Towards informed and multi-faceted wildlife trade interventions

Article (Published Version)

Global Ecology and Conservation 3 (2015) 129–148

Contents lists available at ScienceDirect

Global Ecology and Conservation

journal homepage: www.elsevier.com/locate/gecco

Review paper

Towards informed and multi-faceted wildlife trade interventions

Daniel W.S. Challender[a,*], Stuart R. Harrop[b], Douglas C. MacMillan[a]

[a] Durrell Institute of Conservation and Ecology (DICE), University of Kent, Canterbury, Kent, CT2 7NR, UK

[b] School of Law, Politics and Sociology, University of Sussex, Friston Building, Southern Ring Road, Falmer, Brighton, East Sussex, BN1 9RH, UK

ARTICLE INFO

Article history:
Received 28 September 2014
Received in revised form 20 November 2014
Accepted 20 November 2014
Available online 22 November 2014

Keywords:
CITES
Community conservation
Compliance
Economics
Regulation
Wildlife trade

ABSTRACT

International trade in wildlife is a key threat to biodiversity conservation. CITES, the Convention on International Trade in Endangered Species of Wild Fauna and Flora, seeks to ensure international wildlife trade is sustainable, relying on trade bans and controls. However, there has been little comprehensive review of its effectiveness and here we review approaches taken to regulate wildlife trade in CITES. Although assessing its effectiveness is problematic, we assert that CITES boasts few measurable conservation successes. We attribute this to: non-compliance, an over reliance on regulation, lack of knowledge and monitoring of listed species, ignorance of market forces, and influence among CITES actors. To more effectively manage trade we argue that interventions should go beyond regulation and should be multi-faceted, reflecting the complexity of wildlife trade. To inform these interventions we assert an intensive research effort is needed around six key areas: (1) factors undermining wildlife trade governance at the national level, (2) determining sustainable harvest rates for, and adaptive management of CITES species, (3) gaining the buy-in of local communities in implementing CITES, (4) supply and demand based market interventions, (5) means of quantifying illicit trade, and (6) political processes and influence within CITES.

Contents

* Corresponding author. Tel.: +44 (0) 7745 547585.
E-mail addresses: dc344@kent.ac.uk (D.W.S. Challender), s.harrop@sussex.ac.uk (S.R. Harrop), dcm@kent.ac.uk (D.C. MacMillan).

http://dx.doi.org/10.1016/j.gecco.2014.11.010

1. Introduction and aims

Globally, overexploitation of wildlife resources is a key threat to biodiversity conservation, much of which takes place for trade (Broad et al., 2003; Butchart et al., 2010). Although most trade occurs at the local and national level, large volumes of international trade also takes place annually, which can diminish wildlife populations, cause species extirpations, and ultimately threaten ecosystem function (Roe et al., 2002; Nijman, 2010; Smith et al., 2010; Duckworth et al., 2012). CITES, the Convention on International Trade in Endangered Species of Wild Fauna and Flora, which entered into force in 1975, is the primary mechanism for regulating international wildlife trade (CITES, 2014a; Wijnstekers, 2011). It seeks to restrict trade in c.35,000 species to sustainable levels using a combination of trade bans and controls. It is implemented by member states (or 'Parties', currently 180), through a system of permits, national legislation and enforcement mechanisms and nominated national agencies (CITES, 2014a).

Despite near universal accession, high volumes of illegal trade in many CITES-listed species takes place annually (e.g., Rosen and Smith, 2010 and Phelps et al., 2010). This is worth an estimated USD20 billion a year globally (South and Wyatt, 2011) and is seemingly unsustainable in many cases. Declining populations of the tiger (*Panthera tigris*), Asian bear species, and the extirpation of the Javan rhino (*Rhinoceros sondaicus*) in Vietnam in 2011, all high-value species subject to CITES strictest trade controls, demonstrate the impact this trade can have on wildlife populations (Abensperg-Traun, 2009; Brook et al., 2012). Similarly, poaching of rhino in Africa and volumes of elephant ivory in illegal trade are currently at record levels (Biggs et al., 2013; Underwood et al., 2013) and illicit trade is causing declines in populations of other mammals as well as birds, amphibians, reptiles, gastropods and marine fishes (e.g., Challender et al., 2014; Theile, 2005; Giles et al., 2006; Herrera and Hennessey, 2007; Lyons and Natusch, 2011; Birdlife, 2011 and Rosen and Smith, 2010), which raises fundamental questions about the efficacy and nature of current, regulatory interventions.

However, despite a large body of literature on CITES and claims it is effective (e.g., Huxley, 2000 and Fuchs, 2010), there has been little comprehensive review of its efficacy (though see IUCN, 2001). Existing research has been species-specific (e.g., Shepherd and Nijman, 2008; Burn et al., 2011 and Vincent et al., 2013), or examined the impacts of trade controls more broadly (e.g., Rivalan et al., 2007 and Courchamp et al., 2006). In this paper we review typical and atypical approaches taken to regulate wildlife trade in CITES, i.e. interventions prescribed in the Convention text as well as those developed since, and critically evaluate its effectiveness. Although determining the efficacy of CITES is difficult, and though it may have had many successes, these are not easily apparent and evidence suggests that CITES can list few clearly measurable conservation successes. We argue that this can be attributed to five overarching factors: non-compliance, an over reliance on regulation, lack of knowledge and monitoring of listed species, ignorance of market forces, and influence among CITES actors. To more effectively manage trade we argue that interventions need to go beyond regulation and should be multi-faceted, reflecting the inherent socio-economic and cultural complexity of wildlife trade. To inform such interventions we assert an intensive research effort is needed and we outline six key areas where attention should be focused: (1) factors undermining wildlife trade governance at the national level, (2) determining sustainable harvest rates for, and adaptive management of CITES species, (3) gaining the buy-in of local communities in implementing CITES, (4) supply and demand based market interventions, (5) means of quantifying illicit trade, and (6) political processes and influence within CITES.

2. Methodology

To inform our review we drew on the CITES and wider wildlife trade literature. Specifically, we searched for articles in the Web of Science database [v.5.14] using the keywords 'CITES', 'CITES effectiveness' and 'wildlife trade', and Google Scholar, and drew on key texts on CITES (e.g., Oldfield, 2003; Reeve, 2002 and Hutton and Dickson, 2000) for evidence of its effectiveness, or otherwise, and contributing factors. Based on this evidence, we conceptualised overarching factors currently shaping the effectiveness of CITES.

3. CITES

3.1. CITES structure

CITES entered into force to govern the import, (re-)export and introduction from the sea of approximately 1100 listed species (CITES, 2014a; Wijnstekers, 2011). Although it initially lacked an expressly stated goal that it seeks to ensure sustainability in international trade, this is implied in Article IV (3) of the Convention text and is now explicitly stated as its reason for existence (see Res. Conf. 14.2, Rev. CoP16).

CITES relies on the mutual recognition of national laws for implementation (Reeve, 2002). Parties accede to the Convention voluntarily and are mandated to enact implementing legislation (Article XIII) and, *inter alia*, designate Scientific and Management Authorities (Article IX). The roles of these Authorities include monitoring and advising on levels of trade, ensuring it is not detrimental to the survival of species in the wild (the so-called Non-detriment Finding (NDF); see Section 2.2), and the granting of import and export permits (CITES, 2014b). The Parties are supported by a small, central Secretariat to which they are legally required to submit annual reports on permits issued, and biennial reports on legislative, regulatory and administrative implementation measures taken (Article VIII; CITES, 2014c). However, they are not required to report centrally on illegal trade (though see Res. Conf. 11.3, Rev. CoP16).

In seeking compliance among Parties, CITES uses a combination of 'carrots' and 'sticks' (Reeve, 2002). This includes capacity building (e.g., providing Parties with training and species identification manuals) and technical assistance. The efficacy of Party legislation is also evaluated under the National Legislation Project (NLP) in terms of meeting the requirements to implement the Convention (Vasquez, 2003). Conversely, the threat and establishment of trade sanctions for listed species are used where Parties are non-compliant (e.g., failure to enact implementing legislation; Reeve, 2002). However, non-compliance remains a problem and 31 Parties (as at 09/09/2013) are currently subject to recommendations to suspend trade (CITES, 2014d; Reeve, 2006).

The Convention's highest decision-making body is its Conference of the Parties (CoP) which meets every 2–3 years to review progress on the conservation of listed species and, *inter alia*, consider proposals to amend Appendices I and II (see Section 2.2; CITES, 2014e and Reeve, 2002). Non-Parties, technically qualified agencies and non-governmental organisations (NGOs) also contribute to CoPs. Proposals, which may only be submitted by Parties are adopted subject to at least a two-thirds majority vote of Parties present and voting (Article XV). New 'rules' in the form of Resolutions and Decisions are also adopted at CoPs and have enabled CITES to develop with some flexibility, but unlike the Convention text they are not legally binding (Bowman, 2013; CITES, 2014f; Cooney and Abensperg-Traun, 2013; Wijnstekers, 2011). Between meetings, CoP responsibilities fall to the Standing Committee, which otherwise provides policy advice to the Secretariat, acts as the Convention's main compliance body, and oversees the Animals and Plants Committees, which themselves provide technical support and expertise to decision-making (CITES, 2014g; Reeve, 2002).

3.2. Approaches to controlling international trade in CITES

Typical interventions in CITES comprise listing species in one of three Appendices with corresponding trade controls. Listings are based on an assessment of threat from international trade evaluated against biological and trade criteria (CITES, 2014b). The current criteria (see Resolution Conf. 9.24, Rev. CoP16), were adopted in 1994, and explicitly adopted the Precautionary Principle resolving that, '*in case of uncertainty regarding the status of a species, or the impact of trade on the conservation of a species, the Parties shall act in the best interest of the conservation of the species concerned and, when considering proposals to amend Appendices I and II, adopt measures that are proportionate to the anticipated risks to the species*' (Wijnstekers, 2011). Currently, there are 35,497 species and 71 subspecies in the Appendices comprising 931 + 47 in Appendix I (3%), 34,419 + 11 in Appendix II (97%) and 147 + 13 in Appendix III (<1%) respectively (CITES, 2014h). Trade is subject to the provisions of each appendix below:

Appendix I—Includes species threatened with extinction. Trade for commercial purposes is prohibited and only permitted in exceptional circumstances, subject to the grant of import and export permits (Article III).

Appendix II—Includes species that could become threatened with extinction from international trade unless it is regulated. Trade is subject to the grant of (re-)export permits based on a NDF, which is a declaration that trade in specimens of a given species will not be detrimental to the survival of that species in the wild. This calls on Parties to limit trade such that species are maintained throughout their range at levels consistent with their ecosystem roles and above levels at which they would be eligible for inclusion in Appendix I (Article IV, 3).

Appendix III—Includes species for which trade is regulated by one Party, but that Party requests the cooperation of other signatories in preventing unsustainable trade. Trade is subject to the grant of export permits (Article V).

Accurately listing species in the Appendices is fundamental to the effectiveness of CITES because it determines the trade controls to which they are subject (Wijnstekers, 2011). Yet, while Res. Conf. 9.24 (Rev. CoP16) provides a scientific basis for listing species, which proponents have to prove individual species meet, in reality decision-making is characterised by eristic divides among Parties as well as non-state actors (e.g., Gehring and Ruffing, 2008 and Hutton, 2000). Both seek to influence decision-making for economic, political, philosophical and even emotional, as well scientific reasons (see Section 3.5; Dickson, 2003 and Vincent et al., 2013). However, Parties can unilaterally opt out of controls for specific species, which is achieved either by entering a reservation, which affects only a very small number of species in reality, or by adopting stricter domestic measures (Article XIV). For example, as the EU does (see Morgan, 2003), and the US does under its Endangered Species Act (1973).

Listing species in CITES also has cultural, socio-economic and broader economic implications. This is because it typically restricts or prohibits their direct use, for example by rural communities in developing countries who may be dependent on wildlife for their livelihoods, adversely resulting in disincentives for conservation (e.g., Roe et al., 2002 and Velásquez Gomar and Stringer, 2011). In recognition of the need to consider these factors in listing decisions, the Parties have adopted a number of Resolutions and Decisions to this end (see Table 1). For example, Resolution Conf. 16.6 explicitly recognises implications of decision-making on local livelihoods and the need to involve local communities in implementation, while the need to consider economic conditions and market forces has also been recognised (Res. Conf. 13.2, Res. Conf. 14.2).

