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Implications and Solutions for the International Trade in Reptile Species

Abstract

Over the last decade, a trend of keeping pet reptiles has emerged in European and North American countries, and with it the desire to keep increasingly exotic and rare animals. This emergence has given rise to the international trade in illegal reptiles, one of the largest illegal businesses in the world. Despite the lack of media attention this market has received it should be viewed as a crisis, given that without intervention this will have long lasting and negative effects on agriculture, biodiversity, economies, ecosystems, natural resources, and public health. In this paper, I will examine the logistics of the illegal trade in reptile species, including the demands by the pet industry, their international transportation, the legal protections that regulate the trade, and the health/environmental implications of this trade in reptiles. For the purpose of presenting all of the information on the subject of reptile trafficking, I will analyze recent academia including scholarly journal articles, popular articles, legal documents, and government publications. I will also collect primary research so I can gain perspective from reptile collectors, reptile breeders, and reptile sellers. This research includes interviews with reptile hobbyists, reptile importers, and a venomous snake breeder. Also, in order to understand why reptile collectors would break wildlife laws I will conduct a poll on *Instagram* within the reptile community to gauge public opinion and knowledge on the topic of wildlife regulations and reptile-related crimes. Finally, I will explore hashtags on *Instagram* to expose illegal reptile sellers and exporters to explore the effectiveness of existing regulations. After outlaying the

gravity of this crisis and explaining the contributing factors, I will propose solutions to regulate the reptile industry and end this illegal trade.



221 likes

jual_tokek Alhamdulillah berkah gecko/tokek
#jualtokek #gecko #tokek

Figure i: Tokay exporter posing with money from illegal reptile trade on an Instagram post; the caption reads "Thank God, blessings of gecko". (Jual_tokek)

The Birth of this Investigation and Topic Background

The international trade of illegal wildlife is the second largest illegal business after the drug trade (Green). I learned this shortly after visiting the Smithsonian National Zoo where I met Ken, a very enthusiastic staff member who took it upon himself to give me a tour of the reptile house. During this tour he revealed that their King Cobra on display had been confiscated from someone who had been keeping it as a pet. Immediately I was struck with so many questions; how could someone obtain this highly venomous animal? How did the police discover that this animal was being kept? Where did it come from? To answer these questions, I did some research and discovered that the international trade of illegal wildlife is extremely prevalent and is only

dwarfed by the drug trade. Live animals make up a significant portion of this trade, with the highest trafficked animals being reptiles and amphibians (Rosen and Smith). This is the result of the high demands for rare reptile species from North American and European reptile hobbyists (Hughes).

To meet the high and ever increasing demands of reptile collectors, reptile dealers in Southeast Asia (Rosen and Smith) are harvesting reptiles from the wild and exporting them across the world. Having kept various species of snakes and lizards since my childhood, I can relate to the desire to have unique and rare animals. However, the scientific and reptile communities alike have ignored the consequences that this market might be having on the populations of wild reptiles, ecosystems, and human health. If species of reptiles are being harvested at an unsustainable rate then it is quite possible these animals will go extinct and that entire ecosystems will be disrupted, which would mean a decrease in the availability of natural resources for human use. Additionally, when reptiles are smuggled into countries illegally, they can introduce lethal zoonotic diseases and disastrous invasive species. In this essay I will connect the existing academia and bring in primary research to investigate how reptiles are being exploited to meet the demands of the pet industry and what implications this might have for them and for us. Also, I will investigate if the current wildlife trade regulations provide enough protection for reptile species. Finally, if it is determined that reptiles are being harvested unsustainably, then I will propose several solutions for governments, reptile hobbyists/breeders, and reptile organizations to mitigate the negative effects.

CITES and Legal Protections for Reptiles

The legal framework for the international trade of protected animal species is set by the Convention on the International Trade in Endangered Species (CITES), an agreement signed by

