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ILLEGAL ONLINE TRADE IN REPTILES FROM MADAGASCAR

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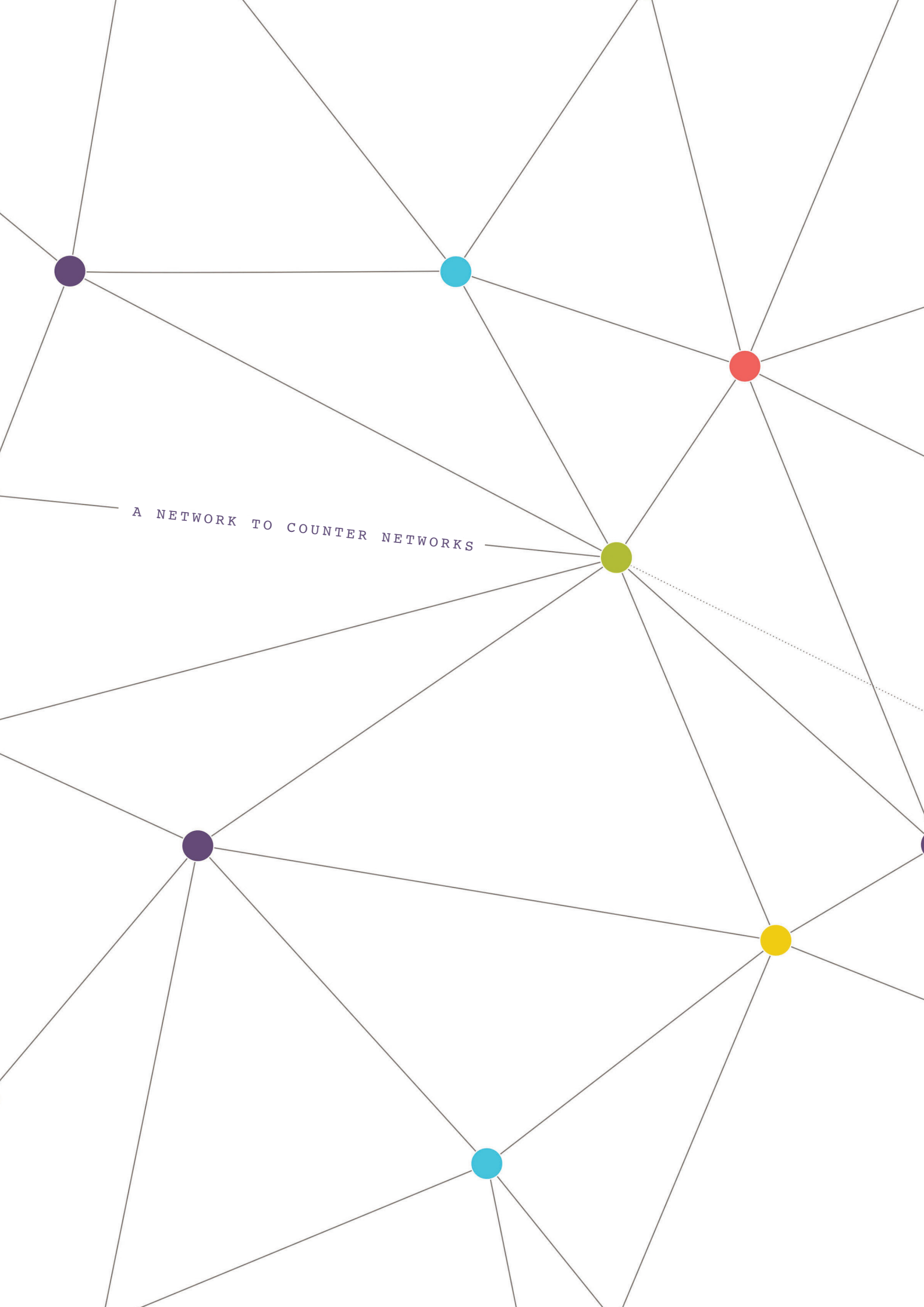
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Summary

Endemic Madagascan animals are prized for their idiosyncrasies and rarity, and the island's tortoises, geckos and chameleons are a particular focus of reptile enthusiasts. The international illegal trade in Madagascan reptiles is routinely conducted online, increasingly via social-media platforms. These sites offer traders a convenient way of connecting with a wide international customer base, where there is little internal monitoring and enforcement and access to information can be easily controlled. As a result, the internet facilitates a trade that already poses an acute threat to highly endangered species. At the same time, internet-based or internet-facilitated trade makes enforcing existing legislation designed to protect these animals much harder, due to the use of multiple platforms, the linguistic and technical barriers to monitoring these platforms, and the diffuse networks of sellers and buyers driving the trade which are not suitable to 'kingpin'-driven enforcement tactics.