As CITES has developed a number of atypical interventions not originally prescribed or expressly contemplated in the Convention text have also been adopted (see Table 2; IUCN, 2001 and Wijnstekers, 2011). They include ranching, which entails the removal of eggs or juveniles from the wild which would otherwise have a very low probability of surviving to adulthood, and rearing them in a controlled environment, and which is facilitated by the transfer of national populations of Appendix I species to Appendix II thus enabling commercial trade. However, ranching has only been implemented for crocodilians to date (see Table 2). Annual export quotas and annotations to the appendices have been adopted enabling limited trade deemed sustainable, but these measures have also been used to prescribe stricter trade controls (e.g., zero quotas). Also, while Article VII (4) permits captive-breeding and artificial propagation of Appendix I species for commercial trade, controls on these operations have become more stringent over time (Table 2). Similarly, species-specific Resolutions have been adopted for a small number of species and which have typically pursued the eradication of consumer demand and elimination of illicit trade. The most notable measures have been for the African elephant, rhinos and the tiger. Concerning the African elephant they have included one-off sales of ivory and the establishment of two bespoke monitoring systems for elephants globally, namely MIKE (Monitoring the Illegal Killing of Elephants) and ETIS (Elephant Trade Information System), with which to monitor illegal killing and population trends, and record and analyse illegal trade levels, respectively (CITES, 2014i). Measures for rhino and the tiger have included, *inter alia*, trade sanctions, the exertion of diplomatic pressure on consumer states and the urged destruction of rhino horn stockpiles (Table 2; Leader-Williams, 2003 and Reeve, 2002). Finally, in response to species-specific non-compliance regarding Appendix II species, the Review of Significant Trade (RST) process was devised.

This aims to ensure species are not traded unsustainably through the formulation of remedial measures (e.g., export quotas), where trade data suggest they have been (Table 2; Reeve, 2002).

Like listing decisions, the adoption of atypical measures has often been characterised by heated debate among Parties and non-state actors, and is typified by the use vs. no-use argument that has become synonymous with CITES (e.g., Mofson, 2000 and Vincent et al., 2013). Seen by some to reflect the Convention's imperialist history (e.g., Kievit, 2000), this debate, it is argued, is characterised by preservationists of northern, economically developed consumer states who have sought to halt the utilisation of wildlife and conservationists, primarily in Southern African states, who have sought to embrace conservation through sustainable use (Abensperg-Traun, 2009; Duffy, 2013; Hutton, 2000). This was apparent in the adoption of ranching and has characterised discourse on proposals to ranch Marine turtles, but which have not been adopted to date. However, it has led to concerns about how homogeneously the Precautionary Principle has been applied to listed species (Dickson, 2003; Kievit, 2000; Webb, 2000, 2013). The most extreme example surrounded decision-making on the African elephant, particularly its transfer from Appendix II to Appendix I in 1989 ('t Sas-Rolfes, 2000).

Unique to this decision was the unprecedented scale of high-profile media attention it received, led by western NGOs and animal welfare organisations ('t Sas-Rolfes, 2000; Huxley, 2000). However, it has been argued such organisations were more concerned with the survival of individual elephants than the long term conservation of the species, the 'Disneyization' of wildlife according to some (e.g., Martin, 2012a). In reality, the issue was predominantly one of contrasting wildlife management philosophies between African elephant range states and lack of national enforcement capacity ('t Sas-Rolfes, 2000; Duffy, 2013). Even so, the media furore and the resulting decision to up list the species arguably demonstrates the influence non-state actors can have on decision-making (see Thornton and Currey, 1991 and Duffy, 2013).

4. The effectiveness of CITES

Although hailed as the world's most successful wildlife conservation Convention (e.g., Fuchs, 2010 and Huxley, 2000), the effectiveness of CITES continues to be debated (e.g., ERM, 1996; IUCN, 2001; Shepherd and Nijman, 2008 and Bowman, 2013). However, from a species conservation standpoint, determining the causal contribution of CITES to species' status is difficult given the multiplicity of factors affecting species (Martin, 2000; IUCN, 2001; Dickson, 2003). This includes other threats such as habitat loss and climate change as well as intrinsic and extrinsic biological factors. Consequently, CITES may have had many successes, but these are not easily apparent, and cast iron proof that CITES has been effective, i.e. measurably led to improvements in species' status is hard to find, with few exceptions (IUCN, 2001; Kievit, 2000; Martin, 2000). This does not prevent claims though that CITES has had greater success (e.g., CITES, 2013a), but which in reality plays down the primary role of complimentary conservation efforts (Martin, 2000). Cases where CITES is considered to have been effective include: the recovery of crocodilian populations (Jenkins et al., 2004; Platt and Thorbjarnarson, 2000); the recovery of the Southern white rhino in South Africa (Amin et al., 2006); export quotas for the leopard (*Panthera pardus*) in Southern Africa (Jenkins, 2000) and Suleiman markhor (*Capra falconeri*) in Pakistan (Frisina and Tareen, 2009); as well as annotations down listing vicuña (*Vicugña vicugña*) in South America (see Table 2; McAllister et al., 2009). Generally, improvements in the conservation status of these species followed the removal of trade bans and the advent of regulated trade, including ranching in the case of crocodilians which bestowed an economic value on wild populations, and crucially, the involvement and buy-

Table 1
Active Resolutions and Decisions recognising socio-economic, cultural, economic and livelihood considerations within CITES.

Year	Resolution/Decision	Provisions
1992	Res. Conf. 8.3 (Rev. CoP15) Recognition of the benefits of trade in wildlife	Recognises that commercial trade may be beneficial to the conservation of species and ecosystems, and local people. Recognises that implementation of CITES-listing decisions should take into account potential impacts on the livelihoods of the poor.
1994	Res. Conf. 9.24 (Rev. CoP15) Criteria for Amendment of Appendices I and II	Notes the objective to ensure that decisions to amend the Convention's Appendices are founded on sound and relevant scientific information, and take into account socio-economic factors.
2004	Res. Conf. 13.2 (Rev. CoP14) Sustainable Use of Biodiversity: Addis Ababa Principles and Guidelines	Practical Principle 2: Recognises that local users of biodiversity components should be sufficiently empowered and supported by rights to be responsible and accountable for use of the resources concerned. Practical Principle 10: International, national policies should take into account: current potential values derived from the use of biological diversity, intrinsic and other non-economic values of biological diversity, and market forces affecting values and use. Practical Principle 12: The needs of indigenous and local communities who live with and are affected by the use and conservation of biological diversity, along with their contributions to its conservation and sustainable use, should be reflected in the equitable distribution of the benefits from the use of those resources. Practical Principle 13: The costs of management and conservation of biological diversity should be internalised within the area of management and reflected in the distribution of the benefits from the use.
2004	Res. Conf. 13.4 Conservation of and trade in Great Apes	Calls upon all governments, intergovernmental organisations, international aid agencies and non-governmental organisations, as a matter of urgency, to assist the range States in any way possible in supporting the conservation of great apes including: the development of projects which deliver tangible benefits to local communities such as alternative sources of protein.
2007	Res. Conf. 14.2 CITES Strategic Vision: 2008–2013	The Conference of the Parties to CITES should take into account, within the context of its mandate issues including: contributing to the UN Millennium Development Goals relevant to CITES, cultural, social and economic factors at play in producer and consumer countries; and promoting transparency and wider involvement of civil society in the development of conservation policies and practices.
2010	Res. Conf. 15.2 Wildlife trade policy reviews	Encourages Parties to take into account the needs of indigenous people and other local communities when adopting trade policies concerning wild fauna and flora.
2013	Res. Conf. 16.6 CITES and livelihoods	Recommends Parties consider the following when addressing livelihood issues: **Regarding empowerment of rural communities** Encourages Parties to work with key stakeholder groups to design, implement and monitor effective strategies with regard to the implementation of CITES listings recognising, *inter alia*, that: • Although amendments to the CITES Appendices must, unless indicated otherwise in an annotation, come into effect 90 days after their adoption by the Conference of the Parties, developing appropriate solutions to mitigate negative impacts on the livelihoods of rural communities may require more time to implement relevant policy changes; • Community and traditional knowledge should be considered, as appropriate and in accordance with the provisions of the Convention and national laws, regulations and policies. Recognises that empowerment of rural communities should be encouraged through measures that include: • Promoting transparency and participation of rural communities in the development and implementation of national CITES-related policies; • Maximising the benefits for rural communities of CITES implementation and trade concerned, in particular to support poverty eradication; • Promoting associations of primary users of wildlife, however they are defined; and • Recognising resource tenure and ownership and traditional knowledge of or in rural communities associated with CITES-listed species, subject to any applicable national or international law.

(*continued on next page*)

Table 1 (*continued*)

Year	Resolution/Decision	Provisions
		Recognises that support for the implementation of CITES listings should be enhanced by public awareness and education, including programmes for rural communities, to ensure that: • The positive aspects of CITES and related legislation are understood; • CITES-listed species are conserved and the potential benefits to rural communities realised; and • Communities support policies and activities designed to reduce or eliminate illegal trade in specimens of CITES listed species. Recognises that as implementation of some listings may have short-term negative impacts on rural communities, mitigation strategies should be adopted as appropriate, which may include: • Providing assistance, including short-term financial support, to rural communities most severely affected by the implementation of the CITES-listing decisions; and • Promoting alternatives to rural communities to enhance the effective implementation of CITES-listing decisions, for instance: income generation such as payments for ecosystem services, sustainable tourism, employment in eco-tourism or as game wardens, and licences or concessions for tourism, hunting, fishing and harvesting and the development of alternative products. **Regarding the potential shift from in situ to ex situ conservation** Recognises that: • *Ex situ* conservation may lead to the loss of revenues for local communities; and • Positive incentives to promote *in situ* production systems may encourage benefits for these communities; and • Cooperation between exporting and importing countries may include: working with *in situ* and *ex situ* producers and trade associations; and conservation and development projects.
2013	Decisions 16.17–16.18 CITES and livelihoods	16.17—Exporting and importing countries are invited to carry out voluntary rapid assessments of the impact of implementation of CITES-listing decisions on the livelihoods of rural communities and to mitigate negative impacts. 16.18—Parties are encouraged to develop case studies and facilitate exchange visits between relevant stakeholders from the different ongoing conservation and sustainable use programmes which address issues related to CITES and livelihoods in order to stimulate the exchange of lessons learnt regarding CITES-listed species living in similar environments and/or social conditions.

Table 2
Atypical interventions adopted within CITES and notable successes and failures.

Nature of intervention	Intervention	Provisions	Notable successes and failures
Sustainable use			
	Ranching	• Recognises that populations of some Appendix I species could benefit from 'safe' harvesting and commercial trade. • Comprises the rearing of wild-caught animals in a controlled environment. • Facilitated by down listing national populations from Appendix I to Appendix II, within CITES rules. • Only applied to crocodilians to date. • The definition of ranching was amended at CoP15 to restrict the removal of eggs or juveniles from the wild to include only those individuals which would otherwise have had a very low probability of surviving to adulthood (Res. Conf. 11.16, Rev. CoP15).	• Considered a success for crocodilians, having bestowed an economic value on wild populations (Jenkins et al., 2004; Kievit, 2000). • Many crocodilians now have favourable conservation status. For example the Saltwater (*Crocodylus porosus*) and Nile crocodiles, listed as Endangered and Vulnerable respectively in 1986, are now considered Lower risk/least concern. • Broad-snouted cayman ranching in Argentina has also enabled population recovery and the delivery of socio-economic benefits to local people (Abensperg-Traun et al., 2011).
Sustainable use and tighter trade controls			
	Export quotas	• Established by the CoP to enable non-detrimental trade in regulated numbers of Appendix I/II species and/or their derivatives. • Also established by Parties voluntarily for Appendix II species. • Also used to apply stricter trade controls, e.g. zero quotas for Appendix II species. • Use by the Parties is encouraged, and which has the advantage of annual- as opposed to shipment-specific NDFs (Res. Conf. 14.7, Rev. CoP15).	• Considered successful for the leopard in Southern Africa. Bestowing an economic value on its skins led to reduced persecution and population recovery (Res. Conf. 10.14, Rev. CoP14; Jenkins, 2000). • Similar quotas have been established for cheetah (*Acinonyx jubatus*) in sub-Saharan Africa and the Suleiman markhor in Pakistan where populations have increased and trophy hunting has facilitated local prosperity, jobs, access to health care, improved water supplies and rural infrastructure (Res. Conf. 10.15, Rev. CoP10; Frisina and Tareen, 2009). • Failures include: > Parties setting quotas too high (Res. Conf. 9.21, Rev. CoP13). > Quotas being exceeded, e.g., Asian pangolins (Challender, 2011), reptiles (Nijman et al., 2012) and elephant ivory (Underwood et al., 2013). > Illegal trade in non-specified derivatives, e.g., rhino horn and elephant ivory (Biggs et al., 2013; Underwood et al., 2013).