182 countries designed to prevent wildlife trafficking. This agreement regulates the possession, importation, and exportation of protected wild species. Arguably, it does a good job preventing the trafficking of non-living goods and live mammal species, but for several reasons it does not provide adequate protections to the less-cuddly animals like reptiles and amphibians (Green). It has become a recent trend for pet owners to collect reptiles, and it seems that laws surrounding their trade and ownership have yet to catch up. Reptiles are a severely understudied class of animals so data outlining population size, distribution, life cycles, and habitat are almost non-existent for most reptile species (Hughes). This makes regulating the trade of these animals extremely problematic because CITES assigns protections by using this information. As a consequence, 90% of traded reptile species (Hughes) have no legal protections because they do not have CITES classifications. This creates a “gray legal zone” (Vice) where trade in species potentially on the brink of extinction is legally allowed, granted that there is no information about their population trends. Additionally, data from species population trends are used to calculate sustainable harvest quotas to prevent the exploitation of a species. Without accurate data for these population trends then quotas are either nonexistent or incorrect, making it likely that a species is harvested at a rate faster than they can reproduce and replenish their wild populations. In other words, populations for these species are expected to decrease over time as these practices continue. Ultimately, then, my goal is to demonstrate that CITES does not prevent the trafficking and exploitation of reptiles because it is limited by insufficient data.

In the same way that wildlife has been granted protections by CITES, many countries have taken steps to add additional protections for wildlife. For instance, the United States created the Lacey Act (18 U.S.C. 42) in 1900, a law that regulates the possession, importation, and transportation of injurious wildlife which have the potential to cause harm to human resources

(U.S. Fish & Wildlife Service). In contrast to CITES which regulates the international transport of wildlife, the Lacey Act prohibits intrastate transport of wildlife. Admittedly, the Lacey Act is quite limited in its scope as it only regulates nine reptile species: Brown tree snake, Burmese python, Northern African python, Southern African python, Yellow anaconda, Reticulated python, Green anaconda, Beni anaconda, and DeSchauensee's Anaconda (U.S. Fish & Wildlife Service). Furthermore, this law criminalizes the falsification of documents for wildlife shipments and the failure to properly identify wildlife shipments. To summarize, CITES regulates the international reptile market whereas the Lacey Act regulates the United States national reptile market.

The Illegal Trade in Reptiles

Many people assume that between the enforcement of the Lacey Act and CITES that reptiles would be adequately protected from exploitation. My own view, however, is that these laws are not being enforced and that members of the reptile hobby are regularly violating laws as they see fit. To investigate how reptile keepers are behaving I conducted a poll on Instagram within the reptile community. The data revealed that 47% of reptile hobbyists knew someone who committed reptile-related crimes, including: keeping species without the necessary permits, keeping illegal species, catching and selling venomous snakes, and smuggling reptiles into the country. In addition, 30% of the respondents reported violating reptile laws themselves. In fact, they appeared proud to admit this and some of them even found humor in their crimes, these are some of the answers: "it's illegal to have constrictors or venomous snakes in my city but I have a lot", "lacey act can't stop this b**ch", "not yet but I am getting a dwarf caiman", "I have illegally kept venomous pit vipers", and "keeping retics in my state is prohibited but low and behold I bought one lol". My point is not to criticize these reptile collectors, but rather to

highlight the barriers to the enforcement of wildlife regulations. Here many reptile collectors would probably object to being labeled as criminals and claim that they only violated *pointless* regulations. My feelings on the issue are mixed. I do support this opposing position because some of the laws do seem nonsensical, take for example the banning Burmese pythons in New York City or the prohibition of Reticulated pythons transport between North and South Dakota. The motivation behind these laws was to prevent these animals from establishing themselves in the wild and becoming invasive species. However, it is simply not true that these tropical animals could survive in such cold environments and thus they do not pose any risk. Though I concede that such laws are absurd, I still insist that other laws such as those that restrict ownership of dangerous and protected species are beneficial.

Having just argued that enforcement of CITES on an individual level within the United States is insufficient, let us now turn our attention to the enforcement of CITES in Southeast Asian countries. Although it is true that many species of reptiles have been assigned legal protections by CITES, it does not necessarily follow that these animals escape the illegal reptile market. Anyone familiar with the illegal wildlife market should agree that poor enforcement of laws has played a pivotal role in the perpetuation of wildlife crimes. This poor regulation has allowed Southeast Asia to emerge as the reptile trade hub of the world, it is estimated that half of all reptiles are exported from these countries (Hughes). Writing in the *Herpetological Journal*, Vincent Nijman et al. investigated enforcement of wildlife regulations in the article “Over-Exploitation and Illegal Trade of Reptile in Indonesia”. The authors discovered that when permits were approved for Indonesian reptile dealers to harvest certain quotas of wild reptiles, that there was no follow-up or oversight to determine if they abided to these quotas or took them from the permitted areas (Nijman et al.). The researchers conducted interviews to quantify how

many reptiles were being harvested by these dealers per year and discovered that 1.2 million Tokay Geckos are exported from Indonesia per year. This value significantly exceeds the allotted quota of 50,000 tokay geckos per year (Nijman et al.). These findings challenge the work of earlier researchers, who tended to assume that reptile exporters were accurately reporting their exports. As a result of this unsustainable exploitation these animals are expected to become extinct.