Key points

- The illegal trade in Madagascan reptiles is routinely conducted online, increasingly via social-media platforms. These sites offer traders a convenient way of connecting with a wide international customer base, where there is little internal monitoring and enforcement and access to information can be easily controlled.
- Reptiles from Madagascar are advertised online across a number of countries and regions. Southeast Asia and China, and the USA and Europe are emphasized as major markets. The internet may have helped to globalize demand for Madagascan reptiles, and the offline trade routes, which pass through intermediary transit states, complicate enforcement efforts.
- There are massive barriers to monitoring the trade and enforcing legislation that prohibits it. These include language barriers, lack of access to closed social-media groups, the constantly changing range of terms and codes used in online discussions and the lack of a search tool that can recognize species from photographs.
- The majority of traders are private individuals, meaning that law-enforcement efforts cannot be focused on dismantling centralized, hierarchical networks and cohesive organized-crime groups.
- While there is no specific demographic for buyers, these are typically described as 'enthusiasts' who regard owning Madagascan reptiles, especially tortoises, as prestigious. These enthusiasts value rarity and uniqueness as reflected in the high prices that specimens may fetch. In future, policy responses that emphasize these species' rarity should be avoided, as such messaging may increase desirability and exacerbate poaching.

Introduction

Madagascar is home to over 370 reptile species, many of which are endemic and rare.[1] While habitat destruction and the local bushmeat trade are significant factors in species decline, many of Madagascar's reptile populations have suffered due to immense pressure from the international illegal wildlife trade.[2] The most heavily traded Madagascan reptiles are endemic tortoises, chameleons and geckos.[3] The four Madagascan tortoise species described as 'Critically Endangered'[4] – the spider tortoise (*Pyxis arachnoides*), the flat-tailed tortoise (*Pyxis planicauda*), the radiated tortoise (*Astrochelys radiata*) and the ploughshare tortoise (*Astrochelys yniphora*) – are all listed on Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) treaty and protected under Madagascan national law,[5] making all international trade for commercial purposes illegal. Yet the high value of these animals – some of which can fetch thousands of dollars for a single individual – makes their illegal trade highly attractive to animal traders.

Several recent large-scale seizures demonstrate the extent of the trade and its devastating effects on wild populations. In March 2013, 54 ploughshare tortoises were seized at Suvarnabhumi Airport, Bangkok. The ploughshare is considered to be the rarest tortoise species in the world, as thanks to illegal trade only a few hundred adult individuals remain in the wild.[6] At the time, this seizure represented over 10% of the entire wild population.[7] In May 2017, 325 radiated tortoises and five ploughshare tortoises were seized by Malaysian customs following a tip-off.[8] Just under a year later, in April 2018, nearly 10 000 radiated tortoises were seized from traffickers within Madagascar.[9] While this species is mostly traded within Madagascar for bushmeat, the smaller individuals are often smuggled out of the country via the international airport destined for Asian pet markets. This species is likely one of the most heavily exploited species in the world, with a suspected approximately 500 000 individuals being removed annually from a wild population of potentially less than 3 million.[10] Such seizures indicate the massive pressure that international trade adds to the threats facing wild populations of these animals.

This report aims to address how the illegal trade in Madagascan reptiles is conducted online and to what extent the use of internet-based platforms has facilitated the international trade. As has been observed in other forms of illegal wildlife trading, online platforms – in particular, social media – have become a commonly used route for Madagascan-reptile traders to market their specimens to reptile enthusiasts and specialist collectors around the world. The report will discuss the most prominent countries and regions involved in this trade as well as offer insight into how reptile traders operate online, what advantages online platforms offer the prospective reptile trader and how these platforms have shaped the global dynamics of this specialized collectors' market. It will further consider what characteristics the buyers and sellers in this market share and what drives their interest in these species. Drawing together these strands, the report will consider both the challenges and opportunities that the online reptile trade offers for effective monitoring and law-enforcement responses.