(*continued on next page*)

Table 2 (*continued*)

Nature of intervention	Intervention	Provisions	Notable successes and failures
	Annotations to the Appendices	• Denote populations, parts or derivatives of species subject to particular trade provisions (Res. Conf. 11.21, Rev. CoP15). • Facilitates sustainable use of species by down listing national populations from Appendix I to Appendix II. • Also used to denote export quotas. E.g., zero quotas for wild-caught Asian pangolins traded for primarily commercial purposes were established at CoP11.	• Considered successful for vicuña in South America. Populations recovered from c.10,000 in 1965 to >250,000 animals in 2005 (McAllister et al., 2009) and its conservation status improved from Vulnerable in 1982 to Least concern in 2008. • This was facilitated by engagement with local communities in Peru. In return for jobs, a school and income from vicuña products, local communities bought in to conservation of the species over which they were eventually given tenure rights, and which contributed to reduced poaching (Wheeler and Domingo, 1997). • Also successful for white rhino. An annotation down listing the species from Appendix I to Appendix II in South Africa in 1995, allowed export of live animals and hunting trophies, which facilitated population recovery from c.20 animals at the end of the 19th century to c.19,000 animals at present through less stringent trade controls (Amin et al., 2006; IUCN, 2001). • Annotations down-listing elephants from Appendix I to Appendix II to allow trade in elephant hide, hair, and leather products were successful in Zimbabwe (see Taylor, 2009) and Namibia (Weaver et al., 2011), resulting in significant conservation and livelihood benefits.
Tighter trade controls			
	Captive-breeding and artificial propagation	• Captive-breeding and artificial propagation of Appendix I species for commercial trade is permitted subject to the definitions of 'bred in captivity', 'first generation offspring (F1)', 'second generation offspring (F2)', 'breeding stock' and 'in a controlled environment' (Res. Conf. 9.19, Rev. CoP15; Res. Conf. 10.16, Rev. CoP15). • Operations are also required to be registered with the Secretariat (Res. Conf. 12.10, Rev. CoP15). • The Parties also recommend captive-bred specimens in trade be marked (Res. Conf. 8.3, Rev. CoP14; Res. Conf. 12.3, Rev. CoP16). • Specimens not bred for commercial purposes may be traded with a certificate of captive-breeding or artificial propagation, subject to CITES rules. • At present 25 Appendix I listed species are registered for commercial captive-breeding including: cheetah, various crocodilians, falcons, golden arowana (*Scleropages formosus*) and psittaciformes. • Similarly, there are 110 nurseries in 12 countries registered to commercially trade artificially propagated Appendix I listed plant species.	• Failings include: > Wild collection to stock captive-breeding operations. This led to severe declines of Siamese crocodiles (*Crocodylus siamensis*) in Cambodia, Thailand, Laos and Vietnam (Bezuijen et al., 2013). > Laundering of wild-caught specimens declared as captive-bred (Lyons and Natusch, 2011).

(*continued on next page*)

Table 2 (*continued*)

Nature of intervention	Intervention	Provisions	Notable successes and failures
	Ad hoc species-specific interventions	• Adopted for specific species by Resolution or Decision. • Typically urge or recommend Parties to reduce/eliminate illegal trade by increasing penalties and improving regulation and enforcement effort. • Adopted for African elephant, rhinos, Asian big cats, great apes, bears, Tibetan antelope, musk deer, corals, sea cucumbers and, *inter alia*, turtles and tortoises (see Wijnstekers, 2011). • Only Resolutions on elephants (Res. Conf. 10.10, Rev. CoP16), Asian big cats (Res. 12.5, Rev. CoP16), bears (Res. Conf. 10.8, Rev. CoP14), Saiga antelope (Decision 14.94), musk deer (Res. Conf. 11.7) and bush meat (Res. Conf. 13.11) acknowledge the need to address consumer demand. • Only Resolutions on turtles and tortoises (Res. Conf. 11.9, Rev. CoP13) and sturgeon and paddlefish (Res. Conf. 12.7, Rev. CoP16) recommend engaging with stakeholders involved in trade for conservation purposes. • Notable provisions include: > *African elephant*—creation of MIKE and ETIS to monitor illegal killing and the illicit trade in elephants and their derivatives; two one-off ivory sales in 1999 and 2008 from Southern Africa to Japan and China respectively; and creation of an African Elephant Action Plan. > *Rhinos*—requesting Parties and non-Parties to halt all trade in rhino parts, domestic and international, including a moratorium on the sale of government stocks of rhino products; the destruction of government held stockpiles of rhino horn; and the exertion of political and diplomatic pressure on countries allowing trade in rhino horn. > *Tiger/Asian big cats*—include, *inter alia*, technical and political missions to review wildlife law enforcement capacity in 15 Parties in the 1990s; the creation of a Tiger Enforcement Task Force (TETF) to provide technical advice on wildlife crime and law enforcement (see Reeve, 2002); and the adoption of Decision 14.69 to not breed tigers other than for conservation purposes, i.e. not for trade in their parts and derivatives.	• Notable successes and failures include: • *African elephant* > *Failure*—Although levels of illicit trade in ivory fell after the transfer of the species to Appendix I in 1989, this is attributed to the ban by some (e.g., Orenstein, 2013), but by others to social marketing and media campaigns, and not CITES implementation (e.g., 't Sas-Rolfes, 2000 and Stiles, 2004). > Despite difficulties in determining the impact of decision-making on the number of elephants poached (e.g., Burn et al., 2011), illegal trade in ivory is currently at record levels (Underwood et al., 2013). • *Rhinos* > *Failure*—The 1977 Appendix I listing led to price increases and catalysed poaching ('t Sas-Rolfes, 2000) and early Resolutions urging Parties to take action (e.g., destroying government held stocks of rhino horn) were largely ignored by key Parties (Leader-Williams, 2003). > In response to calls for diplomatic pressure in the 1980s (Res. Conf. 6.10) the US implemented trade sanctions against Taiwan, a consumer of rhino horn (as well as tiger parts) under the Pelly Amendment in the 1990s, and threatened China with sanctions. Domestic trade in rhino horn and tiger parts was subsequently banned in both countries (see Reeve, 2002) and trade fell to negligible levels. However, trade has resurged since 2009, to record levels at present (Biggs et al., 2013), in part driven by (illegal) supply restrictions in terms of a moratorium in South Africa in 2009 (EWT, 2009). • *Asian big cats* > *Failure*—Domestic trade bans in consumer states including Taiwan, China and Japan in the early 1990s, brought about by *ad hoc* interventions including political missions (Reeve, 2002) are considered a success by some (e.g., Gratwicke et al., 2008b). However, international trade continues illegally today, and at record levels in some instances e.g., the tiger (NTCA, 2012; Stoner and Pervushina, 2013).

(*continued on next page*)

Table 2 (*continued*)

Nature of intervention	Intervention	Provisions	Notable successes and failures
Species-specific non-compliance			
	Review of Significant Trade (RST)	• Devised to ensure Appendix II species are not traded at detrimental levels (i.e., compliance with Article IV (3)). • Entails analyses of CITES trade data and where trade may be unsustainable, the formulation of remedial measures, including the transfer of species to Appendix I, hunting controls, trade measures (e.g. quotas) and field studies for species deemed priorities (Reeve, 2002). • 514 species have been subject to review to date including those selected post-CoP15. • Arguably the most extreme measures involved sturgeon (*Acipenseroformes*) in 2000. These included: long-term surveys of stocks in the Caspian Sea; the adoption of a long-term collaborative basin-management system Caspian Sea stocks; and a significant increase in efforts to tackle illicit harvesting and trade and regulation of domestic trade and which were backed up by the threat of trade sanctions.	• An evaluation of the RST was completed in 2012. • Focusing on 6 species it concluded that, despite the difficultly of determining the impact of the RST on the status of species, the process had been successful in catalysing the use of export quotas and international conservation efforts more generally for species subject to review (CITES, 2012). • *Failure*—The repeated entering of species into the process suggests recommended remedial measures have been ineffective, or at least implemented poorly (O'Criodain, 2011). • *Sturgeon* (*Acipenseroformes*) > *Failure*—Vincent et al. (2013) report that in the last decade, and since remedial measures were formulated, the status of sturgeons has gone from primarily Endangered to primarily Critically Endangered suggesting that these measures are failing, though distinguishing between domestic and international trade in this instance is problematic.

in of local communities (Table 2; UNEP-WCMC, 2013), but which are typically excluded when evaluating success in CITES (e.g., Lichtenstein, 2011).

Although not linked to species' status, inferences can be made about the effectiveness of CITES based on trade analyses and policy movements (e.g., Carpenter et al., 2005 and Roe et al., 2002). For instance, the number of wild birds imported to the EU fell from 1.37 million in 2003 to <100,000 a year from 2006 following the establishment of an EU wide import ban (UNEP-WCMC, 2013). Similarly, demand for spotted cat and seal skins declined significantly following CITES listings in the mid-late 20th century as did trade in African elephant ivory to Europe following the 1989 trade ban, all apparent CITES successes (IUCN, 2001; Orenstein, 2013; Roe et al., 2002). However, decreasing trade in these latter examples has otherwise been attributed to changing fashions and media campaigns, not CITES implementation per se ('t Sas-Rolfes, 2000; Stiles, 2004). Hence, it is plausible these outcomes could have been achieved through other means such as marketing campaigns to alter consumer demand. This again demonstrates the complexity of attributing success to CITES. Even for the African elephant and with MIKE and ETIS, evaluating the impact of decision-making on trade and the number of animals poached, even after experimental ivory sales is problematic (Martin et al., 2012; Stiles, 2004). Specifying the counter-factual conditions is also difficult given the complex social, economic and governance, as well biological factors affecting poaching and trade nationally and internationally (e.g., Burn et al., 2011).

In contrast, there is ample evidence demonstrating that the Parties to CITES are failing to control trade in many instances (e.g., Rosen and Smith, 2010 and Phelps et al., 2010), despite the implementation of innovative and sometimes extreme interventions (see *ad hoc* interventions; Table 2). Notwithstanding the complexity of factors affecting species, and although 60 species have been transferred from Appendix I to Appendix II since the inception of CITES (CITES, 2013b; UNEP-WCMC, 2013), 286 species + 20 subspecies have been up listed from Appendix II to Appendix I, which suggest, at least broadly, that the CITES approach may be failing. The repeated re-entering of species into the RST also supports this argument (e.g., O'Criodain, 2011).

Affected species are diverse and include the white rhino and African elephant, most populations of which are listed in Appendix I, but which are currently subject to record levels of poaching and trade (Biggs et al., 2013; Underwood et al., 2013; Martin and Vigne, 2013). Similarly, the number of tigers poached for trade reached record levels in India, a tiger stronghold, in 2012 (NTCA, 2012; Stoner and Pervushina, 2013) while other Appendix I species traded illicitly range from the Snow leopard (*Panthera uncia*), Saiga antelope (*Saiga tartarica*), great apes and other primates, to Asian leopards, musk deer (*Moschus* spp.), Asian bear species, the Tibetan antelope and slender and slow lorises (EIA, 2012; Raza et al., 2012; Shepherd and Nijman, 2008; Stiles et al., 2013; von Meibom et al., 2010; Yang et al., 2003; Nekaris et al., 2010; Thomas, 2013; Shepherd, 2010; Shepherd and Shepherd, 2010; Li and Lu, 2014). Among Appendix II species, orchids (Phelps et al., 2010), marine fishes and corals (Nijman, 2010; Giles et al., 2006), gastropods (Theile, 2005), and poison arrow frogs (Nijman and Shepherd, 2010) are traded illegally, as are pythons and other reptiles, and amphibians, and includes the laundering of wild-caught animals as captive bred (e.g., Lyons and Natusch, 2011; Nijman et al., 2012 and Rasheed, 2013). Pangolins (*Manis* spp.), both in Africa and Asia, are also traded illegally in substantial numbers, despite zero export quotas for wild-caught Asian pangolins traded commercially (Table 2; Challender, 2011 and Challender and Hywood, 2012), as are birds and freshwater turtles and tortoises from across the Appendices (Nijman, 2010; Nijman et al., 2012; Nijman and Shepherd, 2007; Herrera and Hennessey, 2007 and Birdlife, 2011). The clandestine nature of this trade also suggests it involves many more species but goes unrecorded (e.g., Shepherd and Shepherd, 2009). We attribute this failure to five overarching factors that are pervasive across species and interventions.