While researchers are quick to point out violations of wildlife laws, there is limited research on the root of the problem. It is in my opinion, that a lack of education and training is one of the main contributing factors to the poor enforcement of CITES. Consider the large volumes of animals that go through a country's border security on a daily basis. The import/export officials are tasked with the job of approving animals for shipments, it is often incredibly difficult for these officials to correctly identify a species of reptiles. As a result, they do not recognize if an animal is endangered (Vice). For example, the common house gecko and the critically endangered *eurydactyloides occidentalis* visually appear to be very similar animals. Only a biologist or reptile expert would be able to identify and distinguish the two species. It follows, then that if a box arrived at border customs containing both species that the inspection official would not recognize the endangered gecko. Naturally, reptile exporters take advantage of this by hiding endangered CITES-protected species alongside non-protected species in shipments or they use falsified CITES permits (Rosen and Smith). Some of the countries which have commonly produced false export permits include Paraguay, Benin, Guyana, Madagascar, Vietnam, Ghana, and Tanzania (United States). Additionally, many adults fail to recognize reptiles as animals (Green) which results in people not caring about them, including legal authorities and politicians. Consequently, without political will there is no political action being

taken to improve the effectiveness of CITES or reptile legal protections. To summarize, without improving the training and reptile education of import/export officials and raising public awareness for reptiles then it is impossible to enforce CITES and associated wildlife regulations.

At this point I would like to introduce another common method for the transportation of endangered or protected reptile species - smuggling. Reptiles are commonly hidden inside of secret luggage compartments, beneath clothing, or in bottles to be transported internationally at airports (Rosen and Smith). Other times, endangered reptile species are hidden inside cargo on freight ships or driven into a country through land boards. Naturally, this illegal reptile trade like any other illegal business is prone to corruption, for instance, authorities will sometimes conspire in wildlife trafficking. Such an example of corruption was observed during Operation Flying 43 Turtle, which was led by the U.S. Fish and Wildlife Service. This investigation prosecuted a California resident and three Japanese nationals for the trafficking of thousands of CITES-listed reptiles between the United States and Japan (United States). To take another case in point, a New York woman was prosecuted for smuggling 18,000 protected reptiles into Canada (United States). These findings have important consequences for the broader domain of boarder security, if people can smuggle reptiles into countries then surely, they can also smuggle guns, drugs, bombs, pathogens, and humans. Although many reptile breeders and exporters make their livelihood by partaking in the illegal reptile trade, one cannot conclude that all reptile breeders violate wildlife laws. Indeed, even in Southeast Asian countries there are responsible individuals that abide to CITES and national wildlife regulations. I spoke with Christopher Shannon, a venomous snake breeder and conservationist from Bangkok, Thailand who went through the legal process of obtaining permits to keep certain reptile species. Despite following wildlife laws himself, Christopher acknowledges that many people in Thailand who are keeping reptiles

illegal. He said, “money speaks louder than words” (Shannon), meaning the wealthy are able to evade criminal prosecution. He has called the fish and wildlife service when he has observed smugglers carrying reptiles around in duffle bags for illegal transactions at reptile markets, and he admitted that he has “made a few powerful enemies in Malaysia before that demanded me to stop busting them or they will come after me” (Shannon). My conclusion, then, is that while not all reptile exports engage in illegal acts such as smuggling, it is still a very common practice that law enforcement must crack down on if they want to end the wildlife trade or other illegal businesses like human trafficking.

