

Research Assessment Exercise 2020

Impact Case Study

University: The University of Hong Kong (HKU)

Unit of Assessment (UoA): 01 - Biological sciences (incl. environmental biology, biotechnology, agriculture & food science, veterinary studies)

Title of case study:

Reduction of illegal global wildlife trade through novel conservation forensics research

(1) Summary of the impact

Conservation research undertaken at HKU's School of Biological Sciences (SBS) has allowed increased enforcement of national and international laws that protect endangered species and support illegal wildlife trade reduction. Conservation actions stemming from this research have resulted in increased protection of turtles, pangolins, and fish under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and via the International Union for Conservation of Nature (IUCN). Furthermore, newly developed forensics techniques have uncovered extensive criminal activities and supported successful prosecution. As Hong Kong is a global hub for wildlife crime, this research has led to significant reductions in illegal trade.

(2) Underpinning research

The annual illegal trade of protected wildlife is estimated to be worth between USD5–20 billion globally, with demand originating largely from Asia. As many of these illegal wildlife activities have been linked to other kinds of criminality, identifying and restricting this trade is of global concern. Hong Kong is a global hub for the wildlife trade due to its free trade laws, which allow the import, export, and re-export of wildlife products into the rest of Asia, for purposes such as Traditional Chinese Medicine and the pet trade. Consequently, CITES (the international convention that governs the trade of endangered species) has received many petitions seeking increased protection against the trade of a number of species.

The School of Biological Sciences' research on the wildlife trade has involved decades of multidisciplinary work. For example, Prof. David Dudgeon (at HKU from 1982 to present) documented the high number of illegally traded Asian turtles in markets across southern China and strongly highlighted the need for protection (3.1). This research was used to support a successful proposal for increased protection of both Trionychidae and Platysternidae freshwater turtles by placing multiple species under CITES Appendix II and moving others from Appendix II to I.

Further research in SBS influenced the decision to afford Sunda and Chinese pangolin species increased protection by moving them from Appendix II to Appendix I (the highest form of protection under CITES) listings in 2016. All eight species of pangolin are now listed on the International Union for Conservation of Nature (IUCN) Red List, as they are highly sought after in Asia for their scales and meat. Through the clear documentation of historical extinction and extirpation of Asian pangolins, research by Prof. Richard Corlett (3.2) (at HKU from 1988 to 2008) highlighted the large-scale negative impacts of hunting wild populations of pangolins and other mammals across Asia and was an early and crucial indication of overconsumption as a wide ranging threat to these mammals.

In 2016, building upon HKU's history of monitoring illegal trade and the impacts on wild populations (3.1 and 3.2), the Centre for Conservation Forensics (CCF) was established at HKU to investigate the wildlife trade (<https://www.ccf-hku.com>). CCF developed a range of molecular and isotopic forensics and data-analysis tools for countering wildlife crime. These enabled Dr David Baker (at HKU from

2012 to present) to gather the first evidence of the illegal trading of European eels into Asia and Hong Kong (3.3). He genetically identified glass eels (juveniles of the endangered European eel) intercepted by Hong Kong Customs, leading to a successful prosecution (see details of impact below). Furthermore, social network analysis (an analytical technique) of data collected from a range of online sources (3.4) on Chinese seizures of pangolins, led by Dr Timothy Bonebrake (at HKU from 2012 to present), supported the increased protection of pangolins under CITES and IUCN. This research complemented the earlier work by Prof. Corlett detailing impacts of hunting (3.2). Finally, while Prof. Dudgeon's research quantified the illegal turtle trade in physical markets (3.1), Dr Yik Hei Sung (at HKU from 2018 to 2019) quantified the immense online trade in turtles and provided management recommendations for the emerging and critical trade of species on the internet (3.5).

(3) References to the research

HKU principal investigators are in **bold** and postgraduates *italicized*. Citation data from Google Scholar September 2019.