The volume of published literature dealing specifically with the illegal online trade in Madagascan reptiles is currently limited. However, a few location-specific studies offer useful information. The data sources for this review include academic literature, policy documents and reports from intergovernmental and non-governmental organizations and the media, as well as consultation with specialists holding relevant experience in addressing the trade in Madagascan reptiles.

The global picture of the Madagascan-reptile trade

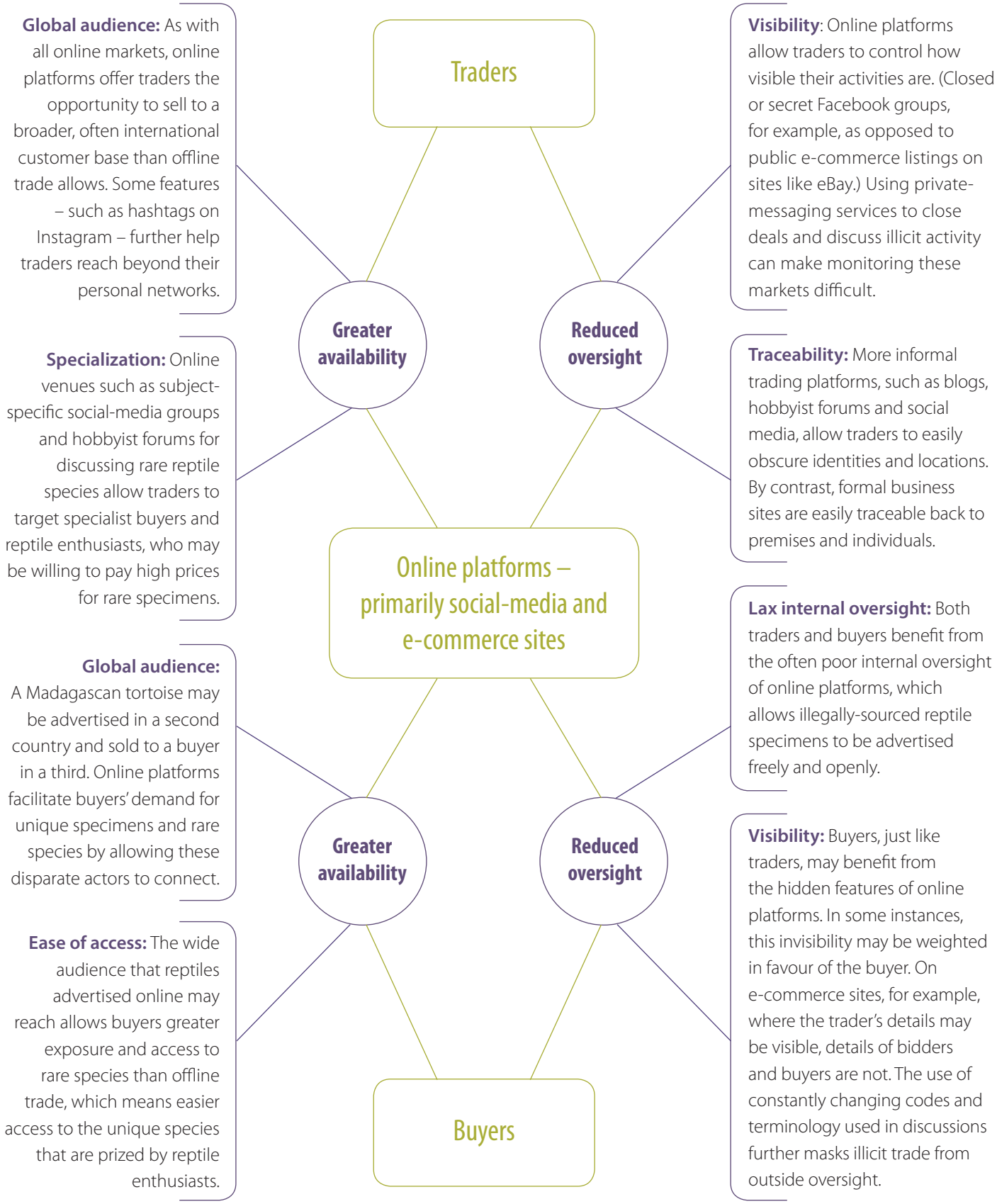
Online platforms play a significant and growing role in the illegal trade in Madagascan reptiles, increasingly through forms of social media. Specimens are advertised online across a range of countries and regions, of which the USA, China, Europe and Southeast Asia are the most prominent. The way these markets operate illustrates some of the inherent difficulties of enforcing laws and international standards on the trade in wildlife and the difficulties of effective monitoring of online illegal trade (see Figure 1). Individual country case studies also serve to demonstrate how the trade in Madagascan reptiles manifests differently in particular contexts, for example, through the preference given to certain platforms or the relationship between online and offline markets.