The Captive-Bred Loophole

Having just explored the ways in which reptiles are illegally traded, I will now address the existence of loopholes within the CITES framework that allow for protected species to be legally traded (Nijman et al.). Specifically, the trade of captive-bred reptiles is unregulated, even if those animals are protected or endangered species. Reptile exporters are aware of this loophole, so they will often claim that their wild-caught animals are captive-bred. Therefore, they can export these “captive-bred” animals in unlimited numbers (Nijman et al.). Consequently, reptile laundering farms have appeared throughout Southeast Asia (Nuwer), a situation in which reptile exporters obtain certificates guaranteeing that the animals were captive-bred, when they are actually harvested from the wild. For instance, companies in Indonesia can export three million captive-bred Tokay Geckos per year, this is a surprising number given that Tokay Geckos rarely reproduce in captivity and that many conservation facilities have failed to breed them. Nonetheless, these facilities have managed to evade attention and prosecution for their crimes, likewise CITES has failed to address this issue at their annual conventions. Consequently, these reptiles and many others continue to be taken from the wild at much faster

rates than sustainable quotas have allowed, thus they will likely become extinct in the future. Ultimately, if it is cheaper to steal reptiles from the wild than to breed them, then this practice will continue, Rachel Nuwer explains that wild geckos are very cheap in her article “That Python in the Pet Store? It May Have Been Snatched From the Wild” and that it is impossible that these laundering facilities are actually breeding reptiles. Specifically, she writes that in order to produce just one million geckos that a reptile dealer would need “140,000 females, 14,000 males, 30,000 incubation containers, 112,000 rearing cages and hundreds of staff”, although there is no evidence that such a breeding operation has ever taken place (Nuwer). Although matters of Tokay Geckos may seem trivial, what matters here is that the CITES captive-bred loophole allows endangered species to be exploited by the pet industry.

Once these animals arrive in European and North American countries it can be very difficult to dispute the claim that they are captive-bred, even if it is obvious that they are wild-caught (Nuwer). Some reptile sellers act responsibly by identifying when the animals are wild-caught, but others will maintain that they are captive-bred specimens. Unfortunately, many reptile sellers fall into the latter category and consequently a large proportion of reptiles sold in pet stores are wild-caught animals, 90% of which die in their first year of captivity (Green). Take for instance one reptile hobbyist who testified on my Instagram poll that their wild-caught tokay geckos were very ill, “I owned many tokays from expos, they all lasted about a week”. Further insight can be gained from Zach Green who works for Domenic Curcio - a Philadelphia-based reptile dealer. Zach cares for and sells the reptiles that his boss imports from Africa, Indonesia, and Madagascar. During his experience working for Domenic, Zach has observed that the health of these imported reptiles depends on the time of year and the demand of the species, “if there is a higher demand on them, the animals will most likely be treated worse” (Grant).

Generally speaking, if it is cheaper to capture wild-reptiles than it is to breed them, then they are not bred in captivity. Instead, they are captured from the wild in massive amounts and shipped to locations with high-demand. Within the reptile-keeping communities' species-trends emerge, during which times a particular species or locality is highly desired by a large volume of reptile collectors, Christopher discussed this in our interview, "here the market sadly destroys itself. One year it would be reticulated pythons... or Burmese python morphs. Black king snakes or African snakes" (Shannon). Unfortunately for the reptiles, it is usually the rare species that are desired by collectors, this has resulted in reptile dealers exploiting academic publications by targeting the areas of newly discovered species (Hughes).

The Reptile Hobby in North American and European Countries

Some conservation biologists have raised concern about the ability for almost any species of reptile, including CITES-listed species to be purchased online and shipped in the mail or conversely, purchased at reptile expos (Hughes). For example, retail websites like *Underground Reptiles*, *LLLReptile*, and *Backwater Reptiles* sell a mixture of captive-bred and wild-caught reptiles and will ship them anywhere in the United States for \$40-\$50. Along the same lines, even individuals without permits or certificates are allowed to sell and ship reptiles world/country-wide. This is perfectly illustrated on *Morph Market*, a website that allows sellers to list their reptiles on auctions. While this encourages the breeding and sale of captive-bred reptiles, sites like this do not restrict certain species and thus simultaneously provide a place for illegal sales to take place. However, not all sellers go through monitored websites like *Morph Market* as I discovered during my social media investigation. *Instagram* allows users to post images with a caption and hashtags, reptile exporters have taken advantage of this to list rare animals through this platform, often including their *WhatsApp* number for customers to contact