4.1. Non-compliance

The failure of Parties, especially developing nations, to enact adequate implementing legislation, the key tenet of CITES, undermines the Convention (Reeve, 2002). Of 180 Parties only 51% (88/173; excluding recent accessions and dependent territories) have legislation in place that meets all the implementing requirements under the NLP (CITES, 2013c). A further 49 Parties have legislation that is considered to meet some of these requirements, while 36 Parties have legislation which is deemed to be inadequate. In such circumstances trade sanctions could be imposed against non-compliant Parties. Yet despite their success in bringing about compliance historically (see Sand, 2013), sanctions are generally considered to be the last resort (Reeve, 2006), arguably because Parties are reluctant to force them on one other (Hutton, 2000; Sand, 2013). For example, Pakistan has not been subject to sanctions despite acceding to CITES in 1976 and only very recently enacting legislation (CITES, 2013c). Similarly, only 3 of the 85 Parties with legislation that does not meet all the implementing requirements at present (Djibouti, Somalia and Mauritania) have sanctions imposed for non-compliance on legislation grounds (CITES, 2014d).

Nevertheless, the effectiveness of CITES as a global mechanism to regulate wildlife trade is handicapped by fundamental fault lines among the international community in terms of governance, state–society relations (e.g., rule of law), culture and enforcement capacity (Martin, 2000). For example, ineffective enforcement, insufficient border controls, poor domestic trade controls and corruption and collusion, especially in developing countries and trade and consumer hotspots, impedes effective implementation (e.g., Duckworth et al., 2012; McFadden, 1987 and Reeve, 2002). Likewise, under-resourcing of wildlife agencies, the low priority given to wildlife trade by enforcement agencies generally and the failure to treat illegal wildlife trade as a serious crime all work synergistically to create a weak deterrent effect nationally and internationally (e.g., St John et al., 2012; Wellsmith, 2011 and Shepherd, 2010). These factors are manifested in on-going illegal trade, export quotas being exceeded, the laundering of species, and a failure to implement *ad hoc* species-specific interventions (see Table 2; e.g., Leader-Williams, 2003; von Meibom et al., 2010; Shepherd and Nijman, 2008; Shepherd et al., 2012; Stengel et al., 2011; Challender, 2011; Rosen and Smith, 2010; Natusch and Lyons, 2012 and Nijman and Shepherd, 2012). Although the Parties have responded to governance issues, for example by commissioning voluntary wildlife trade policy reviews (see Res. Conf. 15.2), only four Parties have conducted these to date, and non-compliance with biennial reporting means there is limited knowledge of implementation and enforcement within and among Parties (Reeve, 2006). Yet, there is a clear need for an understanding of issues inhibiting effective governance if better compliance is to be achieved and interventions implemented effectively.

4.2. Over reliance on regulation

Although there is scope to improve enforcement of wildlife trade regulations in many instances, there is growing recognition that a predominant reliance on regulation is proving insufficient to control trade and that additional interventions are needed urgently (e.g., Drury, 2011; Rosen and Smith, 2010 and Veríssimo et al., 2012). This is reflected in trade-driven population declines of many listed-species (e.g., Giles et al., 2006; Lyons and Natusch, 2011 and Theile, 2005) and is particularly apparent where high-value species are concerned, illicit trade in many of which (e.g., Asian pangolins, white rhino and the African elephant) is currently increasing or at conspicuous levels (see Challender and MacMillan, 2014). For example, despite high-level political and financial commitment to tiger conservation in the last 40 years, and the pledging of USD113.8 million by tiger range States to directly tackle poaching over the first 5 years of the Global Tiger Recovery Programme (GTRP, 2012), global tiger populations remain in decline.

Relying on regulation also places the cost of conservation on developing countries, which harbour most CITES-listed species. Yet, this is unsustainable in the long-term due to politico-economic reasons and remains subject to external (e.g. international aid and NGO) funding but which is not guaranteed (see Res. Conf. 9.14, Rev. CoP15; Res. Conf. 10.10, Rev. CoP16; Res. Conf, 16.9; Bulte and Damania, 2005 and Walston et al., 2010). For instance, in light of the recent poaching crisis the cost of protecting elephants in east, west and central Africa and rhinos in South Africa alone has been estimated at USD384 million and USD400 million a year respectively, and rising, but with no guarantee of success in controlling poaching and trade (Martin, 2012b; Martin et al., 2012).

Strict application of trade controls, especially bans, is not inherently beneficial either because trade may persist, be it in a clandestine manner, and have adverse outcomes in conservation terms. For instance, increased profitability from inflated black market prices can incentivise or even exacerbate poaching and attract the engagement of organised criminality ('t Sas-Rolfes, 2000; Biggs et al., 2013). Although data on the profitability of illicit trades is difficult to obtain, sharp increases in the price of rhino horn followed the 1977 rhino trade ban, as did poaching and speculative stockpiling of horns, apparently due to the high profits that could be made, and which led to the local extinction of Black rhino (*Diceros bicornis*) in at least 18 range states ('t Sas-Rolfes, 2000; Leader-Williams, 2003). Steep price increases for whale meat were also apparent following the government crackdown on whaling in Korea in 2004, and prices for a number of high-value CITES-listed species are currently increasing (MacMillan and Han, 2011; Challender and MacMillan, 2014). Also, the surreptitious nature of this trade frustrates assessments of sustainability, with knowledge typically limited to seizures or data from market surveys, and is a major concern, especially for species where trade is primarily illegal (e.g., Asian pangolins; Nijman, 2010 and Barber-Meyer, 2010).

Moreover, relying on regulation is also inadequate because it fails to address the real drivers of trade including rural poverty, growing relative poverty nationally and internationally, and consumer demand (also see Section 3.4; Challender and MacMillan, 2014; Roe et al., 2002 and Drury, 2011). As such, parallels have been drawn against the reliance on regulation in CITES and the failed 'war on drugs', which favoured increasing investment in enforcement effort over actions to tackle drug abuse directly (e.g., Challender and MacMillan, 2014; Poret and Téjédo, 2006 and Werb et al., 2013). In conservation terms, regulation implementing CITES in much of the developing world reduces the complex nature of wildlife trade, which is intrinsically linked to poverty alleviation, tenure rights, rural livelihoods and cultural traditions, into a simple law enforcement problem (Roe et al., 2002; Velásquez Gomar and Stringer, 2011). Yet, this approach typically translates into disincentives for conservation by restricting the direct use of wildlife on which rural communities depend socio-economically (e.g., for food, income and trade) and culturally (e.g., ceremonial hunting; see Abdullah et al., 2011; Donovan, 2004 and MacMillan and Nguyen, 2014). As examples, Malaysia and Botswana have recently introduced new legislation further restricting the use of many species by local communities. Although CITES has recognised this complexity, most recently at CoP16 (see Table 1), decisions to list species in CITES remain focused on trade controls, and socio-economic considerations are considered to be the prerogative of the Parties (Cooney and Abensperg-Traun, 2013; CITES, 2002; Mathur, 2009). However, this is unrealistic in immediate terms as Parties generally have made little provision for local communities in implementing CITES, and results in a dichotomy between globally defined conservation goals and socio-economic realities in the developing world (see Abensperg-Traun, 2009 and Challender and MacMillan, 2014).

Crucially, this approach also typically fails to generate positive incentives for conservation and therefore overlooks any potential benefits from local communities as conservation partners. For instance, community-based approaches have demonstrated the potential to deliver positive outcomes for species conservation and local, economic development (Murphree, 2009; Velásquez Gomar and Stringer, 2011). Examples include community management of the vicuña (*Vicugña vicugña*) and ranching of the Broad-snouted cayman (*Caiman latirostris*) in South America, projects such as CAMPFIRE

(Community Areas Management Programme for Indigenous Resources) in Southern Africa, and community-based trophy hunting of the Suleiman markhor in Pakistan (Abensperg-Traun et al., 2011; McAllister et al., 2009; Wheeler and Domingo, 1997; Taylor, 2009). Important opportunities therefore exist by engaging local communities in implementing CITES though further research and evaluation are necessary to understand the approaches that have and have not been effective, where, and the reasons why (Roe et al., 2009; Murphree, 2009; Abensperg-Traun et al., 2011).

4.3. Lack of knowledge and monitoring of listed species

A lack of knowledge of listed species, in particular population levels, current offtake levels and sustainable harvest rates, undermines CITES, specifically its scientific integrity relating to the making of NDFs (Parsons et al., 2010; Phelps et al., 2010; UNEP-WCMC, 2013). Non-detriment findings are fundamental to the Convention's effectiveness because they apply to all Appendix II (or 97% of) listed species. However, robust NDFs typically prove problematic because most listed species are found in developing countries, where baseline population data and information on offtake levels are lacking, as are the financial and technical resources required to compile these data (Abensperg-Traun et al., 2011; UNEP-WCMC, 2013; de Angelis, 2012). Although CITES has responded by providing guidance on, and holding workshops on the making of NDFs (e.g., in Cancun, Mexico in 2008, also see Rosser and Haywood, 2002), a dearth of knowledge of listed species and harvest rates continues to undermine the NDF process (Smith et al., 2010; UNEP-WCMC, 2013).

Emanating from the Cancun workshop, Smith et al. (2010) highlight ten research areas that could support the making of NDFs specifically, and *inter alia*, they include the impacts of harvesting on wildlife populations, the relationship between information availability and risk in making NDFs, guidance on implementing adaptive management, and enterprises based on the harvesting of listed-species. Enterprises are important because they could simultaneously deliver development benefits to local communities and contribute to species conservation (e.g., through Community Based Natural Resource Management (CBNRM) approaches), though further research on engaging communities in implementation is needed (see Section 3.2; Abensperg-Traun et al., 2011). Similarly, long-term population monitoring (either exact or through adaptive management approaches) could contribute to making NDFs, but in combination with policy analyses could also contribute to understanding the effectiveness of CITES (e.g., Carpenter et al., 2005), but also commands further research (see Section 4.2).

4.4. CITES ignores market forces

Historically, changing demand for wildlife, driven by consumer preferences, has arguably been more influential in controlling wildlife trade than regulation, at least in the west (Abensperg-Traun, 2009; Phillip et al., 2009; Roe et al., 2002). For example, reduced demand for ivory and animal fur clothing in Europe post-1989 has been attributed to the creation of a 'stigma effect' associated with its procurement ('t Sas-Rolfes, 2000; Stiles, 2004). However, CITES functions under the assumption that trade controls work in isolation of market forces (Roe et al., 2002). This is despite acknowledgement of the economic nature of trade and importance of market forces in decision-making (Table 1). For instance, there is no explicit mandate in the listing criteria (Res. Conf. 9.24; Rev. CoP16) to consider markets, especially demand factors (e.g., consumer preferences, social norms driving consumption, or demand elasticity). Proponents of amendments to the Appendices are only required to provide information on how proposed changes to species' listings will '*affect the nature of trade*' (e.g., the purpose and source of trade, and derivatives in trade), but are not required to evaluate their impact on markets and which are ostensibly excluded from decision-making. This is unrealistic though because it is known that demand can serve to undermine trade controls (e.g., Underwood et al., 2013; Challender, 2011 and Biggs et al., 2013), and changes to species' listings can stimulate trade (e.g. Rivalan et al., 2007) and increase prices, which have resulted in adverse outcomes for CITES-listed species (e.g., Rivalan et al., 2007 and Leader-Williams, 2003).

