



## Scale of the issue: Mapping the impact of the COVID-19 lockdown on pangolin trade across India

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### ABSTRACT

Recent studies have linked COVID-19 induced restrictions to an increase in wildlife crime, with severe yet unknown implications for severely threatened taxa like pangolins. We analyze publicly available online seizure reports involving pangolins across India before (2018–2019) and during the pandemic (March–August 2020), using a longitudinal study design to estimate how lockdowns have impacted pangolin trade. Our analysis indicates a significant increase in seizures reported during the lockdown months of March to August 2020, in comparison to the same period in 2018 and 2019. We discuss the drivers behind this spike in pangolin trade and offer potential conservation measures.

### 1. Introduction

The COVID-19 pandemic has produced a myriad of impacts across all spheres of human life. The most standard response to containing the virus globally has been ‘lockdowns’ - complete or partial suspension of movement, international travel, economic activity, and public gatherings. This has had immense socio-economic and environmental consequences. Short-term positive effects on the environment - reductions in pollution and an overall improvement in air quality - have been observed in several regions worldwide (Diffenbaugh et al., 2020). However, the negative impacts of the lockdown on the global economy, including an increase in global poverty, food insecurity and loss of income, have led to adverse environmental impacts such as accelerated deforestation and increase in wildlife crime (Diffenbaugh et al., 2020). Several studies have suggested that such livelihood loss coupled with increased human confinement and limited conservation enforcement would have inadvertently increased likelihood of poaching of wildlife (Bakar and Rosbi, 2020; Bates et al., 2020; Buckley, 2020; Rutz et al., 2020). Such spikes in poaching during lockdown have already been witnessed in southern African parks (Roth, 2020), Morocco (Cherkaoui et al., 2020), and Italy (Manenti et al., 2020). Similar trends have also been observed in Asia, including India (Dalton, 2020; Special Correspondent, 2020; Ghosal and Casey, 2020; Saeed et al., 2020).

The pandemic has highlighted the dangers of zoonotic spillovers

from wild animals to humans from illegal wildlife trade (IWT), and wild meat consumption especially in mammals (Zhou et al., 2020). IWT is defined as a green crime encompassing illegal trade, smuggling, poaching, capture or collection of endangered species, protected wildlife, their derivatives or their products (Wyatt, 2009). Studies show that SARS-CoV-2 is closely related to a pangolin coronavirus (pangolin-CoV-2020), suggesting the potential role of trafficked Malayan pangolins in the transmission of SARS-CoV-2 (Zhang et al., 2020). Hunting and IWT is affecting biodiversity, disrupting ecosystems, facilitating pathogen spillovers and spread of novel infectious diseases in humans and wildlife (Gratwicke et al., 2010; Karesh et al., 2005). Millions of wild animals are traded yearly for traditional medicine and bush meat, spreading risks of zoonoses (Karesh et al., 2005; Nijman, 2010). Several zoonotic outbreaks have become full-blown epidemics in recent decades, including Nipah in 1999 and 2001 (Hughes et al., 2009), SARS in 2003 and Ebola in 2004 and 2014 (Coltart et al., 2017), resulting in high human and wildlife fatalities (Bermejo et al., 2006).

Pangolins are among the most threatened taxa globally. Of the eight pangolin species, four are distributed across Asia, while the other four range across Africa (Gaudin et al., 2009). All eight are listed under Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), which places a blanket ban on international commercial trade in wild-caught specimens. Yet, pangolins are one of the most widely trafficked mammals globally (Challender