The global distribution of the trade was effectively demonstrated in a 2009 study of Madagascan tortoises offered for sale online. Specimens were recorded across 10 countries and included all four of the species described as 'Critically Endangered' and listed on CITES Appendix I. The greatest concentration of online dealers was found to be within the USA, where five dealers were offering spider tortoises for sale and two were offering flat-tailed tortoises and radiated tortoises respectively.[11] In Southeast Asia, radiated tortoises have been identified in online sales in Thailand, Malaysia and the Philippines, and according to the Durrell Wildlife Conservation Trust, over 75% of all ploughshare tortoises sold in 2009 were advertised in Southeast Asia and China.[12] It is believed that Chinese actors play a major role in this market, particularly in trading the two *Astrochelys* species, yet no dedicated country studies have yet been published, which is a significant knowledge gap.[13] In the EU, both CITES-regulated and nationally protected species have been openly offered for sale, and Madagascar is among the top 15 countries of origin for live-reptile imports to the bloc.[14] Dutch investigators have recorded multiple offerings of Madagascan giant day geckos and panther chameleons on online marketplaces in the Netherlands.[15]

Across the available country-specific case studies, different platforms and techniques of advertising goods and contacting buyers take precedence. In Indonesia, for example, forums identified for trading in Madagascan reptiles include Kaskus, Ceriwis and Carousell, as well as more ubiquitous social-media sites, such as Instagram and Facebook. A surge in Instagram posts advertising ploughshare tortoises was noted in Indonesia in 2015.[16] By contrast, in China, a 2014 study on the illegal online wildlife trade (not specifically in Madagascan reptiles) found that social media – primarily the applications QQ and WeChat – were the most commonly used platforms. A rise was also noted in sales on Baidu Tieba (Bar).[17] Similarly, while the study in Indonesia noted that traders may post the same advertisement on multiple forums or groups to increase the chance of sale, the use of so-called agents has been described in China.[18] Agents help extend a trader's audience by reposting information on illegal wildlife products onto their own social-media platforms, and if someone in their circle wants to buy the product, the agent buys it from the dealer and resells it at a higher price to the contact within their circle.

The flourishing online trade in Madagascan reptiles should be a key cause of concern for conservation efforts. That being said, the correlation between availability of online markets and a rise in poaching remains unclear. The poaching of reptiles from the wild invariably involves local people in the origin country. Although potentially profitable, and a means for providing cash income to some households as part of a diverse livelihood strategy, commercial collection of live animals to supply the international pet trade among poor rural communities in Madagascar has been found to be sporadic, and is perceived as unreliable and risky.[19] The high demand and volume of illegal trade in Madagascan reptiles is undeniably contributing to the poaching, smuggling and trading of these species.[20] While there is the implication that increased online trade is linked to an increase in poaching, the reviewed literature falls short of elaborating the steps that connect poachers to the people who advertise animals online.[21]

Figure 1: Overview of the illicit online Madagascan-reptile trade



Trends in online and offline trade

In some instances, there is evidence that dealers operate in both online and offline markets. On the European market, traders offer animals for sale on specialist websites and specifically mention the reptile trade fair Terraristika, held quarterly in Hamm, Germany, as a place where specimens bought online can be obtained.[22] Similarly, a 2011 study on the trade in Thailand found that some dealers advertised animals both online and in physical shops and markets.[23]

In many regions it seems likely that online trade is emerging as a preferred alternative to physical markets.[24] For example, in the Thailand study, while open offline trade still exists, the internet is increasingly the preferred venue for sales of exotic, endangered species, such as Madagascan chameleons. According to the dealers in this study, the decentralization away from physical markets is due more to the expansion of trade and simplicity that internet-based operations offer than to increased detection and seizures. This same decentralization has been observed elsewhere. Shops that previously had reptiles on site are now often empty, with potential buyers encouraged to view the companies' social-media pages. Animals are kept off-site in warehouses or private residences. The physical space is retained to reassure the buyers and serve as some security during the financial transaction.[25]