them. While searching through Indonesian hashtags I made several shocking discoveries, in one image a man was holding several *Candoia carinata* (Galuh_christianto); a species of endangered snake. Trade in this species is prohibited because they are listed under CITES Appendix II. A second image shows hundreds of Tokay geckos crowded in a wire cage (see Fig. ii). In another one of his posts, four critically endangered *Geochelone platynotan* were being sold, the trade of this tortoise is illegal because they are listed under CITES Appendix I. I encountered a new user's post; this image showed a shrieking Tokay gecko trapped in a mesh bag; it was for sale (Jual_binatang_peliharaan). I inquired about its origin and the seller confirmed that it was a wild-caught gecko. I also encountered Instagram user's selling *Crocodylus porosus*, *Varanus salvator*, *Candoia paulsoni*, and *Shinisaurus crocodilurus*; all of which are endangered or threatened species protected by CITES Appendix I and II. The creation of online reptile markets has dramatically altered the nature of the pet trade by increasing the accessibility of rare and endangered species for reptile collectors. Undoubtedly, the ability to order an endangered crocodile from your bed has contributed the prevalence of the illegal reptile trade. This raises questions about the morality of buying animals online, if you can't order a dog online then why can you order an endangered reptile? My conclusion, then, is that the internet has provided a place for the illegal reptile trade to flourish and reach new customers, so perhaps it is time to rethink the legality of this practice.



Figure ii: Indonesian reptile exporter selling Tokay Geckos on an Instagram post. Hundreds of geckos crowd together in a small cage. (Galuh_christianto)

Having discussed the online reptile market, I will now discuss the role that reptile expos have in contributing to the illegal reptile trade. Reptile expos are market places where vendors and collectors gather several times per year at hundreds of locations around the world to engage in the selling and buying of reptiles. Many of these reptile expos allow the selling of wild-caught reptiles (Green), having attended these expos I can testify for the hundreds of wild-caught or endangered animals I have seen being sold with my own eyes. From my own observations, the most commonly sold wild-caught reptiles at these expos include: Tokay geckos, iguanas, chameleons, Savannah monitors, and Nile monitors. Additionally, I have also witnessed the endangered Crocodile skink and Chinese cave gecko being sold at reptile expos under the claim that they are captive-bred. In a poll that I conducted on Instagram, 71% of reptile hobbyists reported having witnessed wild-caught reptiles being sold at reptile expos. The most commonly

observed species at these expos were geckos, rat snakes, turtles, boas, reticulated pythons, and monitor lizards. Cody Kopp, a herpetoculturist with an interest in snakes and monitor lizards reached out to me on Instagram and shared his experience with a vendor from the Nebraska Reptile Breeders expo, “I know of a guy locally that owns a reptile store, and he gets into our STRICT captive bred only expo because of lack of knowledge by the people that run the expo pertaining to monitor lizards. He claims he has captive bred *Melinus* and *Indicus* monitors” (Kopp). He explained to me that *Varanus melinus* has only been bred once in captivity and that no one has successfully bred *Varanus indicus*, so that it is impossible that this vendor was breeding these animals. This is problematic because the Nebraska Reptile Breeders expo is supposed to explicitly sell captive-bred animals, however, the owner of the expo was taken advantage of by the monitor breeder because the owner is a boa breeder and could not identify that these monitors were rare wild-caught animals. When Cody confronted the vendor and demanded proof that the animals were captive-bred the vendor refused to provide any information. Cody also told me that he had purchased a “captive bred” snake from this vendor before only to find out that it was “obviously wild caught due to the volume of parasites, scars, and mites” (Kopp). To summarize, reptile expos when unregulated provide a location for vendors to sell wild-caught and endangered species of reptiles.

But is it all Bad? - Benefits of Harvesting Reptiles from the Wild

At this point some reptile collectors may object to the statements I have made and exclaim that taking reptiles from the wild and putting them into captive breeding programs is beneficial. To a degree I can agree with this, various threatened and endangered species have been saved from the brink of extinction due to efforts from reptile enthusiasts. For example, the Australian Corroboree frog nearly went extinct as a result of chytrid fungus disease, however, the

Taronga Zoo in Sydney, Australia led a successful breeding program that saved this species (Pettit). Similarly, the Myanmar roofed turtle was declared extinct until the Turtle Survival Alliance and the Wildlife Conservation Society raised and bred 60 turtles that were later released back into the wild (Pettit). Additionally, various pet supply breeders have produced enough captive-bred reptiles that they have lessened the demand for wild-caught specimens. An excellent illustration of this phenomenon is the Bearded Dragon; an animal native to Australia. Despite their export being illegal since 1960, massive amounts of Bearded Dragons were smuggled out of Australia between 1974 and 1990 to supply the pet trade (Chehaw Zoo). This gave reptile breeders the experience to work with and research these animals, and thus they were able to perfect their captive-breeding. Now captive-bred Bearded Dragons are one of the most common species in the reptile trade, and it is almost impossible to find a wild-caught specimen being sold. Similarly, the captive-breeding of Crested geckos, Leopard Geckos, Corn snakes, Burmese pythons, Reticulated pythons, and Ball pythons has dramatically reduced the volume at which these species are taken from the wild. My point is that the captive breeding of wild reptile species definitely has the potential to do good, however, more times than not, this is not the case.