Similarly, a number of species-specific Resolutions have recognised market forces (see *ad hoc* interventions; Table 2), which typically urge the reduction and elimination of demand for given species and/or derivatives traded illegally, but which also make assumptions about demand. Many of the species for which Resolutions have been adopted are in demand in East Asia where wildlife consumption as luxury foods, ingredients in traditional medicines, and as curios is culturally embedded, having been used for hundreds or thousands of years. In contrast to the west, it also remains socially acceptable in some cases and is used to impart social status (Drury, 2011; Zhang and Yin, 2014). Moreover, evidence also suggests that demand for highly threatened and high-value species in East Asia is growing, and may be price-inelastic (e.g., Biggs et al., 2013), that is quantity of a given product consumed changes little with a proportionate increase in price. This has important implications for trade interventions (e.g., Challender and MacMillan, 2014). Growing demand, as a result of rapid growth and increasing affluence in East and Southeast Asia, for example China and Vietnam have averaged close to 9% growth over the last two decades (IMF, 2012), means a now unprecedented number of potential consumers (Drury, 2011; Nijman, 2010). Similarly, potentially price-inelastic demand means that trade controls will, theoretically at least, lead to large increases in the price of wildlife, but have only a minor impact on the quantity of wildlife demanded (IUCN, 2001; Challender and MacMillan, 2014). These factors are important because it is evident that what has worked in the west to alter demand may not necessarily be effective in East Asia. In such circumstances a more appropriate response could be to increase supply (e.g., through ranching, wildlife farming or regulated trade; Bulte and Damania, 2005), and which in theory could reduce prices for wildlife traded illegally, and hence poaching incentives (Biggs et al., 2013). Similar approaches have previously brought about conservation successes (e.g., for crocodilians; Table 2; Hutton and Webb, 2003).

However, the impact of such interventions remains uncertain and further research is needed into both demand and supply-side interventions and their impacts on species and markets (e.g., incentives to poach and consumer demand), and their links to livelihoods. For example, increasing supply could induce changes in consumer behaviour leading to higher levels of demand, while eliminating demand may not result in optimal conservation outcomes where species provide important contributions to livelihoods (e.g., Lombard and du Plessis, 2003). Although recent research has examined wildlife consumption in East Asia it has focused on only a few species to date (e.g., Drury, 2011; Dutton et al., 2011 and Gratwicke et al., 2008a), and there remains little evidence of demand reduction initiatives having led to measurable changes in consumer behaviour (Veríssimo et al., 2012). Similarly, while research has examined the conditions under which supply-side interventions may be effective, further research into their feasibility is needed, addressing issues such as legal vs. illegal supply chain costs and the substitutability of products (e.g., Biggs et al., 2013 and Phelps et al., 2013).

4.5. Influence among CITES actors

Despite a scientific basis for listing species in the Appendices, decisions continue to be made for reasons ranging from the emotional to political (see Section 2.2; Dickson, 2003 and Vincent et al., 2013). For instance, prior to the advent of electronic voting at CoP14 (2007), Parties could be seen following the lead of other, arguably influential nations when casting votes (Martin, 2000). While recognising that CITES is a political endeavour with inherent vested interests, in such instances and where decision-making deviates from a scientific basis it damages the Convention's credibility (e.g., by misapplying trade controls) potentially diluting funding for listed species and overburdening the Appendices (Martin, 2000; Mofson, 2000). Unwarranted retention, inclusion or up listing of species' would establish unnecessarily strict trade controls, with potentially adverse implications for rural livelihoods, while failure to up list or include species' in need of trade regulation could result in potentially unsustainable trade. Unfortunately, broad evaluation of the appropriateness of listing decisions is frustrated by the complexity of determining the effectiveness of CITES (see Section 3). However, CITES has been criticised for an over-representation of charismatic mega-fauna and heterogeneous application of the Precautionary Principle, which raises questions about decision-making in amending the Appendices (e.g., Dickson, 2003; Martin, 2000 and Webb, 2000, 2013). Yet, despite its importance to the determination of trade controls the decision-making process has received little research attention to date (though see Gehring and Ruffing, 2008). Disentangling vested interests from scientific arguments though is essential to better understanding decision-making and thereby the effectiveness of CITES.

While both pro-trade and anti-trade lobbies engage in CITES, it has also been argued that non-state actors, principally NGOs, in pursuit of their own, often very specific agendas, actively seek to, and do, exert substantial influence on CITES decision-making. In particular, narrowing debate to the application of trade controls (e.g., Bryant, 2009; Duffy, 2013; O'Criodain, 2011 and Vincent et al., 2013). This is achieved by building powerful alliances with receptive Parties and 'soft-steering' (i.e. appealing to science to enhance the legitimacy of their own policy positions; see Bryant, 2009; Duffy, 2013 and Riise, 2004). A good example is the manner in which animal welfare and conservation NGOs shaped global debate on the African elephant and claimed a moral victory when the species was up listed to Appendix I (see Duffy, 2013 and Thornton and Currey, 1991). More recently, this narrow approach has been advocated through calls for strict application of the Precautionary Principle (e.g., Born Free, 2007 and Thorson and Wold, 2010). This is particularly noticeable where fundraiser-friendly mega-fauna are concerned (Dickson, 2003; Webb, 2013). Again, such influence can work to undermine CITES. For example, NGOs influenced the decision not to down list the Tanimbar corella (*Cacatua goffini*) from Appendix I to Appendix II in 1994 (CoP9), which had arguably been subject to an unwarranted up listing in 1992 (CoP8), not because it had been inappropriately listed, but because it would have meant NGOs having to report back to their supporters that they were incorrect in supporting the initial up listing, and which would risk damaging their 'expert' status (see Jepson, 2003). Such examples have led some to consider western NGOs as eco-colonialists, drawing comparisons between them and imperialist actors in the Convention's history (e.g., Carpenter et al., 2005 and Kievit, 2000). Moreover, these arguments also suggest that evaluation of the role that non-state actors play in CITES, particularly NGOs, and the scope and implications of their engagement is needed if we are to better understand decision-making, and implement informed interventions which reflect the conservation needs of trade-threatened species.

5. Towards a research agenda to inform multi-faceted interventions

Current, regulatory interventions defined at the international level are failing to control seemingly unsustainable trade in many CITES listed species and though CITES may be being effective in many cases this is not easily apparent. Where existing interventions have proved successful and led to measurable improvements in species' conservation status, they have typically involved the sustainable use of species and regulatory measures have been augmented with buy-in from local communities, efforts to alter consumer demand (e.g., media campaigns) and in certain circumstances supply-side interventions (e.g., ranching). To more effectively conserve trade-threatened species therefore we argue that a broader suite of interventions is needed within CITES and which go beyond regulation to reflect the socio-economic, cultural, and economic complexity of wildlife trade. While such interventions will need to be underpinned by regulation, crucially they should be species- and context-specific; they may necessitate devolution of land or resource tenure, or other incentives to local communities to obtain their buy-in to implementing CITES; they may require additional demand or supply based interventions, informed through research into consumer preferences, demand factors and livelihood considerations; they will likely mean accounting for illegal as well as legal trade (e.g., in CITES reporting), and their effectiveness should be measured against the delivery of benefits to local livelihoods as well species' population trends. Although CITES currently possesses many of the provisions to implement these interventions (e.g., the ability of Parties to devolve land/resource tenure), implementation will require full consideration of factors such as markets, consumer demand and local community engagement in listing-decisions, and which represents a move away from a principally regulatory approach. However, this will also necessitate careful analysis of the Convention text to determine its capacity to deal with this broader approach, potential alterations to the Listing Criteria, and the likely adoption of new Resolutions. Fundamentally though, it will require political will on the part of the Parties. To inform these interventions an intensive research effort is needed and below we outline six key areas where we assert attention should be focused:

5.1. *Factors undermining wildlife trade governance at the national level*

Non-compliance has meant there is little understanding of CITES implementation at the national level, or factors impeding it. Existing research in this area has tended to focus on the scale and extent of non-compliance (e.g., Shepherd and Nijman, 2008 and Shepherd, 2010), on factors undermining regulation more broadly (e.g., Smith et al., 2003 and Wellsmith, 2011), or sought to theorise non-compliance and rule-breaking behaviour (e.g., Keane et al., 2008 and Rowcliffe et al., 2004). However, despite regulation and enforcement being central to CITES there is a notable lack of in-depth, peer-reviewed research examining the factors inhibiting effective implementation within and among Parties, for instance, institutional factors (e.g., enforcement agency structure, cultural norms, staff motivation) or social and cultural factors (e.g., state–society relations, rule of law; exceptions include Carpenter et al., 2005 and Robinson et al., 2010; also see Webb, 2013). Yet, understanding these issues is critical if remedial measures are to be taken facilitating more effective implementation of CITES.

5.2. *Determining sustainable harvest rates for, and adaptive management of CITES species*

To inform decision-making in CITES and to underpin NDFs, there is a need to determine sustainable harvest rates for listed species, to understand their population ecology and to better monitor populations (UNEP-WCMC, 2013; Phelps et al., 2010). To inform NDFs Smith et al. (2010) advocate research on the impact of harvesting on populations and ecosystems, case studies, guidance on adaptive management of species, and among other areas, enterprises based on the harvesting of listed species given their potential to deliver conservation gains and address rural poverty. However, in informing NDFs, and given impediments (e.g., lack of resources) to collecting precise data on most species, consideration should also be given to determinants of finding non-detriment (e.g., incorporating traditional ecological knowledge in to the NDF process). Adaptive management approaches should also be considered as a proxy for more traditional population monitoring, and which could remain robust but would remove the need for exactitude in data collection (Abensperg-Traun et al., 2011). Smith et al. (2010) also advocate research on enterprises and which should include examining markets for specific species and products at local to international levels, in order to assess their feasibility, and how enterprises could contribute to implementation of CITES (e.g., by informing NDFs). Finally, research should include evaluation of the status of species and temporal population trends, either precisely or based on adaptive management measures. Importantly, focusing on adaptive management would not only provide a less resource intensive means of monitoring populations, but could remain robust (see Smith et al., 2010), and in combination with analyses of trade, policy movements and other conservation initiatives (e.g., demand management measures), could provide greater evidence for the effectiveness, or not, of CITES (e.g., Carpenter et al., 2005).

5.3. *Gaining the buy-in of local communities in implementing CITES*

Community-based wildlife management approaches have had notable success in the conservation of CITES-listed species and delivered socio-economic benefits to rural communities (e.g., Frisina and Tareen, 2009 and Abensperg-Traun et al., 2011). Valuable opportunities therefore exist on both these fronts despite the Parties having made few such provisions to date (Abensperg-Traun, 2009). Crucially, this approach also has the potential to remove current disincentives and generate positive incentives for conserving listed species, for example through sustainable use, or payments for protecting populations (e.g., Clements et al., 2013 and Dinerstein et al., 2012). However, if communities are to genuinely buy-in to conservation in the long term, this will likely necessitate going beyond payment systems, which may not always incentivise conservation (e.g., Harihar et al., 2014), to direct negotiations to determine what communities want from such partnerships. For example, greater disposable income, empowerment, land or resource tenure, a start-up enterprise, permission to sustainably harvest listed species, or access to schools and health services (Abensperg-Traun et al., 2011; Challender and MacMillan, 2014; MacMillan and Nguyen, 2014; Wheeler and Domingo, 1997). This represents a more holistic CBNRM approach but despite success to date, it requires further research in order to optimise existing models to understand what has and has not worked, where, and the reasons why (Murphree, 2009; Roe et al., 2009). Furthermore, while sub-Saharan Africa, South America and South Asia boast good examples of CBNRM projects, Southeast Asia does not, yet its position as an illegal trade hotspot suggests it should be a research priority (Duckworth et al., 2012; Nijman, 2010). Likewise, research should examine opportunities for synergy between CBNRM, export quotas and enterprises based on the harvesting of listed species, such as certification schemes, which could also deliver mutual benefits to local communities and species conservation (Aziz et al., 2013).

5.4. Supply and demand based market interventions

Conserving trade-threatened species necessitates understanding markets (Bulte and Damania, 2005). Yet, notwithstanding earlier examples, there is little evidence of targeted demand reduction campaigns having measurably changed consumer behaviour, particularly in East Asia, where demand for high-value species in particular is increasing (e.g., Challender and MacMillan, 2014). Also, given the potential conservation gains from supply-side measures future interventions should consider strategies to increase supply as well, informed through an understanding of consumer preferences, specific markets and local livelihood considerations.

Reducing demand should, all other things being equal, reduce consumption of given species, thereby alleviating harvest pressure on wild populations. To do so requires an in-depth understanding of demand but existing research has focused on only a few species to date (e.g., tiger parts and bear bile—Drury, 2011; Dutton et al., 2011 and Gratwicke et al., 2008a). There is an urgent need therefore, for research on the consumption and/or procurement of many highly-threatened species (e.g., Challender and MacMillan, 2014), and which should seek to understand consumer preferences, key attributes of species in demand (e.g., wild vs. farmed) and the social function they perform, a willingness to accept to substitutes, and the social dynamics of consumption (Challender and MacMillan, 2014; Drury, 2011). This requires an interdisciplinary approach combining consumer psychology, social marketing and education (Drury, 2009; Veríssimo et al., 2012). From a social marketing perspective this approach is critical to ensure that interventions go beyond raising awareness about wildlife consumption. To be effective target audiences need to be reached with the right message through the right communications medium and initiatives should be evaluated in measurable terms, i.e. how effective they are in bringing about changes in consumption (Challender and MacMillan, 2014).