The example above points to the toothlessness of current enforcement efforts, as a result of which illegal traders respond only to new and better opportunities for business, rather than sanctions from law enforcement or private platforms. Yet the extent to which the shift to online trade may be connected to increased enforcement efforts targeted at markets and shops varies according to location. In Singapore, for example, both law enforcement and pressure from conservation NGOs were said to have been responsible for driving the trade onto the internet.[26] However, this connection cannot be held across the board; in the case of China and Hong Kong, for example, the suggestion that the change is due to increased enforcement was met with scepticism.[27] Instead, increased awareness among traders, buyers and the general public that these sales are illegal was believed to be a more likely explanation for the development. Similarly, evidence suggests that social-media sites have emerged as the preferred option for reptile traders partly because pressure from conservation NGOs on retail websites and e-commerce

WeChat conversation: Conversations between traders and buyers often begin on messaging apps, after a potential buyer sees an image with limited information on a social-media platform. Price and delivery are discussed on these encrypted messaging channels. Chinese platform WeChat integrates social media, messaging and e-commerce, making the shift between different channels very easy. This is a mock-up for illustrative purposes.

platforms has increased. Both of these developments suggest that targeted enforcement efforts, NGO advocacy and public pressure may be effective at discouraging trade and disrupting established marketplaces.

However, a shift to online trade may prove problematic for enforcement and monitoring efforts. The nature of online trade makes it difficult to determine location and therefore build a comprehensive picture of trade routes. A tortoise originating from Madagascar may be advertised in a second country and sold to a buyer in a third. Trade to intermediary countries, which are not final destinations, may be misleading from a monitoring perspective. It is also difficult to determine whether the trader and the commodity are in the same location or even in the same country, or whether a seller resides in the country where the animal is advertised. For instance, the study of online trade in ploughshare tortoises in Indonesia found that 75% of the advertisements were from sellers based in Indonesia, while 15% were from Cameroon (four unique sellers) and a single advertisement was identified from each of Malaysia, France and Thailand.[28] For law-enforcement agencies aiming to identify and apprehend individuals engaged in the online trade, perhaps cooperating with other national forces in complex operations, this lack of transparency presents a significant challenge.[29]

The challenges of monitoring social media: Closed groups, codes and context

While the illegal trade in Madagascan reptiles takes place across a variety of different online platforms – including many national and local sites and blogs – social-media sites are increasingly becoming the dominant mode of trade. Apart from the obvious attractions, such as their ability to reach a wide audience conveniently, free of charge and often anonymously, the collected evidence suggests that traders prefer social-media platforms because they provide a layer of control and accessibility, which can be limited by those managing the group. Social-media platforms offer different opportunities for controlling the audience of posts and access to information. For example, trade via a closed Facebook or WeChat group is far more discreet than a public advertisement via an online marketplace, such as eBay, since only previously vetted and trusted members of the group may view the activity. In some locations, a shift has been observed towards these more private and access-limited platforms. Increasingly sellers choose to advertise on WhatsApp, which is more difficult to monitor, while Twitter appears to be less utilized, presumably as it does not provide a platform for selling products and is not as well set up for private or group messaging. At the same time, internal monitoring and the enforcement of policies and guidelines on these platforms is largely ineffective, providing the ideal environment for illegal trade to flourish.

While the names of these social-media groups may often indicate openly that their purpose is to trade in live animals,[30] such groups may be kept closed to all but approved members. Alternatively, while initial advertisements may be public, the final stages of the detail and crucial information may be exchanged via private-messaging channels, making oversight difficult. A study by TRAFFIC, conducted over a 17-day period in 2017, found four juvenile radiated tortoises (among several other CITES Appendix I-listed non-native species) advertised on Facebook. The tortoises were deemed likely to be recently procured wild-caught individuals, acquired illegally and/or smuggled, since no importations of this species have been permitted since the Philippines became a party to CITES in 1981.[31] Most deals were closed via Facebook Messenger, meaning that critical information was not accessible for the study.

Traders may also remain relatively anonymous by setting up profiles specifically for trading and using code names to disguise the illegal nature of their goods.[32] According to a source with knowledge of the illegal trade in Madagascan reptiles in China, sellers advertise using either the local name of the animal, the common name, the Latin name or a code name.[33] Sometimes a mixture of these is used. An unpublished study of a local online platform in Hong Kong found that five different Chinese terms were used for the radiated tortoise and three different terms for the

ploughshare tortoise. The wording in the advertisements depends on location, and the codes used within the groups evolve over time between members.