Implications of the Unsustainable and Illegal Trade in Reptiles

While it is much easier for people to feel sympathy for the exploitation of charismatic warm-blooded animals like polar bears and elephants, it is actually the exploitation of the lesser-known species that is of the most concern to conservationists. Given that CITES is not overseeing the harvesting of CITES-protected species or destroying loopholes within the framework, and that massive volumes of protected species are being smuggled at international airports; most of the reptile species being traded are experiencing decreases in their population sizes, the result of being harvested at a faster rate than they can reproduce. Ultimately, what is at

stake here is the conservation of reptile species. Although the conservation of reptiles may appear to be a concern limited to reptile enthusiasts, it should in fact concern anyone who benefits from medicine, agriculture, and natural resources. It may come as a surprise, but reptiles play a huge role and intricate role in the health of ecosystems. At the current rate reptile species are being exploited unsustainably, and it is predicted that the ecosystems in which they inhabit will begin to collapse as a result (Nuwer). These findings have concerned scientists, so much so that they have identified the wildlife trade as one of the largest threats to biodiversity (Nijman et al.). At first glance, surrounded by our concrete cities; humans appear to live independent of nature. But on closer inspection it becomes clear that humans are just another species of animal that relies on biodiversity and the health of ecosystems for its survival. After all, much of the natural resources that humans use to produce building materials, food, agricultural supplies, and clothing are dependent on the health of ecosystems. For example, reptiles frequently prey on insects and small mammals, which could otherwise destroy agricultural crops. If reptile species went extinct then these pests would destroy crops and millions of people could starve as a result. Ultimately, my goal is to demonstrate that the collapse of reptile species and their respective ecosystems could have a serious rippling effect on human societies in the form of economic losses and the loss of human lives.

Having just argued that the unsustainable exploitation of reptiles has dire effects on the health of ecosystems, let us now turn our attention to the implications of smuggling live reptiles. Those unfamiliar with the process of shipping wildlife internationally may be interested to know that when a wildlife shipment enters a country the specimens are inspected for the possibility of carrying infectious diseases or harboring invasive species. On the other hand, wildlife that is smuggled into a country does not receive any sort of screening, and as a result these animals can

transmit diseases to humans and other animals, moreover these shipments can introduce invasive species (Rosen and Smith).

According to Gail Rosen and Katherine Smith, wildlife smuggling presents an extraordinary risk to public health. In the article “Summarizing the Evidence on the International Trade in Illegal Wildlife”, Rosen and Smith illustrate this risk with the international trade in Northern American Bullfrogs and the resulting worldwide pandemic of the fungal infection – chytridiomycosis (Rosen and Smith). This lethal fungus hitched a ride on the Bullfrogs as they were shipped across the globe, it quickly spread to infect wild populations of amphibians on every continent except Antarctica. Consequently, many species of amphibians are facing possible extinction. They provided another example with the illegal trade of Green Tree Pythons and the spread of another pathogen. These pythons were illegally shipped from Singapore and then seized in Australia, upon inspection the pythons were discovered to be carrying Wamena virus; a lethal virus that is transmittable to fish, reptiles, and amphibians (Rosen and Smith). It is fortunate that the animals were seized by authorities, otherwise the disease could have spread killing Australian wildlife. Along the same lines, non-reptilian species of illegally trafficked animals have also been found to carry pathogens, including: monkeypox virus, severe acute respiratory syndrome, psittacosis, highly pathogenic avian influenza, Newcastle disease, Salmonella, and Chlamydia (Rosen and Smith). These pathogens have the potential to kill humans, livestock, or wildlife, so this risk should be taken seriously. Consider the ramifications if all of the chickens, pigs, and cattle in the United States died from infectious disease. It is likely that the economy would collapse, and that the United States population would suffer from food shortages. It follows, then that because wildlife smuggling has the potential to introduce diseases

that kill humans and livestock that border security must prioritize catching these criminals in their tracks.

