourable with trade than without it. A recent analysis found that utilized species are actually faring better than non-utilized species (e.g. food and raw materials) overall (Tierney et al., 2014), providing some support for the widespread operation of these dynamics.

Bans on trade can be useful in some cases, such as to enable species to recover when stocks are depleted. But in other cases they can create adverse conservation incentives. For example, species may become undervalued and habitat converted to more productive uses, such as agriculture or plantation forestry. Alternatively, where species retain their market value, trade bans may stimulate illegal trade and excess harvesting.

3. Local livelihood impacts of trade

A significant share of global wildlife resources is in developing countries, in areas where rural and remote communities live and work. These communities have the potential to benefit from international demand for wildlife products. For example, Peru exports more than US$ 300 million of biodiversity-based products a year, and this employs more than 10,000 people, mainly in rural areas (UNEP 2013). In Burkina Faso, wild-sourced shea butter (from the shea tree Vitellaria paradoxa) is the fourth-largest export product after gold, cotton and livestock (Konaté, 2012).

Wild shea nuts obtained from shea trees (© Erik (HASH) Hersman)

3.1. Positive impacts

Trade has positive benefits for livelihoods when it builds the ability of people to cope with and recover from stresses; maintain or enhance their capabilities and assets; and provide opportunities for the next generation (Chambers and Conway, 1991). This includes the opportunities provided by natural assets such as wildlife.

Major livelihood benefits from wildlife trade stem from associated income and employment opportunities. In some cases, wildlife trade contributes the majority of household income, as in the cases of collection of devil's claw (Harpagophytum spp.) in Namibia, Botswana and South Africa, and of mushrooms and jipi japa (Carludovica palmata) in Mexico (Wynberg, 2004; Marshall et al., 2006). In recent years, the harvest and sale of caterpillar fungus (Ophiocordyceps), traded to meet rising demand in traditional Chinese medicine, has been the major source of income for a large number of people in the Tibetan Plateau and Bhutan (Finkel, 2012; Mukhia and Rai, 2012).

In other cases, wildlife trade supports livelihoods by providing a supplementary income source during certain times of the year (alongside other agricultural or seasonal activities), enabling poorer households to meet the financial costs of schooling, medicine, books and so on (Neumann and Hirsch, 2000; Ros-Tonen and Wiersum, 2003; Roe, 2008).

Beyond economic benefits, wildlife trade can contribute to broader livelihood and development outcomes, including building community networks, skills and capacities, and strengthening land tenure, resource access, natural-resource management and local enterprise development (see e.g. Dalal-Clayton and Child, 2003; Lichtenstein, 2010; Lichtenstein and Carmanchahi, 2012). Commercial trade in wildlife is often attractive to poor communities (and women in particular) due to the low entry requirements (no need for high levels of education or skills or for expensive harvesting technology), the year-round availability of some products, and ease of combining with other income-generating activities (Marshall et al., 2006).

Trade in biodiversity benefits local communities (© Scott Darbey)

3.2. Negative impacts

Wildlife trade can also have negative impacts on local livelihoods. Trade in high-value species or products can marginalize poor communities where international corporations or large businesses monopolize harvest, production and trade. In these cases, those at the bottom of the value chain (local harvesters, hunters or collectors) tend to receive a very small share of the overall value of the products in trade, or communities may be entirely excluded (Roe, 2008).

Where trade contributes to overexploitation, as described above, there are also negative impacts on local livelihoods. The costs associated with harvest and trade increase as rare or fragmented wildlife become more difficult to source. As a result, the benefits for local communities from trade participation diminish. In some cases, harvest for trade may no longer present a viable livelihood activity.

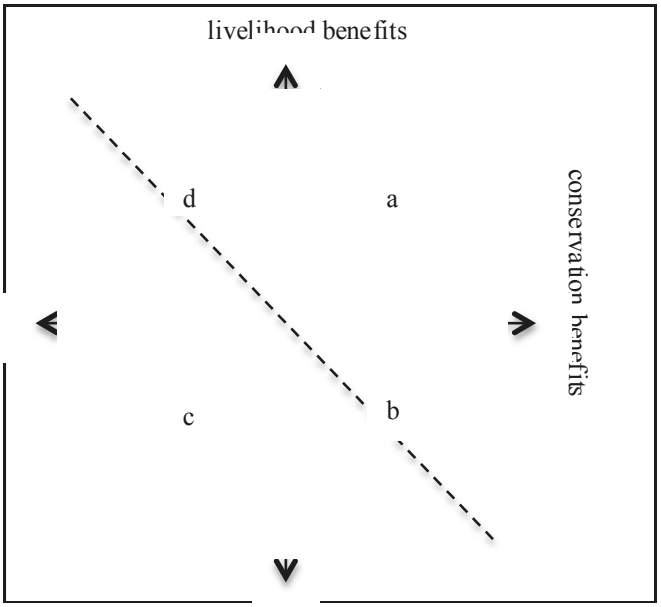
Illegal trade in wildlife products may have positive or negative consequences on livelihoods. In the short term, communities or individuals may benefit from illicit income-earning opportunities associated with harvest and trade. These can make a significant contribution to local livelihoods where few alternatives are available. For example, indigenous people in Kalimantan, Indonesia, are highly dependent on forest resources – some of which are illegally harvested – to meet income and other livelihood needs (TRAFFIC, 2008). However, these benefits are likely to be short-lived where vulnerable species are overexploited, which is often the case when harvesters have no legal long-term stake in the resource.

Illegal trade can also be associated with armed conflict – both in terms of armed gangs participating in trade and posing a security threat to local people, and in terms of the growing militarization of responses to illegal trade that can unfairly target local people. South Africa National Parks (SANParks), for example, has increased the military presence in parks such as Kruger in response to rising threats to black and white rhino (Ceratotherium simus and Diceros bicornis) from well-equipped and well-organized poaching gangs (Duffy, 2014). Tanzania's 2013 military response to rhino and elephant (Loxodonta africana) poaching led to claims of extortion, rape, murder and torture of innocent local people, and a parliamentary inquiry found 13 people were murdered and thousands of livestock (the livelihoods of many people) were maimed or killed (Makoye, 2014; Roe et al., 2014).