As such, the cultural context on local sites, as well as the language barrier, may be difficult to grasp for outside researchers, frustrating the research. This is on top of the fact that many monitoring groups do not have the effective capacity to monitor the trade in China, due to language issues and difficulties in acquiring reliable translations. Additionally, according to a report by Xiao Yu and Wang Jia, the range of code words on online platforms in China is continually expanding in response to a number of terms being blocked by platform owners and related advertisements deleted following pressure from conservationists.[34] Enforcement may lead to the proliferation of methods to conceal the trade. One further point to consider is that some advertisements contain only a photo of the animal, with no name, code or otherwise identifying description, perhaps only accompanied by the text 'to sell'.[35] The current absence of an automated search tool that can recognize species from photographs is a further obstacle to reliable recording and monitoring.[36]

Fraud in the online Madagascan-reptile trade?

In instances where researchers and law-enforcement officials are able to access online information about the trade, determining whether such information is accurate or true may be difficult. Some advertisements are posted by fraudsters, that is, people who place fake advertisements, ask for a deposit or full payment and then fail to supply the animals. While there may be some fake sellers, this is unlikely to be a significant problem within the social-media groups since such fraudsters would quickly be reported and denounced within the community.[37] Fake sellers have however been identified in studies, such was the case with the advertisement of six spider tortoises from Madagascar offered for sale online in France.[38] In a study from Indonesia, sellers categorized as breeders operating from outside of the country were suspected to be swindlers, as personal delivery would have been impossible or impractical and would have required a money transfer. This was also the only group of traders that offered any documentation in the advertisements and only twice did people enquire in the comments about the legality of the sale; both comments were in English and both were ignored.[39]

Sellers were said to take less precaution when advertising online than in physical shops and seemed less concerned about detection or enforcement.

Sources further emphasize the lack of internal monitoring and enforcement on social-media platforms as another major advantage for illegal traders. Sellers were said to take less precaution when advertising online than in physical shops and seemed less concerned about detection or enforcement, to the extent that some sellers may use their full name and photograph in online forums, although pseudonyms are more typically used.[40] In Madagascar one successful arrest and conviction was made from monitoring Facebook, but in general the widespread use of concealed identities makes it only possible to monitor and note what is for sale.[41] Reports that online communities openly discuss how to launder their specimens, such as through laundered or used permits or by declaring reptiles as bred in captivity,[42] as well as the vast majority of reptiles being openly advertised with no reference to their origins or any purported proof of legality,[43] further suggest that actors within the online trade feel a sense of impunity. Some sellers may post a photo of a CITES permit but nothing more, and according to one source, the legality or authenticity of these permits is not questioned.[44] A lack of references to Madagascan reptiles in a 2017 INTERPOL study of wildlife trade on the dark web may also indicate that trade on the surface web takes place without major obstruction and that traders feel little need to hide their activities more carefully.[45]

Networks and norms of online reptile traders and buyers

Consistently across previous studies it has been found that reptile traders are predominantly private individuals, not connected to wider structured or organized groups. They are regularly described as reptile hobbyists, typically middle-aged men and some women.[46] In the case of the Facebook trade in the Philippines, most of the traders appeared to be private individuals, some of whom offered to exchange wildlife for other species or other products in place of money.[47] In Indonesia, 49 identified online traders in ploughshare tortoises were grouped into the categories 'private sellers', 'breeders' and 'commercial sellers'. Private sellers (31 individuals accounting for 57% of advertisements) were traders with no links to commercial trade; commercial sellers (12 individuals with 18% of advertisements) were traders who were associated with either a physical shop or online store (or both); and breeders (9 sellers accounting for 25% of advertisements) were differentiated from commercial traders in that they either mentioned they were breeding tortoises or they discussed wholesale trade involving multiple species.[48] Additionally, Facebook traders in Madagascan reptiles are described as ranging in scale, from those advertising a dozen tortoises to sellers advertising just one, which might include owners who have grown tired of their pet tortoise and want to sell it.[49] This correlates with other studies on the social organization of trafficking for exotic-pet markets, which have urged caution to analysts and law-enforcement strategists in employing the mafia or organized-crime narrative for these kind of online traders, given that no kinship ties were found and relationships appeared to be based largely on convenience within both loose and structured networks.[50]

