POLICY FORUM

CONSERVATION

Long delays in banning trade in threatened species

Scientific knowledge should be applied with more urgency

By **Eyal G. Frank**[1] *and* **David S. Wilcove**[2]

The harvesting of wild animals and plants for international trade affects thousands of species, and compounds ongoing extinction threats such as habitat loss and climate change (*1*–*4*). The loss of overexploited species can result in cascading effects that reduce overall ecosystem functioning (*4*, *5*). The primary international framework for preventing the loss of species due to international wildlife trade is the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Given that CITES aims to be as scientifically based as possible (*6*), we analyzed how quickly species that are identified by the International Union for Conservation of Nature (IUCN) Red List as being threatened from trade are subsequently protected under CITES. The Red List represents an authoritative body of scientific knowledge regarding extinction risks. We find that in nearly two-thirds of the cases, the CITES process of regulating trade in threatened species lags considerably behind the IUCN identification of species in need of protection from trade. Such delay in the application of scientific knowledge to policy formulation could result in species extinctions. With signatories to CITES set to gather in May to determine which species merit protection, we suggest opportunities to improve this process.

IMPORTANT TOOLS

The CITES treaty, which has been ratified by 183 party members, was formalized in 1973 and entered into force in 1975 in order to coordinate and regulate international trade in wildlife products. The strongest tool CITES has is to list a species in Appendix I, which restricts trade in that species to "exceptional circumstances" only (*7*). This, in effect, places a trade ban on specimens or their body parts that are caught in the wild for commercial purposes, although it still allows trade for

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International wildlife trade can develop quickly, threatening species with extinction, such as this helmeted hornbill, in just a few years.

personal or scientific reasons, such as the shipping of pets and trophies or the moving of live specimens for captive propagation.

CITES can also list species in Appendix II, which requires monitoring of trade in those species. Trade in species listed in Appendix II requires an export permit after a determination that the level of trade is not detrimental to the survival of the species and that the specimens were obtained in a legal manner (under domestic laws). Signatories to the treaty meet every 2 to 3 years at a Conference of Parties (CoP) where they vote on listing decisions. Listing in Appendix I or II requires approval by a two-thirds majority of party members.

The overall effectiveness of CITES at protecting species from international trade remains an open empirical question. Placing restrictions on trade can potentially increase demand if doing so signals that the species might become extinct in the near future. Also, if trade shifts from legal to illegal markets, it becomes harder to monitor and enforce a trade ban. Nonetheless, CITES is the only global agreement of its kind and, we would argue, an important tool in stemming extinctions due to international trade.

Estimating the true degree of threat facing wildlife populations is challenging. The IUCN is widely considered to be the global authority on the extinction risk of different species, which it assesses using quantitative criteria and compiles into the Red List. The IUCN compiles data on factors that imperil species, such as population declines, habitat loss, and direct harvesting. These assessments follow a systematic process that aims to make them comparable through time and across taxonomic groups (*8*, *9*). Species classified as Vulnerable, Endangered, or Critically Endangered (hereafter "threatened") are considered to be at risk of extinction; a species identified as having "intentional use" as a threat is one that is being directly targeted by collectors, hunters, or trappers.

With growth in international commerce and wildlife markets, coupled with unsustainable levels of legal and/or illegal trade, species can become endangered quickly (*1*, *2*). For example, the helmeted hornbill (*Rhinoplax vigil*) was listed as only Near-Threatened in the Red List in 2012, but a sudden increase in demand around 2011 resulted in it being upgraded to Critically Endangered in 2015 (*10*). The Tapah Islands race of the white-rumped shama (*Copsychus malabaricus opisthochrus*) went from being common to nearly extinct in the wild after only 5 to 7 years of intensive trapping for the pet trade (*10*). An estimated one million pangolins (Manidae) were trafficked from 2000 to 2013 (*11*). Although all pangolin species had been added to Appendix II by 2000, with trade quotas for some species set to zero, seven of the eight species were added to Appendix I only in 2017 in the face of rapidly escalating international trade.

IUCN ASSESSMENT AND CITES LISTING

We collected data on how species targeted by the international wildlife trade were classified by the IUCN and treated by CITES (*12*, *13*) (see supplementary materials for details). We started with species that the IUCN has assessed as Vulnerable, Endangered, or Critically Endangered and for which the IUCN has listed direct harvesting (intentional use) as a threatening factor. We then drew information from IUCN assessments, academic articles, and reports to determine how many of these species were involved in international trade (eliminating those for which direct harvesting appeared to be for domestic use only).