Chapter 3 Analytical framework

The impacts described in the previous section begin to reveal a complex relationship between wildlife trade, conservation and livelihood outcomes. These relationships can be viewed graphically (see Figure 1). In practice, trade may have positive consequences for conservation and livelihoods (zone *a*); negative outcomes for conservation and livelihoods (zone *c*); or some level of tradeoff between the two (zones *b, d*). For example, trade in NTFPs may lead to a win-lose scenario, where livelihood opportunities are generated but primary forest is converted to near monocultures, degrading ecosystems (outcome *d*) (Belcher and Schreckenberg, 2007). Alternatively, trade may be positive for conservation by generating incentives to maintain wild populations and effectively protect them from illegal use, but the land tenure situation or cost of licensing may exclude the poor (outcome *b*).

Figure 1. Interactions between conservation and livelihood outcomes



Trade may have positive outcomes for conservation and livelihoods (*a*); negative outcomes for conservation and livelihoods (*c*); or some level of tradeoff between the two (*b, d*)

This section sets out an analytical framework to guide assessments of the conservation and livelihood outcomes of international wildlife trade. An assessment based on this analytic framework can help practitioners to evaluate, for an internationally traded wild-sourced species, in an integrated and objective way:

- likely outcomes of trade for conservation and livelihoods;
- opportunities to improve outcomes of trade for conservation and livelihoods; and/or
- potential risks for conservation and livelihoods associated with policy or managerial changes along the value chain.

It is made up of four components, each addressing one set of factors that will impact the conservation and livelihood outcomes of any specific trade chain:

- **Species-level factors**: Is a species suitable for sustainable harvest and trade?
- **Governance factors:** Do the governance and institutional regimes support and provide incentives for conservation and benefit-sharing?

- **Supply-chain factors:** Does the supply-chain structure provide incentives for conservation and opportunities for local communities to participate in and benefit from trade?

- **End-market factors:** Do the returns from trade, and the type of products demanded, create sufficient incentives for market entry and sustainable use?

Within each component, the following chapters explain the relevance of each factor to conservation and livelihoods, illustrating the relevant dynamics by reference to examples of specific trades.

Understanding the likely conservation and livelihood outcomes (including any tradeoffs) of a specific trade chain – that is, in which zone of figure 1 a species sits – requires *integration* across these four components. For example, while a species may be vulnerable to overharvest due to its location or habitat (species-level factors), appropriate governance and supply-chain structures may be in place, ensuring that use remains sustainable. Similarly, the structure of the supply chain may not guarantee significant benefits to local people involved in wildlife harvest, yet certain policy measures may be in place to compensate those communities and generate positive livelihood outcomes (and thereby local incentives for sustainable use). As such, conservation and livelihood implications of trade cannot be fully determined without considering and integrating the information from assessments across the four components.

Note that, in practice, addressing the risks and challenges identified in one component may necessitate a change in business or policy decision-making, unless the outcomes generated from other components are sufficiently strong to compensate. In addition, while this framework may serve to identify likely areas where challenges, risks or opportunities may be found, every trade chain will vary, and additional factors not highlighted here may be critical in some cases.

1. Species factors

Examination of species-level factors can be used to assess whether a species is suitable for trade, and to better understand the impacts of production and harvesting systems on conservation and livelihoods. This component guides assessment of the broad question *'Is a species suitable for sustainable harvest and trade?'* including:

- Is the species resilient to harvest?

- What level of harvest for trade is sustainable?

- What harvest methods are sustainable?

- Is trade likely to create livelihood opportunities for rural communities?

- Is wild harvest or intensive management likely to have better outcomes for conservation and livelihoods?

Box 1. Key points

- Trade in wildlife is more likely to generate conservation and livelihood benefits when species have a high resilience to harvest. A number of biological (such as reproductive rate) and non-biological factors (such as harvest methods) affect species resilience.
- Easily accessible species provide greater prospects for local livelihoods and sustainable use, but may make species vulnerable to overharvest.
- Moving from wild to intensive management and production may create opportunities or risks for conservation and livelihoods.

1.1. Resilience to harvest

Many wildlife species and parts traded internationally are collected or harvested from the wild. In general, wildlife resources are renewable and consequently can withstand some level of harvest. However, some species are less resilient than others, affecting their potential for sustainable use in trade. Both biological and non-biological factors can influence species resilience (see Box 2). A species' capacity to recover from harvest, however, will also be dependent on the scale of harvest itself. For example, having broad distribution and habitat specificity may only confer higher resilience if the harvesting process does not span the entire range and habitats of the species.

Açai fruit (© Center for International Forestry Research)

Trade in species with higher resilience is (other factors being equal) more likely to be sustainable. Resilience to harvest may further be affected by other ecological or biological factors dynamics more complex than those listed in box 1. For example, reduction of density of older saltwater crocodiles through harvesting leads to a compensatory increase in survivorship of some juvenile age classes, likely due to reduced cannibalism (Webb and Manolis, 1991). Similarly, harvest of palm hearts (palmito) from one stem of açai enhances the plant's production of another valuable product, the açai fruit, from another stem (Weinstein and Moegenburg, 2004). In both cases, these dynamics enhance these species' suitability for harvesting.

In comparison, trade in species with low resilience can be a threat to conservation outcomes. For example, because of a slow reproductive rate, larger parrots are more vulnerable to overexploitation than small finches, despite relatively fewer parrots being captured for the pet trade (Sodhi et al., 2009).

Livelihood benefits are also likely to be more secure for species with higher resilience, as the productivity of the species, and thereby the income stream it provides, is expected to be more stable. Where wildlife cannot readily recover from regular or ongoing harvest, species stocks will decline and harvest is likely to become costly or unviable for local business and communities.

In some cases, there may be livelihood benefits from harvesting wildlife with low resilience. For example, if the value of the species in question is high then the returns from harvesting can be extraordinarily high. However, these gains may be short term, if overharvest contributes to species decline and thereby reduces

Box 2. Factors affecting resilience to harvest

- **Biological factors**

Biological factors that affect resilience to harvest are summarized in table 2 and include distribution, reproductive output and time to maturation, among other factors. For example, species with a broad distribution and high reproductive output are more likely to sustain a higher harvest.