Increasing supply through regulated trade, ranching or wildlife farming should also be considered given the potential to reduce the price of wildlife, and poaching incentives (Bulte and Damania, 2005). However, this also necessitates research into the conditions under which these measures are likely to be effective, as well as potential adverse impacts. For example, it is argued poaching incentives may be reduced only where laundering can be prevented, where a legal supply can reach the market more reliably and cost-effectively than illegal supply, where demand does not escalate to dangerous levels, and where farmed products are direct substitutes for wild products (Biggs et al., 2013). It has also been posited that a number of biophysical, market and regulatory conditions are necessary for supply-side interventions to be effective, but again they require further research and greater evaluation (Phelps et al., 2013). Although supply-side policies do have their opponents (e.g., Gratwicke et al., 2008b), in reality these approaches have been subject to little research (Damania and Bulte, 2007; though see Brooks et al., 2010 and Drury, 2009) and the predicament facing many trade-threatened species therefore commands interventions informed through further in-depth, objective research and which should include evaluation of strategies to increase supply.

5.5. Means of quantifying illicit trade

Many CITES species are traded illicitly but as this trade is not recorded centrally, determining its extent and sustainability is inherently difficult. However, new methods are being applied to determine such parameters and trade dynamics but they require further application, evaluation, and testing. This includes application of ecological field methodologies (e.g., mark-recapture approaches and occupancy modelling), wildlife forensics, advanced modelling (e.g., Underwood et al., 2013), and indirect questioning. For example, Barber-Meyer (2010) has proposed using occupancy modelling to more accurately estimate trade volumes from repeat market surveys and Baker et al. (2007) and Raza et al. (2012) have applied capture–recapture methods, a form of mark-recapture approach, to estimate the extent of illicit trade involving the North Pacific minke whale (*Balaenoptera acutorostratra ssp.*) and the leopard, respectively. Given the potential of such methods to improve the accuracy of illegal trade estimates and to directly inform decision-making and policy (e.g., Burn et al., 2011) we advocate their further application and testing.

5.6. Political processes and influence within CITES

Despite the importance of listing-decisions to determining trade controls for CITES-listed species, the decision-making process itself has received very little research attention to date (exceptions are Gehring and Ruffing, 2008 and Duffy, 2013). However, in light of evidence suggesting decision-making can be, and is, heavily influenced by a range of actors, and which can serve to undermine the Convention's scientific credibility, research seeking to understand this process, and the scope and implications of influence from actors, both state and non-state and pro-trade and anti-trade lobbies, is needed. This is to elucidate such influence, disentangle vested interests from scientific arguments, and inform potential reforms to this process if informed interventions which reflect the conservation needs of species are to be adopted.

6. Conclusion

International trade in wildlife remains a key threat to biodiversity and CITES remains the framework through which it is controlled. Although difficult to measure CITES cannot define many measurable conservation successes and its Parties are failing to prevent seemingly unsustainable trade in many listed species. This is because many Parties are non-compliant, CITES over relies on regulation, there remains a lack of knowledge and monitoring of CITES species, and the Convention is ignorant of market forces in decision-making and implementation terms. Influence among CITES actors also means that decision-making may not reflect the conservation needs of trade-threatened species. To more effectively manage trade, interventions need to go beyond regulation and should be multifaceted reflecting the complexity of wildlife trade and its drivers. However, this necessitates a concerted research effort into factors undermining wildlife trade governance at the national level; sustainable harvest rates and adaptive management of CITES species; gaining the buy-in of local communities in implementing CITES; supply and demand based market interventions; and means of quantifying illicit trade. Only by conducting research in these areas, and into decision-making in CITES can we hope to improve compliance and decision-making, and inform and implement interventions with which to conserve trade-threatened species in the long-term.

Acknowledgements

We would like to thank three anonymous reviewers and Daniel Natusch for helpful comments on earlier versions of this article. D.W.S. Challender was supported by a joint Economic and Social Research Council (ESRC) and Natural Environment Research Council (NERC) studentship (number ES/I028420/1).

References

Abdullah, A., Or, O.C., Fadzil, K.S., 2011. Collectors and Traders. A Study of Orang Asli Involvement in Wildlife Trade in the Belum-Temengor Complex, Perak. Centre for Malaysian Indigenous Studies, University of Malaya, Kuala Lumpur, Malaysia.
Abensperg-Traun, M., 2009. CITES, sustainable use of wild species and incentive-driven conservation in developing countries, with an emphasis on southern Africa. Biol. Conserv. 142, 948–963.
Abensperg-Traun, M., Roe, D., O'Criodain, C., 2011. CITES and CBNRM. In: Proceedings of an International Symposium on The Relevance of CBNRM to the Conservation and Sustainable use of CITES-listed Species in Exporting Countries. Vienna, Austria, 18–20 May 2011, IUCN, Gland, Switzerland, IIED, London, UK.
Amin, R., Thomas, K., Emslie, R.H., Foose, T.J., Van Strien, N., 2006. An overview of the conservation status of and threats to rhinoceros species in the wild. Int. Zoo Yearb. 40, 96–117.
Aziz, S.A., Clements, G.R., Rayan, D.M., Sankar, P., 2013. Why conservationists should be concerned about natural resource legislation affecting indigenous peoples' rights: lessons from Peninsular Malaysia. Biodivers. Conserv. 22, 639–656.
Baker, C.S., Cooke, J.G., Lvary, S., Dalebout, M.L., Ma, Y.-U., Funahasi, N., Carraher, C., Brownell Jr., R.L., 2007. Estimating the number of whales entering trade using DNA profiling and capture–recapture analysis of market products. Mol. Ecol. 16, 2617–2626.
Barber-Meyer, S.M., 2010. Dealing with the clandestine nature of wildlife-trade market surveys. Conserv. Biol. 24, 918–923.
Bezuijen, M.R., Cox Jr., J.H., Thorbjarnarson, J.B., Phothitay, C., Hedemark, M., Rasphone, A., 2013. Status of Siamese Crocodile (*Crocodylus siamensis*) Schneider, 1801 (Reptilia: Crocodylia) in Laos. J. Herpetol. 47, 41–65.
Biggs, D., Courchamp, F., Martin, R.B., Possingham, H., 2013. Legal trade of Africa's rhino horns. Science 339, 1038–1039.
Birdlife, 2011. Review of the illegal killing and trapping of birds in Europe. In: European Conference on Illegal Killing of Birds, Larnaca, Cyprus, 6–8 July, pp. 1–76.
Born Free, , 2007. Inconvenient but true. The unrelenting global trade in elephant ivory. Report Prepared for the 14th Meeting of the Conference of the Parties to CITES 3rd–15th June 2007. The Hague The Born Free Foundation.
Bowman, M., 2013. A tale of two CITES: divergent perspectives on upon the effectiveness of the wildlife trade convention. RECIAL 22 (3), 228–238.
Broad, S., Mulliken, T., Roe, D., 2003. The nature and extent of legal and illegal trade in wildlife. In: Oldfield, S. (Ed.), The Trade in Wildlife. Regulation for Conservation. Earthscan, London, pp. 3–22.
Brook, S.M., Van Coeverden de Groot, P., Scott, C., Boag, C., Long, B., Ley, R.E., Reischer, G.H., Williams, A.C., Mahood, S.P., Hien, T.M., Polet, G., Cox, N., Hai, B.T., 2012. Integrated and novel survey methods for rhinoceros populations confirm the extinction of Rhinoceros sondaicus annamiticus from Vietnam. Biol. Conserv. 155, 59–67.
Brooks, E.G.E., Roberton, S.I., Bell, S.I., 2010. The conservation impact of commercial wildlife farming of porcupines in Vietnam. Biol. Conserv. 143, 2808–2814.
Bryant, R.L., 2009. Born to be wild? Non-governmental organisations, politics and the environment. Geogr. Compass 3, 1541–1558.
Bulte, E.H., Damania, R., 2005. An economic assessment of wildlife farming and conservation. Conserv. Biol. 19, 1222–1233.
Burn, R.W., Underwood, F.M., Blanc, J., 2011. Global trends and factors associated with the illegal killing of elephants: a hierarchical Bayesian analysis of carcass encounter data. PLoS One 6, 1–10.
Butchart, S., et al., 2010. Global biodiversity: indicators of recent declines. Science 328, 1164–1168.
Carpenter, A.I., Robson, O., Rowcliffe, J.M., Watkinson, A.R., 2005. The impacts of international and national governance changes on a traded resource: a case study of Madagascar and its chameleon trade. Biol. Conserv. 123, 279–287.
Challender, D.W.S., 2011. Asian pangolins: increasing affluence driving hunting pressure. TRAFFIC Bull. 23, 92–93.
Challender, D.W.S., Hywood, L., 2012. African pangolins under increased pressure from poaching and international trade. TRAFFIC Bull. 24, 53–55.
Challender, D.W.S., MacMillan, D.C., 2014. Poaching is more than an enforcement problem. Conserv. Lett. 7 (5), 484–494.
Challender, D., Nguyen Van, T., Shepherd, C., Krishnasamy, K., Wang, A., Lee, B., Panjang, E., Fletcher, L., Heng, S., Seah Han Ming, J., Olsson, A., Nguyen The Truong, A., Nguyen Van, Q., Chung, Y., 2014. *Manis javanica*. The IUCN red list of threatened species. Version 2014.2 www.iucnredlist.org (Accessed 29 July 2014).
CITES, 2002. Economics incentives and trade policy (Doc. 18). In: 12th Meeting of the Conference of the Parties to CITES, Santiago, Chile, 3–15 November 2002. CITES, Geneva, Switzerland.
CITES, 2012. Evaluation of the review of significant trade [Decision 13.67 (Rev. CoP14)]. In: Joint Sessions of the 26th Meeting of the Animals Committee and 20th Meeting of the Plants Committee, Dublin, Ireland, 22–24 March 2012 (AC26/PC20 Doc. 7).
CITES, 2013a. CITES (1973–2013) Regulating the world's wildlife trade. CITES, Geneva, Switzerland.
CITES, , 2013b. Amendments to Appendices I and II of the Convention adopted by the Conference of the Parties at its 16th meeting, Bangkok, Thailand, 3–14 March 2013. Notification to the Parties No. 2013/20. CITES, Geneva, Switzerland.
CITES, 2013c. Status of legislative progress for implementing CITES. CoP16 Doc. 28, Annex 2 (Rev.1). CITES, Geneva, Switzerland.

