



Short communication

Enforcement seizures reveal large-scale illegal trade in India's tortoises and freshwater turtles

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ABSTRACT

Illegal trade in tortoises and freshwater turtles (TFTs) for pet, meat and traditional medicine markets in East and Southeast Asia poses significant threats to wild TFTs globally. South Asian countries such as India are believed to be disproportionately large sources of wild TFTs in illegal international markets, but the nature and dynamics of this trade in India are poorly understood. Using data from 223 enforcement seizure reports obtained through systematic online searches, we show that at least 15 of India's 28 TFT species, including 10 IUCN Threatened species, are illegally harvested, with over 58,000 live individuals seized during 2011–15. *Geochelone elegans*, *Geoclemys hamiltonii* and *Lissemys punctata* were recorded in the largest number of seizures and comprised the largest numbers of TFTs seized overall. Nearly 90% of all seizures were from illegal commercial trade, and there were numerous reports of Indian TFTs being transported by road, rail and air within India, as well as to known pet and meat trading hubs in Bangladesh, Thailand, and four other East/Southeast Asian countries. Commercial trade of live TFTs now targets twice as many Indian species as reported in the 1990s. Alongside illegal harvests for local consumption and TFT body parts for traditional East Asian medicines, this illegal trade poses a growing threat to Indian TFTs. Our findings indicate that building awareness and capacity for handling TFT seizures among enforcement agencies, and strengthening international cooperation for law enforcement, are important steps needed for conserving India's endangered tortoises and freshwater turtles.

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1. Introduction

Illegal wildlife harvest and trade is one of the largest illegitimate businesses globally, with an estimated annual market value of around US\$ 20 billion, and is a growing global biodiversity threat (Haken, 2011; Maxwell et al., 2016; Rosen and Smith, 2010; UNODC, 2016). In East and Southeast Asia, there exists a large and growing market for tortoises and freshwater turtles (TFTs) for pets, meat and use in traditional medicines (Chen et al., 2009; Cheung and Dudgeon, 2006; Gong et al., 2009; Haitao et al., 2008; Harrison et al., 2016; Nijman, 2010; Nijman and Shepherd, 2014; van Dijk, 2000). This international trade is an important driver of the ongoing Asian turtle crisis, with over half of all Asian TFT species currently threatened with extinction (van Dijk et al., 2012).

While East and Southeast Asia are the largest markets for illegally traded TFTs globally (Cheung and Dudgeon, 2006; Gong et al., 2009; Nijman and Shepherd, 2014), around 25% of the seizures of illegally traded TFTs originate from South Asia (UNODC, 2016). Globally, India ranks sixth, in terms of TFT richness, and is recognized as a TFT 'mega

diverse country', with the Gangetic plain in particular considered a TFT diversity hotspot (Buhlmann et al., 2009; Mittermeier et al., 2015). Over 78% (22 species) of Indian TFT species are considered threatened with extinction i.e. either Vulnerable, Endangered or Critically Endangered in the International Union for Conservation of Nature and Natural Resources (IUCN) Red List of Threatened Species (Supplementary Table 1). Although Indian laws prohibit harvest and trade of native TFT species, illegal commercial trade in Indian TFTs has long been recognized (Choudhury and Bhupathy, 1993; Moll, 1990). However, an in-depth understanding of this illegal trade is limited to the Star Tortoise (*Geochelone elegans*) and, to a lesser extent, the Spotted Pond Turtle (*Geoclemys hamiltonii*), both of which are traded in international markets (Chng, 2014; D'Cruze et al., 2015). Apart from these two species, there is a paucity of information on what species are traded, in what volumes, and on TFT trading hotspots and mechanisms. Given that international TFT markets are known to be highly dynamic, with demands regularly shifting to new species (Nijman and Shepherd, 2014), understanding the current illegal trade in India is essential for conserving India's endangered tortoises and freshwater turtles.

As in the case of most illegal wildlife trade, documenting and understanding illegal TFT trade can pose a considerable challenge, owing to its highly clandestine nature. Recent studies have taken advantage of the

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increasing availability of and ease of access to media reports on enforcement seizures to obtain new insights into the workings of illegal wildlife trade networks (Patel et al., 2015). Although such datasets are prone to biases arising from variation in enforcement effort and effectiveness, they are currently perhaps the best source of information for documenting and understanding illegal wildlife trade (Hansen et al., 2012). Here, we use media reports of seizures of Indian TFT species, obtained through systematic online searches, to study the characteristics of the illegal trade in India during 2011–15. Specifically, we (1) assess what TFT species are present in seizures, how frequently they are encountered and in what volumes, (2) examine shifts in TFT species targeted for trade from 1990s to present, based on comparisons with previous reports, and (3) identify TFT trading hotspots, in terms of preferred trading hubs and routes, both within India and internationally.