Similar to the dispersed, individual nature of reptile traders, there seems to be no specific demographic that characterizes the buyers, who are not described as collectors in terms of seeking to own as many species or specimens as possible. Instead, they are referred to as 'enthusiasts' with a particular interest in reptiles, who view such species as prestigious. It seems to be primarily this shared 'enthusiasm' for the species that brings these individuals together on online forums and binds together these loose communities. As a line of enquiry for further study, or for enforcement purposes, one source advised that we start looking into the connections between enthusiasts, breeders, buyers and sellers on social media.[51]

In addition, the nature of the interactions between traders and customers taking place on social-media sites may increase the desirability of Madagascan reptiles among collectors and drive demand. In Indonesia, online advertisements and photographs of ploughshare tortoises, particularly on the pages of Facebook groups and on Instagram, were regularly 'liked' and commented on by people who expressed envy of the seller/owner of the tortoise. Comments included *mantap* (Indonesian slang for 'perfection'), *super mewah* ('very luxurious'), *sangat langka* ('extremely rare') and *astaga, ternyata ada di Indonesia juga, beli di mana bro?* ('wow, in fact they are here in Indonesia too, where did you buy it?'). The price is an indicator not only of the potential buyers' economic means but also that they regard the ploughshare tortoise, like other rare species, as a commodity that can act as a status symbol among fellow wildlife collectors.[52]

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One conclusion from this may be that demand-reduction campaigns emphasizing how endangered these reptiles are, could paradoxically fuel the demand for them, and responses will need to address the 'norms' of these communities in other ways.

Threat to species: Risks related to price and supply

Madagascan species may fetch some of the highest prices of all reptiles traded illegally around the world, and these prices have increased in recent years. While a ploughshare tortoise would sell locally for US$2 in 2009, villagers today are offered between US$20 and US$40 by traffickers, and prices increase rapidly along the trade chain.[53] In the case of online trade in ploughshare tortoises in Indonesia, only a few advertisements provided prices for the tortoises on sale; the majority of sellers asked potential buyers to send their personal details so that the seller could contact them privately. However, from the figures that were available, prices ranged from US$509–US$47 000, with a median price of US$1 374. There was a strong positive correlation between the size of the tortoise and the price.[54] A four-month study aimed at documenting the trade in Jakarta's physical markets and pet shops observed that ploughshare tortoises were the most expensive species on sale, with prices ranging from US$7 143–US$2 571 for an individual.[55]

A three-month survey from 2016 on the Facebook trade in the Philippines found that the asking price for radiated tortoises has seen an almost five-fold increase in recent years: while the lowest asking price for an 8–10 cm individual was US$388 in the years 2008–2013, the more recent study found the lowest asking price to be US$1 832 per individual.[56] A study by Walker found the flat-tailed tortoise to vary in price from nearly US$2 000 for an individual in the Czech Republic to one advertised for US$861 in Malaysia. On the other hand, a ploughshare tortoise for sale in Malaysia was offered for US$1 926. The most valuable species was the radiated tortoise, with animals selling for as much as US$28 839. The price increase in recent years could be a result of high incidence of deaths of animals that were imported seven years ago (before 2004, when they were listed as Appendix II), due to the difficulty of keeping the species thriving in captivity.[57] While Madagascan tortoises are reported to be largely unavailable in Northern Europe, two suppliers of radiated tortoises were located in the UK, both quoting prices of £3 000 (about US$4 800 at rates from 2010, when the study was conducted) for specimens approximately two years old. The unit price for specimens of similar age in Thailand was found to be significantly lower at THB9 000 (about US$273 at 2010 rates).[58] This indicates the market in Northern Europe is small but highly lucrative, which is nonetheless dangerous for such a threatened species.

The nature of the reptile market – as predominantly an 'enthusiasts' market in which the ownership of rare species is seen as prestigious and a way of gaining status – is reflected in the factors affecting the price of individual specimens. As illustrated above, in the discussions between buyers and traders on social-media sites the rarity of a specimen is a prized factor. Hence, elevated threat status and trade restrictions – far from being deterrents against exploiting a vulnerable species further – are major incentives to collect reptiles as they underline the rarity of the species in question and the prestige it may confer on the buyer.[59] In the case of tortoises with long lifespans, the value increases with age: hatchlings are less expensive than adults. Consequently, some traders may intentionally invest in a young tortoise, take care of it until it reaches adulthood and then sell it to make a profit.[60] This may exacerbate the conservation threat that illegal trade poses to these species, as reptiles of reproductive age are most valuable and hence most at risk. Finally, reptiles advertised as legitimate and with legal documentation generally have a higher asking price.[61] Though, of course, the claim of legality is no guarantee that the animal is legitimately captive bred.[62]

The most valuable species was the radiated tortoise, with animals selling for as much as US$28 839.