(3.1) **Cheung SM, Dudgeon D** (2006) Quantifying the Asian turtle crisis: market surveys in southern China, 2000–2003. *Aquatic Conservation*, 16, 751–770. doi: 10.1002/aqc.803
(Cited by 137)

(3.2) **Corlett RT** (2007) The impact of hunting on the mammalian fauna of tropical Asian forests. *Biotropica*, 39, 292–303. doi: 10.1111/j.1744-7429.2007.00271.x (Cited by 381)

(3.3) Stein FM, Wong JCY, Sheng V, Law CSW, Schröder B, **Baker DM** (2016) First genetic evidence of illegal trade in endangered European eel (*Anguilla anguilla*) from Europe to Asia. *Conservation Genetics Resources*, 8, 533–537. doi:10.1007/s12686-016-0576-1 (Cited by 5)

(3.4) Cheng W, Xing S, **Bonebrake TC** (2017) Recent pangolin seizures in China reveal priority areas for intervention. *Conservation Letters*, 10, 757–764. doi:10.1111/conl.12339 (Cited by 14)

(3.5) **Sung YH, Fong JJ** (2018) Assessing consumer trends and illegal activity by monitoring the online wildlife trade. *Biological Conservation*, 227, 219–225. doi:10.1016/j.biocon.2018.09.025
(Cited by 3)

(4) Details of the impact

Impact on CITES protection of species

Conservation research undertaken in the School of Biological Sciences has provided information influencing proposals made to CITES for the increased protection of species threatened by illegal trade. Global wildlife trade hotspots include those countries bordering China, but particularly Hong Kong, as it practises free trade and is home to the world's busiest cargo airport. To highlight these issues to the public and authorities, and thus influence policy, Prof. Dudgeon quantified the turtle trade in southern China (3.1), identifying multiple threatened species being sold in food markets, in Traditional Chinese Medicine outlets, and in Hong Kong's pet trade. These results were used in the official CITES proposal for the amendment of Appendices I and II at the 17th meeting of the Conference of the Parties in Sept 2016 (5.1). **The work was successful in the listing of two softshell, freshwater turtles in the Trionychidae family, *Cyclanorbis elegans*, *Cycloderma frenatum* in Appendix II of CITES (5.2).** The trading of this turtle family within China was not subject to CITES regulations prior to this case. Prof. Dudgeon's work was also influential in the successful proposal (5.3) and subsequent **increased protection of the big-headed turtle (family Platysternidae) from Appendix II to I, the highest trade protection available from CITES (5.3).** The species became subject to global enforcement of trade in Sept 2014.

Prof. Corlett’s research (3.2) on the impact of hunting mammals inhabiting Asian rainforests drew attention to the fact that exploitation of the two Asian species of pangolins for international trade was unsustainable, largely illegal, and presented the case for greater enforcement (5.4). Trade in pangolins has been prevalent in China for medicine and food for centuries, resulting in a dramatic recent decline in abundance, with all species of Asian and African pangolin now listed as either “Vulnerable”, “Endangered” or “Critically Endangered”. Further study on trade networks of pangolins in China (3.4) has provided vital information for a report by the wildlife trade non-governmental organization, TRAFFIC, with the lead author stating that the CCF research was “...useful for our work on monitoring the illegal pangolin trade” (5.5). **These studies were then influential in contributing to the successful proposals for the up-listing and increased protection of Sunda and Chinese pangolins from Appendix II to I** at the 17th Conference of Parties for CITES in 2016 (5.4, 5.5). All pangolin species are now subject to trade regulation and, specifically, all international trade of pangolin meat and scales is illegal, with increased enforcement and greater penalties for violation of the law.