- **Non-biological factors**

A species' resilience to harvest can also be affected by non-biological factors. For example, one study found wildlife species exposed or susceptible to other threats, such as habitat loss, pollution or human disturbance, were more likely to be threatened by trade (IUCN, 2007). In addition, harvest practices can have a bearing on species resilience. The same study found that species subject to non-lethal harvest practices, such as extracting fibre (through shearing), fruits, nuts, seeds, leaves and other derivatives were less likely to be threatened by trade than those harvested by means that extracted the whole plant or animal from the population (IUCN, 2007).

supply and income viability in the long term. In the majority of cases, if the species is endangered, then harvesting for trade is likely to be illegal and the livelihood of the harvester in jeopardy, if caught.

Table 2. Ecological characteristics of wildlife affecting resilience to harvest

Characteristic	Likely resilience to harvest	
	higher	lower
Distribution	broad	narrow
Habitat specificity	broad	narrow
Dietary specificity	generalist	specialist
Reproductive output	high	low
Growth rate	high	low
Reproductive rate	high	low
Time until maturation	short	long
Abundance	high	low
Population connectivity	high	low
Dispersal ability	high	low
Genetic variability	high	low

Source: Adapted from Kasterine et al., (2012), Erdelen (1998) and Primack (2010)

1.2. Accessibility

Accessibility of wildlife populations to local people can have positive or negative implications for conservation outcomes. Accessible species – those that are easily visible, slow to move, abundant within close proximity to human habitation and/or with low harvest costs (including skills or equipment requirements) – are more likely to be overharvested than those that are difficult or expensive to locate and access. Nevertheless, easily accessible populations are expected to be more readily managed, and it may be more straightforward to establish a system for sustainable use.

In some cases, species may be easy to capture or harvest, but remain difficult to monitor, including many marine, nocturnal, forest or migratory species. For example, several fish species can be readily harvested, but understanding population dynamics and sustainable harvest levels can be prohibitively expensive, especially for communities in developing countries. Similarly, pangolins may frequently be found and captured in human settlements, but reliable population estimates are almost impossible to obtain given their secretive and nocturnal nature (Platt, 2013). As such, sustainable use is difficult to establish and the impact of their trade on conservation outcomes can go undetected.

Accessibility, in general, has positive benefits for those involved in trade. Trade in species located close to poor communities can create valuable livelihood opportunities. Generally, there are fewer skills and equipment requirements for harvesting accessible species. Notably, the cost of managing immobile species (such as trees) is typically lower than 'fugitive' species that move between jurisdictional boundaries, such as guanaco (Lama guanicoe) and migratory fish species (Lichtenstein, 2013).

Pangolins are frequently found and captured in human settlements (© David Brossard)

Given these benefits, businesses or individuals often improve accessibility of species and reduce harvest costs by switching to intensive management systems – such as farming, ranching and captive breeding – which also may have other benefits such as more reliable supply and improved quality. This may create tradeoffs between conservation and livelihood outcomes (see Box 3). On one hand, it may reduce pressure on wild populations and provide an opportunity to engage local people in a viable production activity. On the other, it may create incentives for converting natural habitats, depleting wild populations to secure breeding stock and reducing incentives for in situ management and conservation. These outcomes are likely to depend on the governance and management systems established for intensively managed species (see Section 2.2).

Box 3. Moving from wild to intensive management systems

Moving from wild harvest to intensive management systems, including captive breeding for animals and cultivation, plantations and/or artificial propagation for plants, fungi and algae, can create benefits for or risks to conservation and livelihoods.

In some cases, intensive management can be used to reduce pressure on wild populations. For example, commercial artificial propagation and trade of the rare and newly discovered Wollemi pine (*Wollemi nobilis*) in Australia enabled demand from horticulture to be met while removing any incentive for poaching from the wild (Australian Government and DECC, 2007). Small-scale farming of pythons and other reptiles in Viet Nam has also provided a sustainable income stream for hundreds of households, while mitigating pressure on wild populations (Lyons and Natusch, 2011).

However, adverse consequences may include the following:

- **Loss or degradation of natural habitat**

Demand for particular products can see natural habitat converted to intensive production system for a particular species, posing a biodiversity cost. For example, demand for Amazonian açai palm has led some land managers to move towards plantation-like conditions (Weinstein and Moegenburg, 2004).

- **Pressure on wild populations to supply feed**

Intensive production systems can have adverse conservation impacts where captive animals are fed from wild sources. For example, Cambodian ranching of the Siamese crocodile (*Crocodylus siamensis*), primarily for the international skin trade, requires an annual harvest of 3–12 million snakes from wild populations as feed (Brooks et al., 2010).

- **Fewer incentives and/or resources for in situ conservation**

Ex situ management can reduce incentives and revenue for monitoring and conservation of species and their habitat. For example, sustainable wild harvest and trade of the blue-fronted parrot (*Amazona aestiva*) from Argentina to Europe returned substantive local conservation incentives for habitat retention, and returns to government that were invested into enforcement and protected area management (Rabinovich, 2005; Cooney and Jepson, 2006). Due to EU import restrictions, this trade has been largely replaced by trade from European captive bred sources, with consequent collapse of the conservation benefits (Caldwell and Courouble, 2008).

2. Goverance factors

Relevant governance and institutional arrangements include processes, laws, rules and policies that collectively guide use of wildlife (Decker et al., 2012). This component of the framework addresses the broad question 'Do the governance and institutional regimes support and provide incentives for conservation and benefit-sharing?' as well as the following questions:

- Are property rights over land and resources well-defined and secure?
- Are policy settings supportive of sustainable trade?
- Does the broader governance context enable legal, sustainable trade and livelihood opportunities?