Unfortunately, Madagascar is poorly placed to protect these species. Poaching levels (and hence the supply of reptiles) in Madagascar may be linked to political instability. Besides being a biodiversity hotspot, Madagascar is one of the poorest countries in the world, with a Human Development Index of just 0.520.[63] Following a government coup in 2009, Madagascar has been in a state of civil unrest,

with a contested regime lacking international recognition and an absence of law enforcement at national, regional and local levels. Bilateral aid has been cut and weak internal legitimacy has led to increased corruption levels and unemployment.[64] Subsequently, wildlife crime, in particular poaching and smuggling, has increased.

Conclusions, implications and recommendations

The above discussion demonstrates how online platforms, in particular social media, offer traders an advantageous route to trade in illegally harvested Madagascan reptiles in a low- or no-enforcement environment and to use features and techniques that make effective monitoring and investigation difficult. The loose, unstructured nature of online groups – comprising individual traders and dispersed communities of hobbyist buyers brought together through their shared interest – means that efforts to curb this market cannot be focused on dismantling centralized, cohesive organized-crime groups. There are several knowledge gaps that future research could address, in particular the current lack of available information on the trade occurring on Chinese platforms and sites, as well as further analysis of how networks of individual online actors are structured.

It is an obvious feature of online platforms and marketplaces that traders and buyers are able to create new connections beyond their immediate social groups and geographical locations, and are thus able to form online communities around their shared interest – in this case, the enthusiasm for endangered reptile species – and consequently trade with greater ease.

However, this ease of cross-demographic and often transnational connection of dispersed individuals seems particularly important in the context of the Madagascan-reptile trade, where demand is held within a niche, specialist group of enthusiasts. Online platforms allow this market to be opened up to global demand, turning a small interest group into a large global community of potential buyers. In addition, the discussions among enthusiasts who share admiration for rare specimens means that these online forums can lead to spiralling demand as reptile enthusiasts seek to attain the same prestige and status as their online contacts by owning and collecting their own rare specimens.

Yet an understanding of this market and the values that underpin enthusiasts' desire to own rare specimens may be useful in forming effective future responses to illegal trade. For example, some herpetologists do not support the 'uplisting' of Madagascan reptile species to a more restrictive CITES index as a conservation measure.[65] The reasoning behind this is that, since elevated threat status and trade restrictions may incentivize collecting, particularly in a politically volatile environment where enforcement is scarce, keeping species on a less-restrictive index could inhibit them from becoming more valuable and subsequently prevent an increase in trade activity. Other potential strategies may seek to avoid making species more desirable in the eyes of the collector market.

Although, such a discussion of the secrecy and invisibility that social-media platforms offer traders may make it seem as though advances in technology are working solely in favour of illegal trade, this is by no means the case. There is currently a clear gap in which technology could be used more effectively to enhance monitoring efforts and research into the trade. For example, many of the country-specific case studies and research papers cited here have relied on manual searches for individual advertisements rather than using automated techniques, such as web scrapers. The development of new tools to automate some of the monitoring process would be a useful avenue for future efforts to pursue.

The impact that pressure from NGOs, targeted law-enforcement efforts and changes in public opinion have had on both offline marketplaces and online trading programs in disrupting the illegal trade may invite optimism that the same effect could be seen on social-media markets. Placing pressure on social-media providers to step up internal monitoring activities and to comply with law enforcement may create a less hospitable environment for illegal trade in the future.

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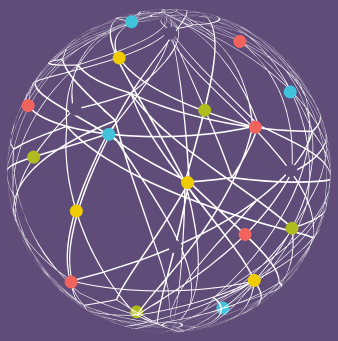

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