2. Materials and methods

2.1. TFT seizure data

We collated information on TFT seizures by systematically searching global online media reports on seizures made between 1st January 2011 to 31st December 2015. We employed a combination of active searches and automated alerts to locate reports of TFT seizures in online newsletters, newspapers, news channels, blogs and YouTube channels. For our searches, we used phrases commonly linked to TFT seizures, such as “turtle seizure”, “tortoise seizure” and “wildlife trade”. Reports in English, and six Indian languages which were translated to English, were retained for further analysis. We reviewed reports to (1) retain those on seizures of live tortoises and freshwater turtles in India and international seizures of Indian species originating from India and (2) follow up on leads from the reports to locate information on other relevant seizures of live Indian TFTs. For each report, we extracted information on the seizure location, numbers and species identities of the seized animals, whenever possible. Internet search results containing information on TFT species from other South Asian countries and information on seized TFT parts were also noted separately (Supplementary Table 2), and not included in any of the analyses. As our searches were not geared to detect reports in other languages, seizures of Indian TFTs outside India that were not reported in English are likely to have been missed, thus underrepresenting international trade in Indian TFTs.

Because media reports do not always provide reliable information on seizure composition, species identities were only recorded from reports that attributed identification to subject experts, trained enforcement agencies (e.g. forest department, wildlife wings of customs and police) and wildlife NGOs having relevant expertise in the respective regions (25% of seizures). In cases where reports were accompanied by seizure photographs or videos, or such visuals were independently obtained from participating experts/officials, these were reviewed by the authors in consultation with other TFT experts to identify as many of the species involved as possible (35% of seizures). For the remaining 40% of seizures, there neither was adequate information within the reports, nor were we able to independently obtain visuals or expert inputs to ascertain species identities. News media photographs that were used for species identification were first run through reverse image search applications such as Google Images and TinEye to ensure that they were actually from the reported seizure, and were not file images. In cases where species identities could not be confirmed, seized animals were either classified to genus (e.g. *Pangshura* spp.) or family level (e.g. unidentified soft-shell/Trionychidae), or left unidentified.

Seizure sizes were obtained from media reports, and where multiple articles on the same seizure reported different numbers, the more conservative estimates were recorded. We recorded the geographic coordinates of each seizure as well as more specific information on seizure locations, such as whether the animals were seized at the point of harvest, in transit (e.g. rail/road/air), or in pet shops or warehouses. Animals seized in transit or in pet shops and warehouses were classified

as being in commercial trade, while seizures that appeared to be for subsistence use, or for which end use was not clear (e.g. seizures made at source or in private residences), were marked as non-commercial and unknown, respectively. Given that some fraction of harvests that appear to be for subsistence use may also be commercially sold, as has been observed elsewhere in the tropics (Nasi et al., 2008), our assessment of commercial trade is likely to be a conservative one. For seizures in transit, consignment origins, destinations and transit routes were also recorded, whenever such information was clearly traceable (e.g. flight records in airport/air transit seizures).

2.2. Analysis

We assessed species' prevalence in seizures from 2011–15 by calculating the proportion of total seizures in which each species was reported (frequency) and total numbers of individuals of each species seized (volume).

To evaluate shifts over time in species recorded in commercial trade, we compared the species list from our 2011–15 dataset with the list of species reported in commercial trade in India during the early 1990s (Choudhury and Bhupathy, 1993). Based on these comparisons, we identified species that were previously unreported in commercial trade in India, and those that were previously traded, but not reported currently.

Finally, we used information on geographic locations and transit status of seizures to generate maps of trading hotspots and routes.

Data were analyzed and plotted using R-3.0.2 (R Core Team, 2013). Maps were made using R-3.0.2 (R Core Team, 2013) and ArcGIS-9.3 (ESRI, 2006).

3. Results

We obtained media reports of 223 seizures containing live Indian TFTs during the period from 1st January 2011 to 31st December 2015. Over 91% of these seizures were made in India, while the remaining 9% were of TFTs that originated from India and were seized in Bangladesh, Thailand and China. At least 58,442 TFTs belonging to at least 15 species (54% of India's TFT species) were reported in seizures during the study period (Table 1). Quality and completeness of information varied across seizures: overall seizure sizes were known for 98% of the seizures and all seized TFTs were identified to at least the family level in 56% of the seizures. On the other hand, nearly 50% of the seizures contained some unidentified species and/or incomplete species-wise counts. The number of confirmed species per seizure ranged from 1 to 5 (47% contained a single identified species) and numbers of individuals per seizure ranged from 1 to 4980 (median = 81 individuals).

Hard-shell turtles (nine species) and tortoises (three species), which were present in at least 50% of the seizures, contributed at least 13,135 individuals. Soft-shell turtles (three species) were present in at least 22% seizures and contributed at least 5831 individuals seized. *G. elegans* (8533 individuals), *G. hamiltonii* (4011 individuals) and *Lissemys punctata* (5186 individuals) were the most commonly encountered species, occurring in at least 23%, 20%, 12% of the seizures respectively (Fig. 1). Ten Threatened species (seven Vulnerable and three Endangered) were recorded in the seizures, including the Endangered *Chitra indica* (six seizures, at least 68 individuals) and *Indotestudo elongata* (one seizure, two individuals) (Table 1). The seizures also recorded two Indian endemic species, namely *Vijayachelys silvatica* (one seizure, seven individuals) and *Indotestudo travancorica* (one seizure, one individual).

Nearly 90% of seizures, and 99% of all seized TFTs, were classified as being in commercial trade (i.e. in transit and in pet shops, or stored in warehouses), while the remaining seizures were classified as non-commercial or unknown. Out of the 15 species detected across seizures in this study, 14 were also recorded in commercial trade seizures (Table 1). In comparison, surveys in the 1990s only recorded seven

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