
Trade in Tokay geckos for medicine on Java

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INTRODUCTION

Tokay geckos, *Gekko gecko*, are widely distributed in Southeast Asia and are traded in significant quantities throughout Asia. For instance, between 2004-2013 Taiwan PoC imported ~15 million geckos from Thailand and Indonesia (Caillabet, 2013). Trade is largely in the form of dried individuals, to be used in traditional Asian medicine. Purportedly, medicines made out of Tokay are effective in treating a wide range of ailments from diabetes and erectile dysfunction to suppressing asthma and relieving coughing (Gu et al., 2011; Bauer, 2009). From 2009-2011, it was believed that unusually large Tokays could be used as a cure for HIV/AIDS (Caillabet, 2013). A small number of Tokays are traded internationally for the pet trade (Nijman et al., 2012). It seems that the two countries that supply the majority of both the medicinal and live pet trade are Thailand and Indonesia (Caillabet, 2013).

Tokays are not protected in Indonesia, but there is a harvest quota in place whereby only a limited amount of geckos can be taken from the wild. These quotas are set in consultation with the Indonesian Institute of Sciences (also acting as Indonesian CITES Scientific Authority) and, presumably on basis on field surveys, these quotas have been reduced by 50% over the last decade. For 2018, the quota stood at 25,250 animals, specifically for the live pet trade, with 90% of these intended for export and only 2,525 allowed for the domestic market. Two-thirds of the harvest quota was allocated to Java (17,000/25,250) and the remainder to ten

provinces in Sumatra, Borneo and Sulawesi. While private citizens are permitted to catch, keep and use Tokays, harvesting for the purpose of commercial trade is regulated by the set quotas.

A number of studies have been conducted on the trade of Tokays for medicinal purposes in Java, but most of them focussed on export. Kartikasari et al. (2008), on the basis of interviews with harvesters, collectors and sellers distributed throughout Central Java, estimated that 975,000 Tokays were harvested each year from this province alone. Data from the Central Javan commerce board indicated that the dried geckos were exported to Hong Kong (Kartikasari et al., 2008). Nijman et al. (2012) and Nijman and Shepherd (2015) showed that between one and three million of wild-caught dried Tokays were exported from Central and East Java annually, with the main export destinations China and Hong Kong SAR. With regards to the export of non-protected species, these exports are in clear violation of Indonesia's quota system and regulations.

Little is known about the scale of the trade in Tokays in Indonesia for domestic consumption. Legally, only a small amount of wild-caught Tokays can be traded commercially, but the actual trade volume may be substantially higher than anticipated. We here report on the domestic trade of Tokay Geckos in the wildlife markets of Java and Bali.

METHODS AND RESULTS

There are at least 53 bird or animal markets, locally known as *pasar burung* and *pasar satwa* on Java

Submitted 4th October, 2018. Accepted 20th November, 2018

Table 1. Tokay gecko trade in wildlife markets in Java and Bali, Indonesia, from 2012 - 2018. High = multiple visits in four or more years; Medium = multiple visits in one year but not in others, or single visits four or more years; Low = single visits in three or less years.

Location	Animal market	Market size	Survey effort*	# Tokay-/visit
DKI Jakarta	Jakarta, Pramuka	large	high	80
DKI Jakarta	Jakarta, Jatinegara	large	high	40
DKI Jakarta	Jakarta, Barito	medium	high	10
West Java	Bogor, T Empang	medium	medium	5
West Java	Bogor, Pasar Bogor	small	medium	0
West Java	Bandung, Sukahaji	large	high	20
West Java	Garut, Mawar	small	high	0
West Java	Garut, Kerkhof	small	high	20
West Java	Cirebon, Plered	medium	medium	40
West Java	Tasikmalaya, Cikurubuk	medium	medium	0
West Java	Ciamis, Manis	medium	low	0
Central Java	Surakarta, Depok	large	low	50
DI Yogyakarta	Yogyakarta, Pasty	large	low	120
East Java	Surabaya, Bratang	large	medium	70
East Java	Surabaya, Turi	medium	medium	10
East Java	Surabaya, Kupang	large	medium	170
East Java	Malang, Senggol	large	low	20
East Java	Situbondo	medium	low	30
East Java	Bondowoso	small	low	10
East Java	Banyuwangi, Pujasera	small	low	0
Bali	Denpasar, Satria	medium	high	20
Bali	Mengwi, Beringkit	small	medium	0

and Bali, where a wide range of wild-caught birds and mammals are sold (Nijman et al., 2018). Many of these markets also have one or more stalls offering Tokays for sale. Whereas most of these are alive in the markets, they are primarily sold for medicinal purposes, with the animals killed on the spot when purchased. Tokays then can be roasted, fried or baked and consumed to relieve itchiness of the skin, eczema, shortness of breath or asthma, and their products can be used as an aphrodisiac (Arisnagara, 2009; Zayadi et al., 2016).

From 2012 to 2018, we made numerous recurrent visits to eight large animals markets (<50 shops or stalls), eight medium markets (= 20-49 shops or stalls) and six small markets (>20 shops or stalls). For each market, we estimated the number of live

Tokays for sale and averaged this for different market size categories. While survey intensity differed between markets, we did not find any bias to the number of Tokays in markets that were surveyed more frequently. In markets with high survey intensity we found an average 27 Tokays (range 0-80), 37 (range 0-170) for markets with medium survey intensity and 33 (range 0-50) in markets, with low survey intensity. On average, large markets offered more Tokays for sale (71, range 20 to 170) than medium markets (14, range 0 to 40) and small markets (5, range 0 to 20). Extrapolation to all 53 animal markets and adjusting for market size, an average 1,048 Tokays are offered for sale daily. We found an average of 715 in the animal markets that we monitored.