Box 4. Key points

- Property rights governing the use of land and wildlife resources have significant implications for the commercial viability of trade, the incentives for sustainable use and associated livelihood benefits.
- Well-defined and secure property rights are generally critical for sustainable use, but may not be sufficient to generate conservation and livelihood benefits.
- State-held property rights for wild resources, even where well-defined and secure, will often require strong enforcement capacity to avoid open access conditions and consequent overharvest.
- Strong private or communal property rights can provide livelihood and conservation benefits under certain conditions.
- Conservation policy settings establishing whether trade is legal and under what conditions affect the benefits of trade and the incentives for sustainable use.
- Conservation and livelihood outcomes will be critically affected by the quality of broader governance.

2.1. Property rights

Sustainable harvest of wildlife will generally rely on secure property rights. Property rights govern who can access, utilize and benefit from the use (including conservation, extraction, transfer, lease and sale) of land and resources, such as wildlife and water. Well-defined, secure and transferable property rights help to establish and capture the value of resources, thereby providing an incentive for owners to efficiently use and maintain resources (Demsetz, 1967). For wildlife, property rights encourage owners to consider long-term implications of harvest, thereby increasing the likelihood of sustainable management.

Four broad property-rights regimes can be identified (Bulte et al., 2003): private property; state property; communal (or common) property and open access (no property rights) (see Table 3). Each has different implications for sustainable harvest and wildlife trade outcomes.

Unless property rights are clearly stated and effectively protected, poor enforcement or conflicts between community, state and other (often powerful) actors may lead to an open access outcome. In this case, wildlife harvesters have no motivation to take into the account the cost of harvest on future resource availability, typically resulting in overharvest (Bulte et al., 2003). For example, poor capacity for enforcement of the state's property rights over abalone (Haliotis midae) in South Africa has led to overharvesting by poachers, despite legal harvest restrictions (Hauck and Gallardo-Fernandez, 2013). Similarly, despite state ownership of elephants, organized criminal poachers exert control over elephant stocks (UNEP, 2013). Insecure property rights can pose a risk for sustainable harvest and increase the likelihood of overexploitation, dissipation of rents and conflicts between local groups and more powerful actors, particularly for highly valued resources (Belcher et al., 2003; Roe, 2008).

Table 3. Property-rights regimes and their implications for sustainable harvest

	Characteristics	Implications for sustainable harvest
Private property	Private owner has exclusive right to use and benefit from wildlife use and conservation (generally some state restrictions).	Can generate incentives for sustainable harvest
State property	State owns wildlife. Individuals may be able to use wildlife under state authority regulations.	Can generate incentives for sustainable harvest; relies on effective enforcement
Communal property	A group owns and manages wildlife and has rights to use and benefit from use and conservation. Non-members are excluded.	Can generate incentives for sustainable harvest; relies on effective cooperation
Open access	No property rights assigned. Open or free access results.	Little incentive for sustainable harvest

Source: Adapted from Bulte et al., 2003

2.1.1. Strengthening private/communal property rights

Stronger tenure over land and wildlife resources for private individuals and/or communities is often advocated as a means of shifting towards sustainable use and improving conservation incentives and livelihood outcomes. Weak tenure of users over land or wildlife resources can undermine sustainability. For instance, Brazil nut (Bertholletia excelsa) farmers in Bolivia do not have legal certification of land ownership and are at risk from competing demands for land from colonized groups and indigenous communities (COPLA, 2009).

A growing number of examples show that strengthening private or communal rights over wild resources has enhanced conservation and livelihood outcomes. In South Africa, the 1990 Theft of Game Act fortified property rights over various large game species, leading to improved market values and growth in populations under free-ranging conditions, a notable example being the white rhino (’t Sas-Rolfes, 1990). Similarly, communal rights to the use of vicuña under a sustainable harvest programme created incentives for sustainable harvest in Peru, Chile, Argentina and Bolivia (Bulte et al., 2003). Lessons also emerge from the forest sector in Africa, Asia, Mexico and Bolivia, where more secure communal tenure has correlated with improved sustainability of trade in non-timber forest products (Kusters and Belcher, 2004; Sunderland and Ndoye, 2004; Marshall et al., 2006).

Where wildlife is valued for trade, secure property rights for users can provide groups with an incentive for sustainable management. However, without market value (or other cultural or social incentives for sustainable management) overexploitation may occur. For example, communal management has not been effective for woodlands in Zimbabwe, which may be due to the poor returns gained from woodlands because of poor soil, limited rainfall and consequent low productivity. These returns may not be enough to justify investments in building effective management institutions (Campbell et al., 2001). This is in contrast to Zimbabwe’s CAMPFIRE wildlife-management programme, where returns for safari hunting of elephant have provided strong incentives for sustainable resource management (Child et al., 1997; Campbell et al., 1999).

Wildlife conservation area in northern Zimbabwe (© Vince O'Sullivan)

Strengthened local property rights can also have other adverse consequences for conservation. Private (or communal) owners will have incentives to utilize land and wildlife for their most profitable use. As such, there may be incentives (and with strengthened property rights, the legal right) to convert land from wild habitat to intensive cultivation or domestication (Belcher et al., 2005; Marshall et al., 2006).

In many cases, a combination of management approaches has proven effective in leading to livelihood and conservation benefits. For example, Brazil nut harvesters in Peru do not have legal ownership of the land, but secure collecting rights through the granting of government concessions or leases. These may be long – members of the cooperative Organisation of Organic Brazil Nut Gatherers of Peru (RONAP) have secured such rights for a period of 40 years (RONAP, 2014), so have strong incentives for sustainability. In addition, holders of these rights are required to comply with a forestry-management plan designed to ensure sustainable production and harvest.

Finally, the process of land or resource tenure reform itself can have adverse consequences for poor and marginalized people. For example, some communities may rely on natural resources under open access, but have low bargaining power in securing legal rights of use. For instance, pastoralists in West and East Africa have lost tenure rights during processes of land tenure formalization (Binot et al., 2009).