This brings the discussion to the next concern that arises from wildlife smuggling – the introduction of invasive species. Invasive species disrupt the natural balance of an ecosystem, either by outcompeting native species or by destroying all the resources in any area where they have no natural predators. The effects of invasive reptile species can already be observed in the Florida everglades due to the release of pet iguanas, tegus, and Burmese pythons. To take a case in point, the Burmese python threatens forty-one endangered species in Florida and have caused a 99% decline in “populations of small- and medium-sized mammals” in the Everglades National Park (U.S. Fish & Wildlife Service). However, it is not just Florida residents who should be concerned; the effects of invasive species reach beyond the tropical Florida environment and extend throughout the entire United States. Invasive mussels in the Colorado River reduce productivity of hydroelectrical plants, invasive insects destroy entire fields of agricultural crops, invasive plants reduce property values, invasive rats destroy grains and property, and invasive Asian carp threaten fisheries (U.S. Fish & Wildlife Service). Although one might dismiss this risk under the assumption that an animal can’t do *that much damage*, this view is simply uninformed. On the contrary, invasive species really do *that much damage*, in fact the cumulative annual cost of damage from invasive species in the United States is estimated at \$120 billion (U.S. Fish & Wildlife Service). Despite records showing the intentional introduction of invasive species, in the majority of cases they are accidentally introduced as “hitchhikers” amongst the cargo of an imported or smuggled species. Hence, it is critical that all wildlife enters at legal ports of entry so that trained officials can inspect all shipments so that invasive species can be identified before they can establish themselves in the wild and create destruction.

Five Solutions for Ending the Illegal Reptile Trade

This discussion leads us to the undeniable conclusion that the illegal reptile trade has serious implications to the health of ecosystems and to humans, and for this reason it needs to be stopped. But to stop this prolific illegal business a combination of several solutions must be employed. The first of these solutions being the reform of CITES to destroy the loopholes that allow reptile dealers to claim that their animals are captive-bred when they are actually wild-caught. This requires the creation of stricter regulations for these dealers to become certified breeding facilities. Captive-breeding if done right can reduce the demand to harvest wild specimens (Nijman and Shepherd), but this requires oversight from authorities to ensure that laundering is not taking place. Meaning that these facilities must be inspected to ensure that the breeding is actually taking place. Additionally, the CITES protections need to be extended to the species of reptiles that currently do not have a classification due to limited population data. Conservation biologist Alice Hughes recommends that only species classified as certified tradeable should be allowed to be transported internationally (Hughes). This would require analyzing the population data for reptile species and assessing if they could be traded sustainably before they became available on the market. In other words, only species that have had their conservation status assessed could be approved for trading in the reptile market. This would destroy the “gray legal zone” (Vice) of the reptile industry, which as I discussed earlier is the trading of understudied species that lack conservation classifications. Furthermore, this would prevent the exploitation of understudied and newly discovered reptile species. Of course, this would require more herpetological field research, so that scientists can collect data for species that have been previously ignored by researchers. Ultimately, by increasing the amount of herpetological field research and reforming CITES then both the gray legal zone and the captive-bred loophole would be destroyed.

The second solution is to improve training for CITES-associated enforcement officers so that protected species can be successfully identified on the streets and in international shipments. This entails training staff ways to quickly identify species and distinguish between common and endangered species, paying particular attention to highly trafficked species. When a violation of CITES is identified, enforcement officers must hold violators accountable for their actions with heavy fines and sentences. This risk would deter individuals from engaging in illegal wildlife activities, since many reptile exporters are aware of the crimes they commit (Nijman et al.) but choose to commit them anyway because there are no consequences for their illegal behaviors. CITES and reptile organizations should also emphasize public outreach and provide training and education for the public. This would translate to increased political will to address the issue of reptile trafficking, because as of right now most people are not aware that reptiles are being trafficked in such high volumes or the risks that this presents to public health, economies, and the environment. Although public outreach is expensive, it would pay off by putting pressure on legislators to pass laws that would protect reptiles from the exploitation of the illegal industry. To summarize, the enforcement of CITES and other wildlife laws would increase if enforcement officers were trained to identify species, also public outreach would put pressure on political actors to pass legislation that protected reptiles from trafficking.

