

Digital surveillance of the illegal wildlife trade: identifying hot-spots for emerging zoonoses

Amy Sonricker Hansen^{1,2*}, Annie Li³, Damien Joly⁴ and John Brownstein²

¹Department of Epidemiology, State University of New York at Albany, Albany, NY, USA; ²Informatics Program, Children's Hospital Boston, Boston, MA, USA; ³City University of Hong Kong, Kowloon, Hong Kong; ⁴Wildlife Conservation Society, Vancouver, BC, Canada

Objective

We aim to develop an automated, real-time, comprehensive, global system for monitoring official and unofficial reports of illegal wildlife trade activity and to determine potential hot-spot regions for emerging zoonotic pathogens along commonly utilized illegal wildlife trade routes.

Introduction

The illegal wildlife trade is a multifaceted, clandestine industry that has led to the disruption of fragile ecosystems, facilitated the spread of pathogens and led to the emergence of novel infectious diseases in humans, domestic animals and native wildlife (1, 2). The trade is as diverse as it is large, with live and dead wildlife, representing multiple species sold to satisfy human demands for food, medicine, pets and trophies. Wildlife are harvested at astonishing numbers and used for such things as exotic pets, ornamental jewelry and clothing and traditional Chinese medicine (3). An estimated 75% of recently emerging infectious diseases originated from animals (4), which can include both live animals and animal products.

Methods

Freely available RSS feeds from official sources, such as organizations dedicated to ending the illegal wildlife trade to include TRAFFIC, WildAid and the Coalition Against Wildlife Trafficking (CAWT), were used to obtain information on illegal wildlife and wildlife product confiscations. In addition, information was obtained from freely available, disparate Internet sources (including discussion forums, mailing lists, news media outlets and blogs) by utilizing specific keyword search strings. For a 1-year period beginning August 1, 2010, English-language reports were collected on the illegal wildlife trade and interception points were analyzed (Fig. 1). When available, the origin and

intended destinations of illegal wildlife products were also collected to aid in the development of proposed wildlife trade routes and hot-spot regions. Lastly, a comprehensive list of commonly traded species was compiled along with the potential zoonotic diseases that could be spread from traded animals to humans.

Results

From 858 reports collected, elephants (n=107, 12.5%), rhinoceros (n=103, 12.0%), tigers (n=68, 7.9%), leopards (n=54, 6.3%), and pangolins (n=45, 5.2%) were among the most commonly intercepted species (to include live animals and wildlife products). Zoonotic diseases associated with these species include rabies, cowpox, echinococcosis, anthrax, and tuberculosis. Countries with the most illegal wildlife product interceptions included India (n=146, 15.6%), the United States (n=143, 15.3%), South Africa (n=75, 8.0%), China (n=41, 4.4%), and Vietnam (n=37, 4.0%).

Conclusions

Available at <http://www.healthmap.org/wildlifetrade>, the digital wildlife surveillance tool is freely available to both wildlife conservation officials as well as members of the general public and shows real-time reports of illegal wildlife trade activity worldwide as an interactive visualization. The system combines official and unofficial reports with an overall goal of providing a greater understanding of the global wildlife trade network in addition to providing a jumping-off point for the identification of hot spot regions where enhanced surveillance should be implemented for emerging zoonoses.

Keywords

Zoonoses; wildlife; digital surveillance; wildlife trade; zoonotic diseases

References

1. Karesh WB, Cook RA, Bennett EL, Newcomb J. Wildlife trade and global disease emergence. *Emerg Infect Dis*. 2005;11:3.
2. Gratwicke B, Evans M, Jenkins P, Kusriani M, Moore R, Sevin J, et al. Is the International frog legs trade a potential vector for deadly amphibian pathogens? *Front Ecol*. 2010;8:5.
3. TRAFFIC The Wildlife Trade Monitoring Network. Our work: wildlife trade. 2008 [cited 2011 April 14]; Available from: <http://www.traffic.org/trade/>.
4. Taylor L, Latham S, Woolhouse M. Risk factors for human disease emergence. *Philos Trans R Soc Lond B Biol Sci*. 2001;356:6.



Fig. 1. The wildlife trade website (<http://www.healthmap.org/wildlifetrade>) showing time period from August 1, 2010 to July 31, 2011. Pins show locations of interceptions of illegally traded wildlife, as provided in reports received through the automated system.

*Amy Sonricker Hansen

E-mail: al Hansen@albany.edu