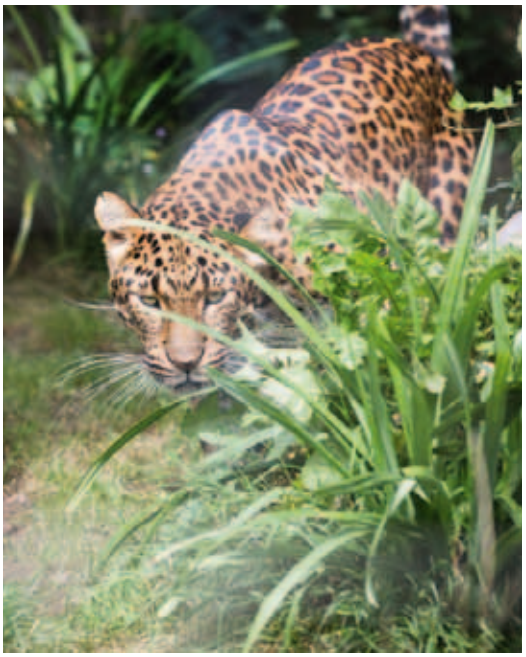
2.2. Policy settings

Policy at national and international level can have a major influence on conservation and livelihoods, particularly through determining whether legal trade can occur and under what conditions (Cooney and Abensperg-Traun, 2013).

Bans on wildlife trade are often advocated as a means of improving conservation outcomes. At an international level, bans and permitting systems are the main means of regulating international trade (Box 5). In some cases, such as for severely depleted or vulnerable species, zero harvest and trade may be the only option to facilitate resource recovery and avoid extinction.

Yet, the merits of trade bans are subject to much debate. Some argue that CITES Appendix I listings (Box 5) are an effective way to protect species threatened by trade. For example, there has been a steady decline in wild cat skin trade since all species were listed in Appendix I in 1975, and today only the Chinese leopard cat (Prionailurus bengalensis bengalensis) and the tiger (Panthera tigris) are believed to be threatened by illegal trade in skins (IUCN, 2000).

However, the effectiveness of trade restrictions in achieving conservation outcomes depends on several factors, particularly the capacity of countries to monitor and enforce them (IUCN, 2001; Cooney and Jepson, 2006; Conrad, 2012). The economic cost of enforcement can be high, particularly when species are distributed across a large area or when demand is high or inelastic (such as products without acceptable substitutes). These factors can increase the susceptibility of species to corruption and illegal trade and add costs to effective enforcement, which is particularly burdensome for lower-income countries (Cooney and Jepson, 2006; ’t Sas-Rolfes, 2000; Biggs et al., 2013).



Chinese leopard (© Cloudtail)

Box 5. Legal framework for international wildlife trade

At the international level, trade in wildlife species is regulated under the Convention on the International Trade in Endangered Species of Wild Fauna and Flora (CITES). CITES subjects trade in species listed in three appendices to mandatory licensing, through permits and certificates, to ensure that trade does not threaten their survival. Around 35,000 species are listed in these appendices, of which about 30,000 are plants.

The Convention regulates trade in species based on their conservation status and the risk posed by trade.

- **Appendix I** contains species threatened with extinction that are or may be affected by trade. Commercial trade is prohibited. Species such as great apes, leopards, tigers, most rhinoceros populations, several parrots and many orchids are in Appendix I. In exceptional cases (such as for scientific research), trade may take place if authorized by an import permit and an export permit.
- **Appendix II** contains species that are not now threatened with extinction, but that could become so unless trade is strictly regulated. Trade is permitted only with an expert permit issued under specific conditions including a 'non-detriment' finding (NDF) by the scientific authority. The NDF must demonstrate that trade is not detrimental to the species' survival. Appendix II contains the majority of CITES-listed species.
- **Appendix III** contains species that are protected in at least one country. CITES parties have enlisted the cooperation of other parties in controlling trade in a species under their jurisdiction. Trade requires an export permit or a certificate or origin if it has been sourced from a country that has not listed the species.

Depending on species characteristics (Section 2.1), various policy measures can be used to create positive conservation incentives and outcomes. This may include the issuance of permits, licensing or tradable quotas to facilitate trade at a level consistent with sustainable use, as well as requirements or payments for tagging, monitoring, reporting, labelling, species stewardship and/or habitat management. For example, under Argentine legislation, landowners are compensated for the number of broad-snouted caiman (Caiman latirostris and C. yacare) nests found on their property, providing a strong incentive for landowners to conserve nest sites and natural wetlands. Supplemented with community managed captive-rearing programmes – whereby wild eggs are collected and moved to facilities (mostly for the skin trade and the remainder for subsequent release) – there is a strong incentive for locals to protect live resources in situ. This approach has seen a steady annual increase in caiman populations, which were previously under threat, while similarly creating viable business opportunities (Larriera, forthcoming; US Fish and Wildlife Service, 2013).

Crocodile eggs collected by the local communities

Shifts in local and international policy can have significant impact on the local livelihoods dependant on wildlife trade. Policies often add to the cost of trade participation, for example the imposition of conservation taxes, licensing or traceability requirements. While these may be necessary for other social objectives, they can be costly for poorer communities and lead to trade exclusion.

On the other hand, governance strategies can also shift the power balance to improve the benefits of trade participation for the livelihood of communities. Policy measures may specifically target the distribution of benefits between trade participants and can support engagement and participation by local communities. In many cases, specific measures may be required to ensure local communities gain from

wildlife trade where they are disadvantaged by lack of information, poor understanding of their rights or inadequate skills and resources to engage in business and policy decision-making.

Where a species can sustain a level of harvest, trade based on supportive conservation and livelihood-oriented policy can have positive outcomes for conservation and livelihoods by creating economic incentives for sustainable management while ensuring some benefits return to local communities (Challender and MacMillan, 2014; Foreign Affairs, 2014). For example:

- Legalizing trade in vicuña fibre and establishing mechanisms for local community management of conservation, shearing and marketing has enabled populations to recover from 5,000 animals in 1994 to over 200,000 in 2010 (McAllister et al., 2009; Lichtenstein, 2011).

- Legalizing trade in yellow anaconda (Eunectes notaeus) in 2003 alongside a regional community management scheme in Argentina, including restrictions on minimum size, limited harvest sizes and traceability requirements, has improved wetland management and population sustainability and provided supplementary income to around 300 local people from La Estrella Marsh (Waller et al., 2011).