CITES, 2014a. What is CITES? Available from http://cites.org/eng/disc/what.php (Accessed 29 July 2014).
CITES, 2014b. How CITES works. Available from http://cites.org/eng/disc/how.php (Accessed 29 July 2014).
CITES, 2014c. Reporting under the Convention. Available from http://www.cites.org/eng/resources/reports.shtml (Accessed 29 July 2014).
CITES, 2014d. Countries currently subject to a recommendation to suspend trade. Available from http://www.cites.org/eng/resources/ref/suspend.php (Accessed 29 July 2014).
CITES, 2014e. Conference of the Parties. Available from http://www.cites.org/eng/disc/cop.php (Accessed 29 July 2014).
CITES, 2014f. Resolutions of the Conference of the Parties in effect after the 16th meeting. Available from http://cites.org/eng/res/index.php (Accessed 29 July 2014).
CITES, 2014g. Animals and Plants Committees. Available from http://www.cites.org/eng/disc/ac_pc.php (Accessed 29 July 2014).
CITES, 2014h. The CITES species. Available from http://www.cites.org/eng/disc/species.php (Accessed 29 July 2014).
CITES, 2014i. MIKE and ETIS. Available from http://www.cites.org/eng/prog/mike_etis.php (Accessed 29 July 2014).
Clements, T., Rainey, H., An, D., Rours, V., Tan, S., Thong, S., Sutherland, W.J., Milner-Gulland, E.J., 2013. An evaluation of the effectiveness of a direct payment for biodiversity conservation: the bird nest protection program in the Northern plains of Cambodia. Biol. Conserv. 157, 50–59.
Cooney, R., Abensperg-Traun, M., 2013. Raising local community voices: CITES, livelihoods and sustainable use. RECIEL 22 (3), 301–310.
Courchamp, F., Angulo, E., Rivalan, P., Hall, R.J., Signoret, L., Bull, L., Meinard, Y., 2006. Rarity value and extinction: the anthropogenic allee effect. PLoS Biol. 4 (12), 1–6.
Damania, R., Bulte, E.H., 2007. The economics of wildlife farming and endangered species conservation. Ecol. Econ. 62, 461–472.
de Angelis, P., 2012. Assessing the impact of international trade on chambered nautilus. Geobios 45, 5–11.
Dickson, B., 2003. What is the goal of regulating Wildlife Trade? Is Regulation a good way to achieve this goal? In: Oldfield, S. (Ed.), The Trade in Wildlife. Regulation for Conservation. Earthscan, London, pp. 23–32.
Dinerstein, E., Varma, K., Wikramanayake, E., Powell, G., Lumpkin, S., Naidoo, R., Korchinsky, M., Del-Valle, C., Lohani, S., Seidensticker, J., Joldersma, D., Lovejoy, T., Kushlin, A., 2012. Enhancing conservation, ecosystem services and local livelihoods through a wildlife premium mechanism. Conserv. Biol. 27, 14–23.
Donovan, D.G., 2004. Cultural underpinnings of the wildlife trade in Southeast Asia. In: Knight, J. (Ed.), Wildlife in Asia. Cultural Perspectives. RoutledgeCurzon, London, pp. 88–111.
Drury, R., 2009. Reducing urban demand for wild animals in Vietnam: examining the potential of wildlife farming as a conservation tool. Conserv. Lett. 2, 263–270.
Drury, R., 2011. Hungry for success: urban consumer demand for wild animal products in Vietnam. Conserv. Soc. 9, 247–257.
Duckworth, J.W., Batter, G., Belant, J.L., Bennett, E.J., Brunner, J., Burton, J., Challender, D.W.S., Cowling, V., Duplaix, N., Harris, J.D., Hedges, S., Long, B., Mahood, S.P., McGowan, P.J.K., McShea, W.J., Oliver, W.L.R., Perkin, S., Rawson, B.M., Shepherd, C.R., Stuart, S.N., Talukdar, B.K., Van Dijk, P.P., Vie, J.C., Walston, J.L., Whitten, T., Wirth, T., 2012. Why Southeast Asia should be the world's priority for averting imminent species extinctions, and a call to join a developing cross-institutional programme to tackle this urgent issue. Sapiens 5, 1–19.
Duffy, R., 2013. Global environmental governance and North–South dynamics: the case of CITES. Environ. Plann. C 31, 222–239.
Dutton, A.J., Hepburn, C., MacDonald, D.W., 2011. A stated preference investigation into the Chinese demand for farmed vs. wild bear bile. PLoS One 6, 1–10.
EIA, 2012. Briefing on snow leopards in illegal trade—Asia's forgotten cats. Environmental Investigation Agency, London, UK.
ERM, 1996. Study on how to improve the effectiveness of the convention on international trade in endangered species of wild fauna and flora. Final Report to the Standing Committee of CITES, Lausanne, Switzerland.
EWT, 2009. International trade in rhino horn. Available from http://www.ewt.org.za/RHINO/articles/International%20Trade_Rhino%20Horn%20final.pdf (Accessed 9 September 2014).
Frisina, M.R., Tareen, S.N.A., 2009. Exploitation prevents extinction: case study of endangered Himalayan sheep and goats. In: Dickson, B., Hutton, J., Adams, W.M. (Eds.), Recreational Hunting, Conservation and Rural Livelihoods. Blackwell Publishing Ltd., pp. 141–156.
Fuchs, C., 2010. Convention in international trade in endangered species of wild and flora (CITES)—conservation efforts undermine the legality principle. In: von Bogdandy, A., et al. (Eds.), The Exercise of Public Authority by International Institutions. In: Beiträge zum Auslandischen Öffentlichen Recht und Völkerrecht, vol. 210. http://dx.doi.org/10.1007/978-3-642-04531-8_17.
Gehring, T., Ruffing, E., 2008. When arguments prevail over power: the CITES procedure for the listing of endangered species. Glob. Environ. Pol. 8, 123–148.
Giles, B., Ky, T.S., Do, H.H., Vincent, A.C.J., 2006. The catch and trade of seahorses in Vietnam. Biodivers. Conserv. 15, 2497–2513.
Gratwicke, B., Bennett, E.J., Broad, S., Christie, S., Dutton, A., Gabriel, G., Kirkpatrick, R.C., Nowell, K., 2008b. The world can't have wild tigers and eat them, too. Conserv. Biol. 22, 222–223.
Gratwicke, B., Mills, J., Dutton, A., Gabriel, G., Long, B., Seidensticker, J., Wright, B., You, W., Zhang, L., 2008a. Attitudes toward consumption and conservation of tigers in China. PLoS One 3, 1–7.
GTRP, 2012. Global Tiger Recovery Program 2010–2022. The World Bank, Washington, DC.
Harihar, A., Ghosh-Harihar, M., MacMillan, D.C., 2014. Human resettlement and tiger conservation—socio-economic assessment of pastoralists reveals a rare conservation opportunity in a human-dominated landscape. Biol. Conserv. 169, 167–175.
Herrera, M., Hennessey, B., 2007. Quantifying the illegal parrot trade in Santa Cruz de la Sierra, Bolivia, with emphasis on threatened species. Bird Conserv. Int. 17, 295–300.
Hutton, J.M., 2000. Who knows best? Controversy over unilateral stricter domestic measures. In: Hutton, J., Dickson, B. (Eds.), Endangered Species Threatened Convention The Past, Present and Future of CITES. Earthscan, London, pp. 57–66.
Hutton, J., Dickson, B., 2000. Endangered Species, Threatened Convention. The Past, Present, and Future of CITES. Earthscan Publications Ltd., London.
Hutton, J., Webb, G., 2003. Crocodiles: legal trade snaps back. In: Oldfield, S. (Ed.), The Trade in Wildlife. Regulation for Conservation. Earthscan, London, pp. 108–120.
Huxley, C., 2000. CITES: the vision. In: Hutton, J., Dickson, B. (Eds.), Endangered Species. Threatened Convention, The Past, Present, and Future of CITES. Earthscan Publications Ltd., London, pp. 3–12.
IMF, 2012. International monetary fund world economic outlook database. Available from http://www.imf.org/external/pubs/ft/weo/2012/02/weodata/index.aspx (Accessed 12 December 2012).
IUCN, 2001. A report prepared by IUCN—the world conservation union on the effectiveness of trade measures contained in the convention on international trade in endangered species of wild fauna and flora (CITES). Prepared for the Economics, Trade and Environment Unit, United Nations Environment Programme.
Jenkins, R.W.G., 2000. The significant trade process: making appendix II work. In: Hutton, J., Dickson, B. (Eds.), Endangered Species. Threatened Convention. Earthscan Publications Ltd., London, pp. 47–56.
Jenkins, R.W.G., Jelden, D., Webb, G.J.W., Manolis, S.C., 2004. Review of crocodile ranching programs. Conducted for CITES by the Crocodile Specialist Group of IUCN/SSC. IUCN SSC Crocodile Specialist Group, Sanderson, Australia.
Jepson, P., 2003. The need for a better understanding of context when applying CITES regulations: the case of the Indonesian parrott—Tanimbar corella. In: Oldfield, S. (Ed.), The Trade in Wildlife. Regulation for Conservation. Earthscan, London, pp. 153–159.
Keane, A., Jones, J.P.G., Edwards-Jones, G., Milner-Gulland, E.J., 2008. The sleeping policeman: understanding issues of enforcement and compliance in conservation. Anim. Conserv. 11, 75–82.
Kievit, H., 2000. Conservation of the Nile crocodile: has CITES helped or hindered? In: Hutton, J., Dickson, B. (Eds.), Endangered Species. Threatened Convention. Earthscan Publications Ltd., London, pp. 88–97.
Leader-Williams, N., 2003. Regulation and protection: successes and failures in rhinoceros conservation. In: Oldfield, S. (Ed.), The Trade in Wildlife. Regulation for Conservation. Earthscan, London, pp. 89–99.
Li, J., Lu, Z., 2014. Snow leopard poaching and trade in China 2000–2013. Biol. Conserv. 176, 207–211.