Figure 1. Workers from CV Andira Alternatif in Probolinggo, East Java, preparing dried Tokay Geckos for export (Fahmi 2017).

Traders purchase Tokays for ~US\$0.20 and sell them for ~US\$0.80 each. The cost of keeping Tokays in the markets is negligible, suggesting that this trade is lucrative and turnover is high. Assuming a one-week turnover time, approximately 55,000 Tokays are traded in a year. With the combined human population on Java and Bali numbering 155 million, only one in every 3,000 people has to consume one Tokay per year to create a demand for 55,000 Tokays.

The majority of people living on Java are Muslim and, while it is generally agreed that consumption of Tokays is considered *haram* (prohibited according to Islamic law), scholars have discussed if the use of geckos as medicine is permissible (Zayadi et al., 2016; Halimah, 2013). While this debate is ongoing, consumers on Java of all religious denominations continue to use Tokays for medicinal purposes.

Bogus captive breeding

In 2014, four of the largest dried Tokays export companies CV Karya Abadi Reptil Mulia and UD Karya Reptil Sentosa in Sitoarjo (East Java), PT Manta Pratama Unggul Perkasa (Semarang, Central Java) and CV Andira Alternatif (Probolinggo, East Java) were granted permission to breed 2,980,000 Tokays for live export for the pet trade --- that is, this permit did not allow breeding for the production

of Tokays for medicinal purposes (Fig.1). These quotas were slightly lowered to 2,855,000 in 2016 (Anonymous 2016). These figures are above the quota that is set for wild-caught Tokay Geckos; if indeed these three million geckos were bred in a closed environment this should have a minimal impact on the wild population. It is however highly unlikely that any captive breeding takes place.

The four companies granted breeding permits are all reptile skins and meat exporters with little recorded trading of live animals for the pet trade. As of 2018, all four companies are still registered as meat and reptile skin exporters in the Indonesian Directory of Exporters (Fig.2). Three of the four companies only have made requests to the Indonesian authorities to breed Tokays, but no other reptiles. CV Karya Abadi Reptil Mulia, however, has permission to breed a range of snakes for the international pet market, e.g. 125,000 Oriental Rat Snakes, *Ptyas mucosa*, 30,000 Masked Water Snakes, *Homalopsis buccata* and 25,000 Javan File Snakes *Acrochordus javanicus*. All these species are widely traded for meat and skins and it is highly likely that these are not exported as live pets.

The logistics of breeding millions of Tokays is considerable and the profit made from export is not able to cover the cost of production. If the quantities reported in trade are accurate, it is clear that this can only be sustained through the routine laundering of wild-caught individuals and their export as dead specimens, rather than live for the pet trade.

Recommendations for improvement of trade

There is an urgent need to address the illegal trade in Tokay Geckos on Java. In the present regulatory framework the Indonesian Ministry of Forestry and Environment, through their Regional Branches, should enforce current quotas and shut down companies that export dried Tokays. If it is broad consensus that export of dried Tokays for the TAM trade should also be allowed permitted, the rules need to be amended.

Domestic trade in Tokay Geckos, either for pets or for medicine, is generally not taken into account when setting harvest quotas or levels of domestic trade as set at unrealistically low levels (i.e. 10%

Direktori Eksportir Indonesia

Nama perusahaan atau komoditi (dalam Bahasa Inggris)

Lokasi (Sumber data: Indonesia Eximbank)

No.	Perusahaan	Komoditi	Bidang Usaha
1.	Andira Alternatif, Ud. Jl. Raya Leces Km 12 Rt.16 Rw.02 Desa Banjarsawah Kecamatan Tegal Siwalan, Probolinggo, Jawa Timur Telp.	Meat&edible,incl.flour & Meal,of Reptil Inc.snake&	Meat&edible,incl.flour & meal,of reptil inc.snake&

Figure 2. 2018 profile of CV Andira Alternatif in the Directory of Exporters from the Ministry of Industry in Indonesia showing its listing as an exporter of reptile meat. Similar entries are available for CV Karya Abadi Reptil Mulia, UD Karya Reptil Sentosa and PT Manta Pratama Unggul Perkasa.

of the total). Actual trade quantities are 20 times higher than permitted and this should either be reflected in a) the quota setting, or b) current quotas need to be enforced, thus shutting down the open Tokay trade in the animal markets.

Captive breeding quotas should only be given to facilities that do indeed breed the species for which permission is given. Bogus captive “breeding facilities” and large-scale laundering of wild-caught individuals as captive bred stockpiles jeopardizes consumer and importer trust and undermines the regulatory system. As a matter of urgency, facilities that claim to breed a million Tokays a year should be investigated and held accountable of any fraud. There is sufficient evidence that there is a need for better regulation of the Tokay and other wildlife trade. The listing in CITES Appendix II is appropriate and provides the necessary framework to achieve this for the international trade. Tokays

qualify under Annex 2(a), Criteria B of Resolution Conf. 9.24, and it would be prudent of China and Indonesia, in line with its current domestic regulations, to fully support such a proposal.

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