Many European and North American countries are quick to pin the blame on Southeast Asian countries for allowing the exportation of such high volumes of reptiles and poor enforcement of CITES. At this point I would like to object to this one-sided perspective because it only addresses the supply while overlooking the demand. Which leads us to the third solution; North American and European countries should take a proactive approach to stop this issue by limiting the number of reptile imports that they allow into their countries. By artificially reducing

the demand for reptiles in North American and European countries, the reptile exporters in other countries will harvest less reptiles in upcoming years. In other words, the number of reptiles being harvested from the wild will decrease if the source of the demand reduces importation of reptile species. In addition, North American and European countries can choose to ban certain species of reptiles or require permits for the possession of non-approved species; this would lessen the damage done by the reptile collector trends. For example, the United States can regulate the wildlife trade by requiring a reptile collector to obtain a permit before obtaining Reticulated Pythons. To consider how the reptile community would respond to such legislation I conducted a poll on *Instagram* and discovered that 85% of reptile collectors would be in support of increasing the regulation of reptile-ownership in order to preserve populations of wild reptiles. Thus, it would be assumed that there would be little backlash in response to governments banning certain species or requiring permits for ownership. Admittedly, this would be ineffective unless the legislation was combined with increased oversight and enforcement since many reptile collectors admitted to violating already established laws.

The fourth solution targets the root of the problem, this is the self-regulation by the reptile community itself. If reptile collectors stopped to think about it, many of them might realize how their actions are contributing to illegal reptile trafficking. For this reason, reptile collectors need to become aware of which species are being exploited and how this is harmful for their wellbeing. They also need to educate themselves as to how to distinguish wild-caught animals from their captive-bred counterparts, so that they are not contributing to the illegal reptile trade. Moreover, reptile sellers need to act responsibly and carefully decide where and who they obtain imported species from, to avoid purchasing illegally exploited animals. They should also focus on breeding species which are currently being taken from the wild, such as

tokay geckos and monitor lizards, this would decrease the demand for wild-caught species. Furthermore, reptile organizations such as herpetological journals and magazines should condemn the ownership of wild-caught and rare reptiles and provide educational resources to collectors and sellers. It can be predicted that efforts at this level would trickle down to reptile sellers and collectors. Finally, reptile expo hosts should ban wild-caught reptiles from their shows and demand that their vendors show proof that an animal was captive-bred. Of course, it is important that the hosts are able to identify and distinguish endangered species of reptiles, in order to prevent another event similar to what occurred at the Nebraska Reptile Breeders expo. To summarize, there are a lot of actions that the reptile community could be taking to reduce the scale of the illegal reptile trade. Naturally some reptile enthusiasts may view this as a limitation to their freedom, but self-regulating can potentially prevent the introduction of additional federal wildlife protections which would be more intrusive.

The fifth and final solution is to regulate the online sale of reptiles, especially on social media platforms. Specifically, the sale of wild-caught and threatened species on websites and social media should be entirely banned. Although it is true that the enforcement officers may encounter problems when trying to track down violators because the internet allows individuals to remain anonymous. Additionally, reptile retailers and breeders should be required obtain permits before being allowed to ship their animals. This oversight would discourage a seller from engaging in illegal business and trading in protected or wild-caught reptile species. With so many endangered reptiles being sold on social media platforms it is time that the site owners are held accountable for the perpetuation of wildlife crimes. These social media companies have the power to censor certain hashtags and should do so to prevent users from gaining access to hashtags where wild reptiles are being sold. In conclusion, the internet plays a key role in the

economy of the illegal reptile market, thus it is only logical that wildlife regulations are updated to reflect technological advancements.

Moving Forward into a Society without Wildlife Trafficking

If a combination of these five solutions is put into action than it is possibly that the illegal trade in reptile species can be eradicated. This does not entail the complete prohibition of trade in reptiles, but rather the reformation of the reptile trade, so that species are traded in a sustainable and nonexploitive fashion. When the wildlife trade is regulated with sufficient oversight and enforcement then the harvesting of species in approved quotas can be beneficial to ecosystems by preventing over population and competition within species, beneficial to communities by generating income and stopping illegal crime, stimulating for the world economy, and most importantly it can be beneficial to reptiles; because as more people keep reptiles as pets, the public becomes more aware about them and the importance of their conservation. But if this reptile trade crisis continues to be barred from discussion and ignored, then it will eventually have irreversible negative effects on human health, agriculture, economies, and natural resources.

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