Lichtenstein, G., 2011. Use of Vicuñas (*Vicugna vicugña*) and Guanacos (*Lama guanicoe*) in Andean countries: linking community-based conservation initiatives with international markets. In: Abensperg-Traun, M., Roe, D., O'Criodain, C. (Eds.), CITES and CBNRM. Proceedings of an International Symposium on The Relevance of CBNRM to the Conservation and Sustainable Use of CITES-listed Species in Exporting Countries. Vienna, Austria, 18–20 May 2011. IUCN, Gland, Switzerland, IIED, London, UK.
Lombard, C., du Plessis, P., 2003. The impact of the proposal to list devil's claw on appendix II of CITES. In: Oldfield, S. (Ed.), The Trade in Wildlife. Regulation for Conservation. Earthscan, London, pp. 146–152.
Lyons, J.A., Natusch, D.J.D., 2011. Wildlife laundering through breeding farms: illegal harvest, population declines and a means of regulating the trade of green pythons (*Morelia viridis*) from Indonesia. Biol. Conserv. 144, 3073–3081.
MacMillan, D.C., Han, J., 2011. Cetacean by-catch in the Korean Peninsula—by chance or by design? Hum. Ecol. 39, 757–768.
MacMillan, D.C., Nguyen, A.Q., 2014. Factors influencing the illegal taking of wildlife by trapping and snaring among ethnic communities in Vietnam. Oryx 48 (2), 304–312.
Martin, R.B., 2000. When CITES works and when it does not. In: Hutton, J., Dickson, B. (Eds.), Endangered Species. Threatened Convention. Earthscan Publications Ltd., London, pp. 29–37.
Martin, G., 2012a. Game Changer: Animal Rights and the Fate of Africa's Wildlife. University of California Press, Berkeley, Los Angeles, California.
Martin, R.B., 2012b. A Legal Trade in Rhino Horn: Hobson's Choice. Rhino Survival Trust, Johannesburg, South Africa.
Martin, R.B., Cumming, D.H.M., Craig, G.C., Gibson, S.C., Peake, D.A., 2012. Decision-making mechanisms and necessary conditions for a future trade in African Elephant Ivory (SC62 Doc. 46.4 Annex), Consultancy for the CITES Secretariat. CITES, Geneva, Switzerland.
Martin, E., Vigne, L., 2013. Lagos, Nigeria: one of the largest retail centres for illegal ivory surveyed to date. TRAFFIC Bull. 25 (1), 35–40.
Mathur, A., 2009. CITES and livelihood. Converting words into action. J. Environ. Dev. 18, 291–305.
McAllister, R.R.J., McNeill, D., Gordon, I.J., 2009. Legalising markets and the consequences for poaching of wildlife species: the vicuña as a case study. J. Environ. Manage. 90, 120–130.
McFadden, E., 1987. Asian compliance with CITES. Problems and prospects. Boston Univ. Int. Law J. 5, 311–325.
Mofson, P., 2000. Zimbabwe and CITES: influencing the international regime. In: Hutton, J.B., Dickson, B. (Eds.), Endangered Species Threatened Convention The Past, Present and Future of CITES. Earthscan, London, pp. 107–122.
Morgan, D., 2003. The European Community wildlife trade regulations. In: Oldfield, S. (Ed.), The Trade in Wildlife. Regulation for Conservation. Earthscan, London, pp. 70–77.
Murphree, M.W., 2009. The strategic pillars of communal natural resource management: benefit, empowerment and conservation. Biodivers. Conserv. 18, 2551–2562.
Natusch, D.J.D., Lyons, J.A., 2012. Exploited for pets: the harvest of and trade of amphibians and reptiles from Indonesian New Guinea. Biodivers. Conserv. 21, 2899–2911.
Nekaris, K.A.I., Shepherd, C.R., Starr, C.R., Nijman, V., 2010. Exploring cultural drivers for wildlife trade via an ethnoprimatological approach: a case study of slender and slow lorises (*Loris* and *Nycticebus*) in South and Southeast Asia. Am. J. Primatol. 72, 877–886.
Nijman, V., 2010. An overview of the international wildlife trade from Southeast Asia. Biodivers. Conserv. 19, 1101–1114.
Nijman, V., Shepherd, C.R., 2007. Trade in non-native, CITES-listed, wildlife in Asia, as exemplified by the trade in freshwater turtles and tortoises (Chelonidae) in Thailand. Contr. Zool. 76, 207–212.
Nijman, V., Shepherd, C.R., 2010. The role of Asia in the global trade in CITES II-listed poison arrow frogs: hopping from Kazakhstan to Lebanon to Thailand and Beyond. Biodivers. Conserv. 19, 1963–1970.
Nijman, V., Shepherd, C.R., 2012. China's role in trade in ivory and elephant parts from Lao PDR. Oryx 46 (2), 172–173.
Nijman V., Shepherd C.R., Mumpuni, Sanders K.L., 2012. Over-exploitation and illegal trade of reptiles in Indonesia. Herpetol. J. 22, 83–89.
NTCA, 2012. Tiger deaths reach an all time high of 88. Available from http://www.itgernet.nic.in/Alluser/News_Detail.aspx?News_id=1910 (Accessed 12 December 2012).
O'Criodain, C., 2011. CITES and community-based conservation: where we go from here. In: Abensperg-Traun, M., Roe, D., O'Criodain, C. (Eds.), CITES and CBNRM. Proceedings of an International Symposium on "The Relevance of CBNRM to the Conservation and Sustainable Use of CITES-Listed Species in Exporting Countries". Vienna, Austria, 18–20 May 2011. IUCN, IIED, Gland, Switzerland, London, UK.
Oldfield, S., 2003. The Trade in Wildlife. Regulation for Conservation. Earthscan, London.
Orenstein, R., 2013. Ivory, Horn and Blood. Behind the Elephant and Rhinoceros Poaching Crisis. Firefly Books, New York.
Parsons, E.C.M., Rose, N.A., Telecky, T.M., 2010. The trade in live Indo-Pacific bottlenose dolphins from Solomon Islands—a CITES decision implementation case study. Mar. Policy 34, 384–388.
Phelps, J., Carrasco, L.R., Webb, E.L., 2013. A framework for assessing supply-side wildlife conservation. Conserv. Biol. 28 (1), 244–257.
Phelps, J., Webb, E., Bickford, D., Nijman, V., Sodhi, N.S., 2010. Boosting CITES. Science 330, 1752–1753.
Phillip, S., Dandy, N., Gill, R., MacMillan, D.C., 2009. Is legislation a barrier to the sustainable management of game species? A case study of wild deer in Britain. J. Environ. Plann. Manage. 52, 993–1012.
Platt, S.G., Thorbjarnarson, J.B., 2000. Population status and conservation of Morelet's crocodile, Crocodylus moreletti, in northern Belize. Biol. Conserv. 96, 21–29.
Poret, S., Téjédo, C., 2006. Law enforcement and concentration in illicit drug markets. Eur. J. Polit. Econ. 22, 99–114.
Rasheed, T., 2013. Illegal reptilian trade in Chagai Desert, Pakistan: a narrative of bad governance and weakening of traditional institutions. TRAFFIC Bull. 25 (1), 8.
Raza, R.H., Chauhan, D.S., Pasha, M.K.S., Sinha, S., 2012. Illuminating the Blind Spot: A Study on Illegal Trade in Leopard Parts in India (2001–2010). TRAFFIC India/WWF India, New Delhi, India.
Reeve, R., 2002. Policing International Trade in Endangered Species, The CITES Treaty and Compliance. The Royal Institute of International Affairs and Earthscan Publications Ltd., London.
Reeve, R., 2006. Wildlife trade, sanctions and compliance: lessons from the CITES regime. Int. Affairs 82, 881–897.
Riise, T., 2004. Global governance and communicative action. Gov. Oppos. 39, 288–313.
Rivalan, P., Delmas, V., Angulo, E., Bull, L.S., Hall, R.J., Courchamp, F., 2007. Can bans stimulate wildlife trade? Nature 447, 529–530.
Robinson, E.J.Z., Kumar, A.M., Albers, H.J., 2010. Protecting developing countries' forests: enforcement in theory and practice. J. Nat. Resour. Policy Res. 2, 25–38.
Roe, D., Mulliken, T., Milledge, S., Mremi, J., Mosha, S., Grieg-Gran, M., 2002. Making a Killing or Making a Living? Wildlife Trade, Trade Controls and Rural Livelihoods. In: Biodiversity and Livelihoods Issues, vol. 6. IIED, London, UK.
Roe, D., Nelson, F., Sandbrook, C., 2009. Community Management of Natural Resources in Africa: Impacts, Experiences and Future Directions. In: Natural Resource Issues, vol. 18. International Institute for Environment and Development, London, UK.
Rosen, G.E., Smith, K.F., 2010. Summarising the evidence on the international trade in illegal wildlife. EcoHealth 7, 24–32.
Rosser, A.M., Haywood, M., 2002. Guidance for CITES Scientific Authorities. Checklist to Assist in Making Non-Detriment Findings for Appendix II Exports. In: The IUCN Species Survival Commission. Occasional Paper of the IUCN Species Survival Commission, vol. 27. IUCN Species Programme, Gland, Switzerland.
Rowcliffe, J.M., de Merode, E., Cowlishaw, G., 2004. Do wildlife laws work? Species protection and the application of a prey choice model to poaching decisions. Proc. R. Soc. B 271, 2631–2636.
Sand, P., 2013. Enforcing CITES: the rise and fall of trade sanctions. RECIEL 22 (3), 251–263.
Shepherd, C.R., 2010. Illegal primate trade in Indonesia exemplified by surveys carried out over a decade in North Sumatra. Endanger Species Res. 11, 201–205.
Shepherd, C.R., Nijman, V., 2008. The trade in bear parts from Myanmar: an illustration of the ineffectiveness of enforcement of international wildlife trade regulations. Biodivers. Conserv. 17, 35–42.

Shepherd, C.R., Shepherd, L.A., 2009. An emerging Asian taste for owls? Enforcement agency seizes 1236 owls and other wildlife in Malaysia. Birding Asia 11, 85–86.
Shepherd, C.R., Shepherd, L.A., 2010. The poaching and trade of Malayan Sun Bears in Peninsular Malaysia. TRAFFIC Bull. 23, 49–52.
Shepherd, C.R., Stengel, C.J., Nijman, V., 2012. The Export and Re-Export of CITES Listed Birds from the Solomon Islands. TRAFFIC Southeast Asia, Petaling Jaya, Selangor, Malaysia.
Smith, M.J., Benitez-Diaz, H., Clemente-Munoz, M.A., Donaldson, J., Hutton, J., McGough, H.N., Medellin, R.A., Morgan, D.H.W., O'Criodain, C., Oldfield, T.E.E., Schippmann, U., Williams, R.J., 2010. Assessing the impacts of international trade on CITES listed species: current practices and opportunities for future research. Biol. Conserv. 144, 82–91.
Smith, R.J., Muir, R.D.J., Walpole, M.J., Balmford, A., Leader-Williams, N., 2003. Governance and the loss of biodiversity. Nature 426, 67–70.
South, N., Wyatt, T., 2011. Comparing illicit trades in wildlife and drugs: an exploratory study. Dev. Behav. 32, 539–561.
Stengel, C.J., Shepherd, C.R., Caillabet, O.S., 2011. The Trade in Tortoises and Freshwater Turtles in Jakaarta Revisited. TRAFFIC Southeast Asia, Petaling Jaya, Selangor, Malaysia.
Stiles, D., 2004. The ivory trade and elephant conservation. Environ. Conserv. 31, 309–321.
Stiles, D., Redmond, I., Cress, D., Nellemann, C., Formo, R.K., 2013. Stolen Apes—The Illicit Trade in Chimpanzees, Gorillas, Bonobos and Orangutans. A Rapid Response Assessement. United Nations Environment Programme, GRID-Arendal.
St John, F.A.V., Edwards-Jones, G., Jones, J.P.G., 2012. Opinions of the public, conservationists and magistrates on sentencing wildlife crimes in the UK. Environ. Conserv. 39, 1–8.
Stoner, S., Pervushina, N., 2013. Reduced to Skin and Bones Revisited: An Updated Analysis of Tiger Seizures from 12 Tiger Range Countries (2000–2012). TRAFFIC, Kuala Lumpur, Malaysia.
Taylor, R., 2009. Community based natural resource management in Zimbabwe: the experience of CAMPFIRE. Biodivers. Conserv. 18 (10), 2563–2583.
Theile, S., 2005. Status of the queen conch *Strombus gigas* stocks, management and trade in the Caribbean: a CITES review. 56th Gulf and Caribbean Fisheries Institute, pp. 675–694.
Thomas, R., 2013. Massive seizure of Tibetan Antelope wool in Nepal. TRAFFIC Bull. 25 (1), 3.
Thornton, A., Currey, D., 1991. To Save an Elephant. Doubleday, London.
Thorson, E., Wold, C., 2010. Back to basics: an analysis of the object and purpose of CITES and a blueprint for implementation. International Environmental Law Project, Lewis and Clark Law School, Portland, Oregon, US.
't Sas-Rolfes, M., 2000. Assessing CITES: four case studies. In: Hutton, J., Dickson, B. (Eds.), Endangered Species, Threatened Convention—The Past, Present and Future of CITES. Earthscan, London, pp. 69–87.
Underwood, F.M., Burn, R.W., Milliken, T., 2013. Dissecting the illegal ivory trade: an analysis of ivory seizures data. PLoS One 8, 1–12.
UNEP-WCMC, , 2013. CITES at 40: Perspectives, Trade Patterns and Future Prospects. UNEP-WCMC, Cambridge.
Vasquez, J.C., 2003. Compliance and enforcement mechanisms of CITES. In: Oldfield, S. (Ed.), The Trade in Wildlife. Regulation for Conservation. Earthscan, London, pp. 63–69.
Velásquez Gomar, J.O., Stringer, L.C., 2011. Moving towards sustainability? An analysis of CITES' conservation policies. Environ. Policy Gov. 21, 240–258.
Veríssimo, D., Challender, D.W.S., Nijman, V., 2012. Wildlife trade in Asia: start with the consumer. Asian J. Conserv. Biol. 2, 49–50.
Vincent, A.C.J., Sadovy de Mitcheson, Y., Fowler, S.L., Lieberman, S., 2013. The role of CITES in the conservation of marine fishes subject to international trade. Fish Fish. 14, 1–28.
von Meibom, S., Vaisman, A., Neo Liang, S.H., Ng, J., Xu, H., 2010. Saiga antelope trade: global trends with a focus on Southeast Asia. TRAFFIC Project Report to the CITES Secretariat. TRAFFIC Europe.
Walston, J., Robinson, J.G., Bennett, E.L., Breitenmoser, U., Fonseca, G.A.B., et al., 2010. Bringing the tiger back from the brink—the six percent solution. PLoS Biol. 8 (9), http://dx.doi.org/10.1371/journal.pbio1000485.
Weaver, C., Hamunyela, E., Diggle, R., Matongo, G., Pietersen, T., 2011. The catalytic role and contributions of sustainable wildlife use to the Namibia CBNRM programme. In: Abensperg-Traun, M., Roe, D., O'Criodain, C. (Eds.), CITES and CBNRM. Proceedings of an International Symposium on "The Relevance of CBNRM to the Conservation and Sustainable use of CITES-listed Species in Exporting Countries". Vienna, Austria, 18–20 May 2011. IUCN, IIED, Gland, Switzerland, London, UK.
Webb, G.J.W., 2000. Are all species equal? A comparative assessment? In: Hutton, J., Dickson, B. (Eds.), Endangered Species. Threatened Convention. Earthscan Publications Ltd., London, pp. 98–106.
Webb, G.J.W., 2013. Wildlife Conservation: In the Belly of the Beast. Charles Darwin University Press, Darwin, NT, Australia.
Wellsmith, M., 2011. Wildlife crime: the problems of enforcement. Eur. J. Crim. Policy Res. 17, 125–148.
Werb, D., Kerr, T., Noysk, B., Strathdee, S., Montaner, J., Wood, E., 2013. The temporal relationship between drug supply indicators: an audit of international government surveillance systems. BMJ Open (3), 1–8.
Wheeler, J.C., Domingo, H.R., 1997. Community participation, sustainable use and Vicuña conservation in Peru. Mt. Res. Dev. 17, 183–287.
Wijnstekers, W., 2011. The Evolution of CITES, ninth ed.. International Council for Game and Wildlife Conservation.
Yang, Q., Meng, X., Xia, L., Feng, Z., 2003. Conservation status and causes of decline of musk deer (*Moschus* spp.) in China. Biol. Conserv. 109, 333–342.
Zhang, L., Yin, F., 2014. Wildlife consumption and conservation awareness in China: a long way to go. Biodivers. Conserv. 23, 2371–2381.