This resulted in 958 threatened species for which we can link international trade as a factor in their endangerment. Because CITES held its two most recent CoPs in 2013 and 2016, we restricted our data to IUCN status assessments from 1994 to 2013, to ensure that assessments were based on the IUCN's more rigorous criteria implemented in 1994 (*14*) and to allow CITES a minimum of 3 years to respond to the IUCN assessments. Information spanning from 1975 to 2018 is presented in fig. S1 and table S3.

Of the 958 threatened, internationally traded species that warranted CITES protection under Appendix I or II, 28.18% were not listed in either appendix. This is a striking, heretofore unrecorded gap in protection from international trade. There were, however, notable differences in protection relative to the severity of harvest pressure. The Red List assesses the severity of harvesting by assigning species an intentional use impact score of 0 (lowest rate of harvest but harvest definitely occurring) to 9 (highest). For each impact score, we determined the percentage of Red List threatened species that actually received protection under CITES Appendix I or II (see the figure, top).

For threatened species for which direct harvesting is an extremely severe threat (impact score 9) and which can be linked with international trade, 75% of species were listed in Appendix I, 20.83% were listed in Appendix II, and 4.17% were not listed in either appendix. All of the Red List's Endangered and Critically Endangered species that are traded internationally and have an intentional use impact factor of 9 are listed in CITES Appendix I or II; only one Vulnerable species with an intentional use impact score of 9 remains unlisted. Thus, trade in the most highly exploited and threatened species has indeed been banned or restricted via CITES. However, for species with impact scores of 8 and below, there are many Endangered and even Critically Endangered species that, to date, have received no protection under CITES.

Beyond examining whether species receive protection under CITES, there is the issue of how long it takes them to receive that protection. We focus on three categories: (i) species assessed by the IUCN as threatened at least partly by international trade and subsequently protected by CITES, (ii) species assessed as threatened at least partly by international trade and not protected by CITES (as of 2018), and (iii) species that CITES protected ahead of any Red List determination that they were threatened at least partly by international trade.

We also summarize the gap (in years) between when each species was assessed by the IUCN as threatened and when it was protected under CITES (see the figure, bottom). Out of 958 species that the Red List classifies as threatened due to intentional use and which are traded internationally, 271 (28.18%) lack CITES protection, 334 (34.86%) received CITES protection after they were assessed by the Red List, and 353 species (36.84%) were protected under CITES before they were assessed by the IUCN as being threatened by international trade.

For this last group of 353 species, it is possible that the parties to CITES had access to information indicating threats posed by trade before such information was available to the IUCN. However, it is also the case that many of the species listed by CITES ahead of the IUCN were the result of higher taxonomic groups (for example, entire genera or families) being added en masse to Appendix I or II. This is sometimes done to ensure that threatened species cannot be easily mislabeled as similar-looking, nonthreatened species and therefore slipped into trade.

Moreover, the process of evaluating species for the Red List is subject to constraints on staffing, funding, or the gathering of scientific information. As a result, certain taxonomic groups have been evaluated by the Red List only relatively recently (*15*). Thus, the large outlier of 127 species added to CITES 18 years before they were assessed by the IUCN (see the figure, bottom) is driven by one group of species: CITES listed 118 corals (class Anthozoa) in 1990, whereas the IUCN did not assess corals until 2008. Mammals were mostly

[1]Harris School of Public Policy and the Energy Policy Institute, at the University of Chicago (EPIC), Chicago, IL, USA. [2]Woodrow Wilson School of Public and International Affairs and Department of Ecology and Evolutionary Biology, Princeton University, Princeton, NJ, USA. Email: eyalfrank@uchicago.edu

assessed and added to the Red List after 1996 and in 2008, and amphibians were mostly assessed and added in 2004.

We also identified 96 and 747 species listed on CITES Appendices I and II, respectively, that are also considered threatened by the IUCN yet are not classified by the IUCN as having intentional use as a threat factor. This may reflect an incomplete cataloging of threats to these species by the IUCN.