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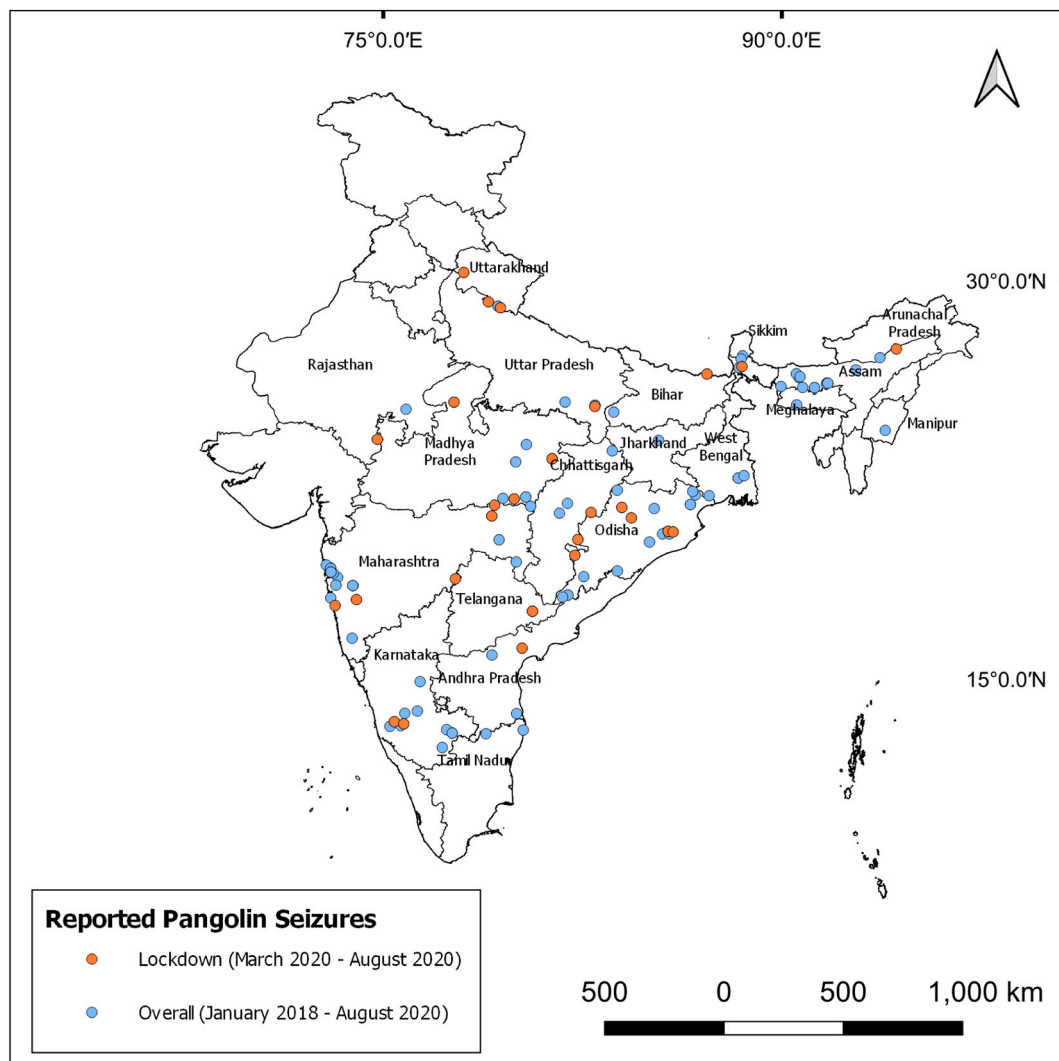
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**Fig. 1.** Reported pangolin seizures during the overall study period (January 2018–August 2020) and the lockdown period (January 2020–August 2020). Labeled states denote states with reported seizures during study period (additional information: Supplementary Table 1).

et al., 2014; Challender et al., 2020). Studies estimate that more than a million pangolins originating from Asia and Africa, have been trafficked globally between 2000 and 2013 (Challender et al., 2014). Pangolins are widely hunted and traded across Asia for their meat, skin and scales (Challender et al., 2015; Nijman et al., 2016). India is home to two pangolin species, the Indian (*Manis crassicaudata*) and Chinese (*Manis pentadactyla*), classified as Endangered (EN) and Critically Endangered (CR) respectively, in the IUCN Red list of Threatened Species (Challender et al., 2019; Mahmood et al., 2019). Both species have endured decades of heavy hunting and trade that has decimated their populations (Aditya et al., 2020b; in press). Across its range, pangolins are widely hunted for meat and trade in India (McEvoy et al., 2019) where an estimated 6000 pangolins were seized from between 2009 and 2017 (Choudhary et al., 2018), despite receiving highest levels of protection in India (under Schedule I of the Wild Life (Protection) Act, 1972) and internationally under CITES Appendix I.

In India, lockdowns were implemented in four phases between 25 March–14 April; 15 April–3 May; 4–17 May; 8–31 May, followed by implementations of varying relaxations in lockdown restrictions through ‘Unlock 1.0’ (1 June–30 June), ‘Unlock 2.0’ (1 July–31 July) and subsequent versions. There is increasing anecdotal evidence of hunting and trade in pangolins from March this year, since the COVID-19 pandemic and nationwide lockdown began (Aditya et al., 2020a; Toi,

2020a, 2020b). In this study, we use online media-reported seizure incidents to investigate trends in illegal trade in pangolins in India before (2018–2019) and during the COVID-19 lockdown (March–August 2020).