2.3. Broader governance context

The broader governance and institutional context also affects the value of harvested wildlife and, therefore, the conservation and livelihood outcomes associated with wildlife trade. This includes, notably, the quality of governance as evidenced by factors such as legitimacy, strategic direction, management effectiveness, accountability and fairness (Borrini-Feyerabend et al., 2013).

Governance shortfalls are often a major constraint to legal, sustainable trade and generating livelihood opportunities (Binot et al., 2009; Roe et al., 2009). This is particularly evident for valuable resources where vested interests and local elites (including political leaders, the well-educated and the wealthy) obstruct market operation and equitable benefit sharing (Ribot, 2003; Binot et al., 2009). For example, in Zimbabwe, the main beneficiaries of game ranching (as a sustainable alternative to the bush-meat trade) are wealthy individuals and patronage networks, despite the establishment of community-based management systems (CBD, 2011). Poor governance and management structures for wildlife can deplete livelihood benefits from trade even for highly valued species. As a result, poor communities can become disenfranchized by wildlife, particularly where it destroys their crops and livestock (Roe, 2008).

Increasingly for wildlife, a wide number of stakeholders including local, regional, national and international governments and institutions influence governance arrangements and their effective implementation. This sharpens the role for cooperative arrangements and partnerships in the management of wildlife trade. Further, given the globalized nature of wildlife trade, transparency, accountability and independent verification systems can play an important role in improving conservation and livelihoods.

3. Supply-chain factors

The supply chain encompasses the processes associated with wildlife trade from harvest and production, through to processing, marketing, sale and consumption. Each stage can influence conservation and livelihood outcomes. This component of the framework addresses the broad question ‘Does the supply-chain structure provide incentives for conservation and opportunities for local communities to participate in and benefit from trade?’ including:

- Is sustainable harvest and trade in this species cost-effective?

- Is wildlife trade the most cost-effective use of wildlife and land resources?

- Are there opportunities for poor communities to participate in the value chain?

- Is the supply-chain structure impeding conservation outcomes?

- Is the supply-chain structure a constraint to livelihood benefits?

This component focuses on the costs and benefits of trade relative to other potential uses (including in situ uses) for wildlife.

Box 6. Key points

- Cost of production can be a barrier to entry into wildlife trade, particularly for poorer communities. Where high costs reduce trade viability, incentives for sustainable use may fall.
- Stockpiling can improve conservation benefits by smoothing prices and reducing incentives for overharvest.
- Livelihood benefits largely depend on opportunities for participation in the supply chain, particularly in upstream ('value-adding') activities. Where participation is low, there can be inadequate conservation incentives for communities located close to wildlife resources.
- Developing locally managed wildlife enterprises, producer cooperatives and associations can be effective in integrating poorer communities and improving conservation incentives.

3.1. Cost and scale of production

The cost and scale of wildlife harvest and trade affect its economic viability and, in turn, likely outcomes for sustainable use. Where wildlife trade presents the most profitable use of wildlife resources, it is likely to be pursued over agricultural, tourism or non-consumptive activities. Alternatively, wild resource harvesting and trade may be part of a diversified land-use strategy. For example, caiman and capybara harvesting combined with cattle ranching and ecotourism provide simultaneous income streams for ranchers in Venezuela (Velasco et al., 2003; Mistry, 2014).

The costs associated with harvest and trade include equipment, transport and processing costs. Higher costs relative to market returns can be a deterrent to the harvest of some species. However, one advantage for people in developing countries has been the low cost associated with market entry for many wildlife products (Neumann and Hirsch, 2000). For example, harvest of non-timber forest products such as seeds and fruits often does not require any technical skills or equipment.

Production methods can be a major driver of costs. For some species, such as parrots and crocodiles, intensive management systems may lower the cost of production as large quantities of wildlife products can be produced in a localized area, improving economies of scale. Further, market requirements in terms of quality and timing of production can often be better controlled (Roe et al., 2002). As discussed in section 2 (species factors), production methods can influence both conservation and livelihood benefits associated with trade.

3.2. Stockpiling

The ability to store a product has implications for conservation of wildlife resources. For example, stockpiling by harvesters or harvester associations can reduce conservation risks as demand peaks are more readily met and prices are smoothed over time. Without a stockpile, an increase in prices could create a strong incentive for poaching and overharvest, and threaten species conservation. However, there may also be conservation risks associated with stockpiling. For example, in the Southeast Asian python skin trade, stockpiling by processors masks the price signal to harvesters, which could lead to harvest rates being maintained at high and possibly unsustainable levels. The stockpiling reduces supply-chain transparency, meaning actual harvest rates are difficult to monitor (Kasterine et al., 2012).

3.3. Participation of poor communities in supply chains

The livelihood benefits associated with wildlife trade largely depend on the opportunities for participation in the supply chain, for example, in land management, wildlife management, collection, harvest and post-harvest activities. These opportunities vary widely between species and locations. Most commonly, poor and marginalized communities participate in labour-intensive collection and harvest activities. In some

cases, employment in value-add activities, such as processing and other upstream activities, also provides livelihood opportunities.

Local communities benefit from harvesting devil's claw (© Alan Harper).

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 livelihood benefits for poorer communities (Sunderland and NDoye, 2004; Lichtenstein, 2010). Where supply chains are long, the harvest of raw materials attracts only a small share of final sales revenue. For example, communities involved in harvesting devil's claw in Namibia receive 0.4% of sales revenue, while locals producing vicuña fibre in Andean countries receive less than 5% (Wynberg, 2004; Lichtenstein, 2010). Although this is low, it often is significant relative to alternative livelihood opportunities in rural and regional areas, and may still serve to provide adequate incentives for species conservation among communities and resource managers.

Strengthening integration of poorer communities into the supply chain can be highly effective in improving livelihood outcomes, particularly when there are opportunities to participate in upstream activities and business decision-making. There are several examples of success in developing locally managed enterprises or integrating local communities through partnerships, cooperatives and producer associations. These have helped to support social and cultural dynamics, improve resource and income management, disseminate business and technical skills, and mitigate unwillingness to adapt to market demands, among other benefits (Molnar et al., 2007). For example:

- Locally managed enterprises: Local capacity can be strengthened through corporate investment into locally managed enterprises – such as for Phytotrade Africa (baobab (Adansonia digitata) powder processing in Southern Africa), CentroTerra Viva (bamboo in Mozambique) and the Novella partnership (production of Allanblackia oil in Ghana, Tanzania and Nigeria) (Elson, 2012).