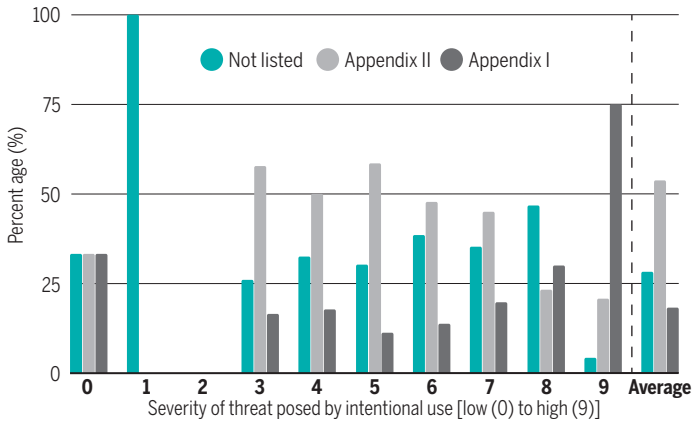
On average, when the IUCN preempts CITES, CITES lists species in Appendix I or II 10.3 years after the IUCN assesses them as being threatened by international trade. When CITES preempts the IUCN, species are assessed as threatened by the IUCN 19.8 years, on average, after they were protected under CITES. For species that are considered by the Red List to be threatened by international trade but have yet to be protected under CITES, we cannot know how long they will have to wait to receive protection under Appendix I or II. For those species, we calculate their lag time as the time since their listing as threatened on the Red List until the end of 2018, which is, on average, 12.4 years. We obtain similar results when focusing on internationally traded Endangered and Critically Endangered species with intentional use impact scores of 6 and above (fig. S2).

We consider the situation in which CITES protection is delayed relative to the Red List finding to be a more severe problem than the reverse situation, when CITES acts ahead of the Red List. The IUCN Red List is purely informational and provides no legal protection to imperiled species, whereas CITES does. Although a species' Red List status by itself does not convey any legal protection, it can play an important role in the allocation of conservation resources and in drawing attention to the species' plight.

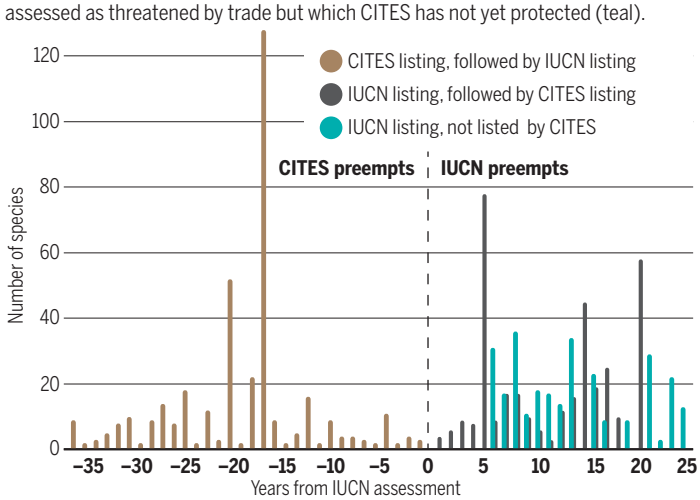
It is important to note that listing under CITES is not sufficient by itself for conservation. CITES coordinates efforts between countries, facilitates the flow of information, and aggregates reports about the levels of trade, but the party members must implement steps through their respective enforcement institutions for there to be real protections.

Overlap and lags between CITES and IUCN listings

Percentage of species under escalating degrees of threat from trade (intentional use impact score) that are listed in CITES Appendix I or II, or are not listed. See figs. S3 and S4 for additional details.



The number of species that CITES protected before (brown) or after (gray) an IUCN assessment as threatened by trade as well as the number of species that IUCN assessed as threatened by trade but which CITES has not yet protected (teal).



RECOMMENDATIONS

To increase the efficacy by which overexploited species receive protection, we offer three recommendations. First, independently from CITES, all countries can use the Red List as a source of information and take measures to protect threatened species found within their borders, including protection from trade. Also, in addition to coordinating trade restrictions, CITES identifies data collection needs and acts as a repository for data; countries can contribute to this process.

Second, hundreds of species that the IUCN classifies as Critically Endangered, Endangered, or Vulnerable due to international trade currently lack CITES protection. To begin to clear this backlog, any signatory nation (party) to CITES can propose that these species be added to Appendix I or II at the next CoP [per Article IV(1)(a)]. Failing that, the CITES Secretariat can at least alert the signatories to the plight of such species under Article XII(2)(e). The ultimate goal should be to create a near-automatic pathway by which unprotected species identified by the IUCN as threatened by international trade receive a prompt vote for inclusion in CITES Appendix I or II.

Third, species that are listed in CITES Appendix I or II but are not classified by the IUCN as threatened should be reassessed by the IUCN as soon as practicable, in case CITES has identified a growing trade threat ahead of the IUCN. Taken together, these steps will improve the degree to which conservation science informs conservation policy and may help to avert the extinction of species due to escalating international trade in wildlife. ■

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SUPPLEMENTARY MATERIALS

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