## 2. Methods

We conducted an exhaustive scan of online media reports of pangolin seizures between January 2018 and August 2020. Data was collected using the Google search engine, by opportunistically employing a diverse combination of keywords including ‘pangolin seiz’, ‘pangolin poach’, ‘pangolin seizure’ for the time period under consideration. Additionally, to facilitate a comprehensive comparison of reported seizures during the lockdown (March–August 2020), with the same time period of 2018 and 2019, we conducted a month-wise search for March–August of 2018, 2019 and 2020 using the keyword ‘pangolin’. All resulting search pages in both Google and Google news search were scanned for relevant media reports. From each report, we extracted information on date of reporting, seizure location, product type (animal-live, animal-dead, or scales) and product quantity. For the lockdown period, we descriptively recorded details on location type and method of operation. Each of these details was cross verified with other media reports on the same seizure incident. However, results of our study need

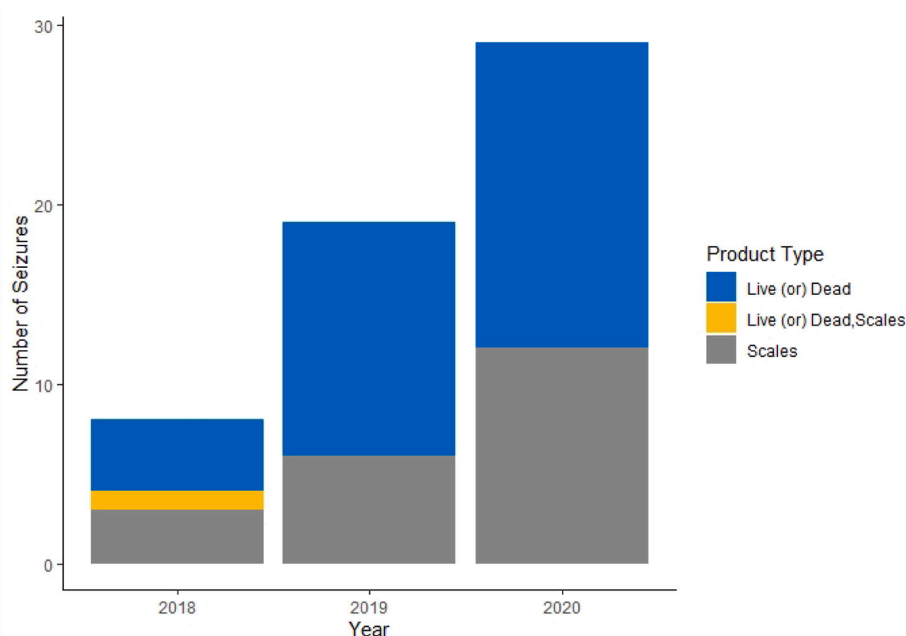


Fig. 2. Reported pangolin seizures between March to August, of 2018, 2019 and 2020.

to be interpreted with caution due to the biases associated with media report data, namely bias due to variability in media reporting and enforcement efforts across regions (Underwood et al., 2013; Mendiratta et al., 2017). We used a chi-square goodness-of-fit test for assessing change in number of pangolin seizures and number of live or pangolins seized, during the COVID-19 lockdown months (March–August) of 2020, relative to the same months of 2018 and 2019. We qualitatively discuss patterns in online pangolin trade nationwide during the 2020 lockdown. Data was analyzed using R (4.0.2). Maps were made on QGIS 3.16.5.

### 3. Results

We recorded a total of 117 pangolin seizures between January 2018 and August 2020 from 19 states across India (Fig. 1). 76 and 38 reported seizures across the study period involved either live (or) dead pangolins or pangolin scales respectively, of which 17 and 12 seizures pertaining to each of the product types occurred during the lockdown (March–August 2020). Of the 19 documented states, pangolin seizures were recorded in 12 states (Supplementary Table 1) during the lockdown period (March–August 2020). Western and Eastern states - Maharashtra and Odisha, were observed to have the highest reported seizures during the study period (January 2018–August 2020), of which seizures that occurred during the lockdown comprised approximately 20% and 25% of the total number of seizures, respectively.