- Producer cooperatives and associations: Integrating local communities through producer cooperatives and associations can strengthen bargaining power, improve social capital, improve wealth accrual and lead to greater environmental accountability (Belcher and Schreckenburg, 2007; Macqueen, 2008; Cooney et al., 2009). Establishing a harvesters' union in Cameroon has improved livelihoods and sustainable management of African cherry (Prunus africana), traded internationally for medicinal products (Ndam and Marcelin, 2004).

3.4. Concentration of market power

Concentrated market power, characterized as only one or few market suppliers, is prevalent in many wildlife supply chains. In general, monopoly power over sourcing is likely to favour conservation and community livelihoods, as harvesters have incentive for sustainable harvest and are able to capture associated benefits. For example, the Hudson's Bay Company monopolized the fur trade in eastern Canada for more than 200 years, with apparently positive effects for sustainability of beaver harvests (Abbott and van Kooten, 2011).

However, monopolistic power further up the supply chain may compromise the benefits to local communities typically involved in harvest. For example, only two companies buy Andean exports of vicuña fibre, limiting the bargaining power of local communities involved in harvesting (Lichtenstein, 2010). Similarly, conservation can be compromised, such as when a monopolistic supplier restricts supply onto the market, thereby artificially raising prices. In the case of ivory, the 2008 one-off sale created an

intermediary monopoly that slowly released ivory onto the market at inflated prices. This practice did not create effective competition with illegal suppliers (’t Sas-Rolfes and Fitzgerald, 2013).

Greater market power is typically gained when there are few market participants in the supply chain (Baumol, 1982) and can be influenced by market entry costs, including barriers posed by governance settings (such as special licences to operate).

4. End-market factors

This component of the framework addresses the broad question ‘Do the returns from trade, and the type of products demanded, create sufficient incentives for market entry and sustainable use?’ including:

- Is there a market to warrant sustainable harvest of this species?
- Is market value sufficiently high to generate livelihood benefits and conservation incentives?
- Does the nature of demand create risks for overharvest or illegal trade?
- Do consumer preferences create an opportunity or a risk for conservation and sustainable livelihoods?

Box 7. Key points

- Market size determines economic viability and income potential associated with wildlife trade.
- Large markets can offer significant livelihood opportunities, but these depend on sustainable, well-managed harvest.
- Price-inelastic wildlife products are typically more highly valued, creating both opportunities and risks. Restricting supply for these products, such as through trade bans, can increase incentives for poaching and illegal trade.
- Consumer preferences vary between countries and socio-economic groups and can affect harvest level and mode of production.
- If consumer demand is low, prices for wildlife can fall, potentially reducing incentives for conservation and livelihood benefits of trade participation.

4.1. Market size

Market size refers to the total value of product sales. A large market may exist even with relatively low quantities of product sales if prices are high. Market size (or potential market size) affects economic viability and income potential associated with trade.

Wildlife species with a large market are more likely to be harvested for trade than those with a smaller market. This is because trade is likely to present the most valuable use for the wildlife resource. A large market improves the potential for business and livelihood benefits associated with trade. Whether larger market size is a blessing or a curse for conservation depends on species and governance factors (Sections 2.1 and 2.2), but a large market is not inherently a risk to biodiversity.

Small markets or no market for a wildlife product can also be a conservation risk. Where wildlife has no market value, incentives may be inadequate for sustainable wildlife management. For many species, cultural, spiritual or other non-use values (i.e. not harvested) ensure their conservation. However, for others, insufficient markets can contribute to biodiversity loss as habitat is converted to more productive uses (such as forestry monocultures or agriculture). Moreover, without a sufficient market, the potential contribution of wildlife resources to improving livelihoods and development outcomes may not be realized.

4.2. Demand elasticity

The elasticity of demand measures the responsiveness of demand to changes in price and income. Demand elasticity for wildlife is largely determined by the availability of substitute goods. Products that are price elastic typically have a number of substitutes. For example, according to one study, bush meat and fish are substitutes in Gabon, meaning that demand for bush meat falls in response to any increase in price as consumers shift to fish consumption (Wilkie et al., 2005). Harvesters and producers benefit from developing a sustainable and consistent supply of these products, as consumers are unwilling to pay higher prices if supply is reduced.

Traditional Chinese medicinal herbs and remedies in jars (© Shutterstock)

Demand for price-inelastic products is less responsive to price changes, in that a significant increase in price does little to discourage consumption. Inelastic demand can create incentives for sustainable use, as products are highly valued, but can also create conservation risks. To elaborate, restricting supply to a sustainable level (such as through trade restrictions or quotas) will raise the price, but do little to lower demand. Such price increases may also exacerbate illegal trade (IUCN, 2001, 't-Sas-Rolfes, 2000). For example, tiger bones remain heavily poached to meet demand for traditional medicine, despite their listing in Appendix I (Verheij et al., 2010). Also, there is anecdotal evidence that demand for rhino horn is price inelastic, which could explain why additional restrictions on trade have been met with increases in poaching and illegal trade (Brown and Layton, 1998; 't Sas-Rolfes and Fitzgerald, 2013). Enforcement costs are typically higher when regulating wildlife products with inelastic demand.

Income-elastic products are those for which demand increases as incomes rise. Many wildlife products are luxury goods characterized by high income elasticity. For example, rising consumer income is frequently cited as a primary driver of increased demand for wildlife products in South-East Asia (TRAFFIC, 2008). Higher demand resulting from a rise in income can improve the conservation and livelihood opportunities from wildlife trade, where a sustainable harvest is feasible and institutional arrangements appropriate and robust.

4.3. Consumer preferences

The quantity of a product demanded by international markets depends on consumer preferences for the product and its attributes, which may vary significantly between countries and socio-economic groups. For example, consumers may prefer products that are natural or synthetic; wild sourced or intensively managed; abundant or rare; and legal or illegally sourced.