Impact on wildlife crime law enforcement

The CCF at HKU provides a professional DNA identification service for the Hong Kong government’s Agriculture, Fisheries, and Conservation Department (AFCD). A case of suspected European eel importation was identified by Hong Kong Customs, and samples were provided to the CCF lab for analysis. Through CCF’s analyses, this case became **the first genetically verified importation of the CITES-listed “Critically Endangered” European eel (*Anguilla anguilla*) into Hong Kong**, leading to a successful publication in collaboration with members from the Sustainable Eel Group in Europe (3.3). This work highlighted the illegal global trade of the endangered European eel (*A. anguilla*) to Asia. The rapid analysis of samples and the provision of evidence to Hong Kong Customs by the CCF lab, together with the publication, **led to a successful prosecution in 2016 (5.6)**. In an email to the CCF, a Hong Kong AFCD Field Officer in charge of seizures noted that “*Your team have already finished the analysis of four cases, the findings were helpful for our case investigation that led to one successful prosecution.*” (5.6). Capitalizing on this success, additional work has built upon the CCF’s molecular techniques for the detection of European eel to develop a reliable, field-based, fast, and cost-effective assay to detect the species in illegal trade, which has led **to two more successful prosecutions in 2019 (5.7)**. These actions highlight the role that the CCF lab has played in **improving the effectiveness of the enforcement of wildlife crime law in Hong Kong**. The results of Dr Yik Hei Sung’s study (3.5) highlighting the scale and scope of the online international turtle trade was used in the recovery plan for the Blanding’s Turtle (*Emydoidea blandingii*) in Canada in 2018 to emphasize the importance of wildlife trade threats to the species and the need for increased enforcement (5.8). This highlights the role that the CCF lab has played in the **conservation and management of endangered species globally**.

(5) Sources to corroborate the impact

(5.1) 2016 proposal for up-listing species of Trionychidae cites Cheung and Dudgeon (2006): <https://cites.org/sites/default/files/eng/cop/17/prop/060216/E-CoP17-Prop-36.pdf>

(5.2) 2016 proposal was successful: <https://www.turtleconservancy.org/news/2016/10/17th-conference-of-the-parties-to-the-convention-on-international-trade-in-endangered-species-of-wild-fauna-and-flora>

(5.3) 2014 successful proposal for up-listing species of Platysternidae cites Cheung and Dudgeon (2006) and went into effect: <https://www.fws.gov/international/cites/cop16/cop16-proposal-appendix-i-listing-of-big-headed-turtle.pdf>

(5.4) 2016 proposal for up-listing Sunda and Chinese pangolins from Appendix II to I cites Pantel and Anak (2010): <https://cites.org/sites/default/files/eng/cop/17/prop/060216/E-CoP17-Prop-11.pdf> which uses and cites Corlett (2007): <https://www.traffic.org/site/assets/files/3168/sunda-pangolin-trade-sabah.pdf>

(5.5) Analysis by Cheng et al. (2017) on pangolin seizures in China informed the briefing paper on pangolin trade by Xu et al. (2016): [see **pdf1** of email from co-author of the TRAFFIC briefing paper], Xu et al TRAFFIC briefing paper available at: <http://static1.1.sqspcdn.com/static/f/157301/27254615/1474377211627/Pangolin-trade-in-China-briefing-paper.pdf?token=M5KBFGwWkxTNgmLB2rCX4AxNYzs%3D>

(5.6) Analysis of samples by the CCF, published in Stein et al. (2016), **was used as evidence in the successful prosecution by Hong Kong government in 2016**: [see **pdf2** of email from AFCD confirming use of the analysis in the case].

(5.7) **Results of Stein et al. (2016)** used in Cardeñosa D., Gollock M. J., Chapman D. D. (2019) Development and application of a novel real-time polymerase chain reaction assay to detect illegal trade of the European eel (*Anguilla Anguilla*). *Conservation Science and Practice*, 39, 1–7. Doi: 10.1111/csp2.39 which has **led to additional prosecutions**:
<https://news.fiu.edu/2019/04/new-dna-test-stops-illegal-shipment-of-endangered-eels/133086>
https://www.news.gov.hk/eng/2019/06/20190613/20190613_192521_465.html

(5.8) Sung and Fong (2018) **cited in the Canadian government recovery strategy for the endangered Blanding’s Turtle**: “Blanding’s Turtle (*Emydoidea blandingii*): recovery strategy 2018” available from: <https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/recovery-strategies/blandings-turtle-2018.html>