Of the total recorded seizures, 30 seizures were recorded in 2018, 49 in 2019 and 38 in the 8 months of 2020 (January 2020 – August 2020) (Fig. 2). Comparing only the reported seizures from the COVID-19 lockdown months (March–August) of 2020 with the same period of 2018 and 2019, there were 29 pangolin seizures reported in 2020, 19 in 2019 and 8 in 2018, indicating a statistically significant increase from 2018 to 2020, but not from 2019 to 2020 (Chi-square Test 2018/2020: X-squared = 11.919, df = 1, p-value = 0.0005557). Likewise, we recorded a statistical difference in the number of live (or) dead pangolins seized during lockdown months March–August of 2020 with the same period of 2018, but not with 2019 (number of live or dead pangolins seized (2018) = 5, (2019) = 14, (2020) = 22; Chi-square Test 2018/2020: X-squared = 10.704, df = 1, p-value = 0.001069).

### 4. Discussion

In this study, we assessed 117 publicly available media reports of illegal trade in pangolins in India between 2018 and 19, the 'pre-lockdown' period and March to August 2020, the 'lockdown' period. Our results indicated an increase in reported pangolin seizures during lockdown months (March–August of 2020) in comparison to the same time period in 2018 and 2019. Several reasons might have contributed to this observed increase. The sudden reverse migration from cities to villages, decimation of rural livelihoods during the lockdowns caused by the loss of employment, shutdown of towns and institutions of education and employment has resulted in greater reliance of rural communities on forests for livelihood (Chakraborty and Maity, 2020). This increased dependence on forests could have likely contributed to the increase. In addition, there has been a general global decline in the risk of wildlife crime being detected, due to restricted access to forests and country side, combined with reduced enforcement activity (Evans et al., 2020). Alternatively, increased enforcement effectiveness (Sharma et al., 2014) and increased global pandemic-induced spotlight on pangolins (Zhang et al., 2020) may have also contributed to our results. While we attempted to do an exhaustive scan of media-reported seizures on pangolins, we acknowledge that the actual number of pangolin seizures and the number of pangolins trafficked in India may far exceed the results from our study, as a large proportion of illegal trade of pangolins may go unreported or undetected.

We examined reported seizures (29 incidents) during lockdown period of 1st March to 31st August 2020. Details concerning suspects mentioned in recorded seizures varied from members from armed forces, elected village heads, students, tribal communities, snake rescuers, and businessmen. Reported incidents collectively indicated the organizational structure of local poachers hunting pangolins and/or extracting scales, whereas local traders facilitating collection of pangolins/pangolin scales from such poachers. Local traders were also noted as persons with potential illegal trade network connections spread out across various districts and states. One report indicated a suspect with an illegal trade network connection to Myanmar. Another incident included the case of a pangolin trader (under the pretext of selling vegetables), recruiting a local poacher to hunt pangolins and extract scales. Reported seizures collectively indicated presence of similar instances, where local traders played the role of scouting poachers to

collect/hunt pangolins. These instances were observed despite varying lockdown-induced restrictions that were in place throughout the lockdown period of March 2020 to August 2020. Additionally, four reported seizures also indicated usage of online platforms to sell pangolins/pangolin scales. Recent studies (Morcatty et al., 2021; WJC, 2020) have recorded similar instances of persistence of illegal wildlife trade through the COVID-19 lockdown through the use of online platforms.

The COVID-19 pandemic has highlighted the role played by IWT in causing zoonotic spillovers which can spiral into global pandemics, while further threatening endangered species like pangolins (Coltart et al., 2017; Gratwicke et al., 2010; Karesh et al., 2005; Zhou et al., 2020). We conclude that the spike in hunting and trade of pangolins across India during the COVID-19 pandemic (March to August 2020), may have affected population which were already being impacted by human hunting and habitat degradation.

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### CRedit authorship contribution statement

Conceptualization: VA, RG, AM

Data curation: VA, AM, RR

Investigation; methodology; formal analysis; writing - original draft; writing - review & editing: VA, RG, AM, RR.

Funding sources

There was no funding involvement in this study.

Ethics statement

The research has not involved any human or animal subjects, no locations or names have been disclosed anywhere in the paper.

### Submission declaration

This work described has not been published previously, is not under consideration for publication elsewhere. Its publication is approved by all authors and if accepted, it will not be published elsewhere in the same form, in English or in any other language, including electronically without the written consent of the copyright-holder.

### Declaration of competing interest

The authors declare no conflicts of interest

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