4.3.1. Natural vs synthetic

There may be synthetic substitutes for wildlife products, such as rubber, natural fibres and many medicinal products. These substitutes can reduce demand for wildlife products, particularly when supplied at a lower cost (FAO, 1998; Belcher and Schreckenberg, 2007). A lack of livelihood opportunities is likely to have a detrimental impact and could also reduce incentives for sustainable wildlife management. On the other hand, synthetic alternatives may reduce demand for overharvested products, enabling demand for wildlife trade to decline to a sustainable level. For example, some reduction in demand for seal and tiger products

appears to be correlated with the emergence of synthetic treatments for erectile dysfunction such as Viagra (Von Hippel et al., 2005).

4.3.2. Wild sourced vs intensively managed

Consumers may have a strong preference for wild-sourced products that are perceived to be of higher quality. For example, Chinese consumers appear to prefer wild tiger bone products due to perceptions of higher potency (Gratwicke et al., 2008) and similarly, consumers in South-East Asia prefer wild porcupine (Hystrix brachyural) meat over that from porcupines bred in captivity (Norsuhana et al., 2012). For others, intensively managed wildlife is preferred. For high-end buyers of crocodilian and tiger skins, captive bred specimens are preferred as they produce more consistent quality skins with less scarring or other defects (MacGregor, 2006).

Crocodile skin from Madagascar

4.3.3. Abundant vs rare/regulated

Pronghorn is listed in CITES Appendix I. (© USFWS/Tom Koerner)

Greater rarity and regulation may themselves increase the appeal of particular species among certain consumers, adding incentives for harvest (often illegal) and raising conservation threats (Courchamp et al., 2006; Rivalan et al., 2007; Hall et al., 2008). For example, Courchamp et al. (2006) present data showing rarer butterflies attract higher prices among collectors, as do CITES-listed species compared to non-listed ones. Rivalan et al. (2007) show that CITES 'uplisting' from Appendix II to Appendix I can stimulate trade increases, further endangering already threatened species.

Rare or localized species can potentially support the development of niche export markets for local communities. However, unless incentives are well managed, rarity values can create incentives to overharvest, which can further deplete species and push rarity values up, leading potentially to an 'extinction vortex' (Courchamp et al., 2006).

4.3.4. Legal vs illegal products

For most consumers, it appears commonsense that there is a strong preference for legal products. Most people are unlikely to seek to consume illegal goods. However, for some products, it is possible that illegality or increased regulation itself may raise the perceived rarity and desirability of species among certain consumers.

In contrast, removing trade bans could lead to a 'reverse stigma effect' whereby demand increases as the product is deemed to be socially acceptable. The conservation and livelihood outcomes depend on the ability to meet legal supply through existing stockpiles and sustainable harvest.

4.3.5. Shifting consumer preferences

Consumer preferences can be influenced through education, branding, marketing and other strategies. For example, the 'superfoods' market is rapidly expanding and providing a trade opportunity for wild resource-based businesses, such as Peruvian maca (Lepidium meyenii)) and African baobab (Adansonia digitata) (ITC, 2012). Certification has played a large role in capitalizing on emerging consumer preferences, such as for ethically sourced products.

Shifts in quantity demanded can have conservation and livelihood impacts. If demand falls, prices are likely to drop, reducing incentives for conservation and livelihood benefits of trade participation.

Baobab trees in Madagascar (© Shutterstock)

Chapter 4 Challenges ahead

The benefits and risks associated with trade in wildlife depend on a host of factors related to the species itself, governance, the supply chain and the end market for wildlife products. This report provides a framework to explore and better understand the impact of international trade in wildlife on both conservation and local livelihoods.

The four components – species, governance, supply-chain and end-market factors – explored in the framework each play a role in revealing the conditions under which the outcomes of trade may be positive or negative for conservation and livelihoods, including whether there may be tradeoffs between these. In combination, these components can be reviewed to better understand and manage the impact of wildlife trade. For example, whether a wildlife trade chain is positive for conservation will probably depend on factors such as whether the species is resilient to harvest (species-level factors), whether the property-rights regime (governance factors) and the economic benefits gained (supply-chain and end-market factors) generate adequate incentives for conservation, and whether there is a supportive policy environment (governance factors). Likewise, whether local people benefit from international trade depends on the viability of species extraction (species-level factors), the market size (end-market factors) and the distribution of economic returns along the supply chain (supply-chain and governance factors).

Detailed assessment of conservation and livelihood impacts of trade are increasingly important to mitigate global challenges of biodiversity loss and rural poverty. Wild resources are critical to the livelihoods of large numbers of people in rural communities, and often particularly important to the poor. It is necessary to gain greater understanding of where harvest and trade can be sustainable to avoid jeopardizing species, their habitats and the livelihoods of those dependent on them.

This framework can support practitioners looking to mitigate adverse impacts and improve the positive contribution of wildlife trade to local communities and to biodiversity conservation. Yet any application should consider a number of important challenges:

- There are a wide range of complex, multifaceted and interlinking factors that affect the outcomes of wildlife trade on conservation and livelihoods and the tradeoffs between them. It is necessary to consider that factors beyond those explored here may be relevant to trade outcomes.

- The benefits and consequences of wildlife trade are likely to be species-, country- and market-specific. The likely outcome for one species may not hold for another, and the framework is not intended to suggest that there is a blueprint approach to designing sustainable trade chains.

- Any comprehensive review of wildlife trade impacts is likely to require significant investment of time, resources and multi-disciplinary expertise. For example, data for many trade chains are limited, incomplete or lack transparency. While this may explain why conservation and livelihood outcomes are so poorly understood, the importance of such information should not be underestimated, particularly for vulnerable species where policy decisions may have unintended consequences or overlook an opportunity to improve local livelihoods.

In the context of growing international concern about trade in wildlife, further exploring specific conservation and livelihood outcomes and opportunities to lift these will necessarily gain greater priority. This report offers an impartial framework and starting point to support informed discussion to facilitate a shift towards sustainable trade chains with positive and transparent conservation and livelihood benefits.

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