

Implementation of species protection act for the conservation of Tanimbar corella, *Cacatua goffiniana* (Roselaar & Michels, 2004)

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Abstract. Haryoko T, O'Hara M, Mioduszevska B, Sutrisno H, Prasetyo LB, Mardiasuti A. 2021. Implementation of species protection act for the conservation of Tanimbar corella, *Cacatua goffiniana* (Roselaar & Michels, 2004). *Biodiversitas* 22: 1733-1740. Birds are among the most favored pet animals and are nurtured because of their melodious voice, intelligence, and beautiful feathers. Therefore, these animals are usually traded in both local and international markets. Wild bird trades are dominated by species from the order Passeriformes/songbirds and Psittaciformes/parrots. Furthermore, one of the Psittaciformes groups that are in high demand as a pet is the cockatoos. The Goffin's cockatoo or Tanimbar corella/*Cacatua goffiniana* (Roselaar & Michels, 2004) is one of seven species of parrots native to Indonesia and has been traded for decades. This endemic bird from the Tanimbar Islands (Maluku Province) has been protected by the Indonesian government since 1990 and has been on the CITES Appendix I since 1992. Therefore, this study aims to review the harvesting of *C. goffiniana* and the effect the bird's protection status has on its trade. It was conducted by investigating the legal trade data for 1981-2018, information on illegal trade, and ex-situ conservation of this species. The review on the trade of *C. goffiniana* was assessed using descriptive analysis. Furthermore, Independent Samples T-Test was used to determine the differences between the number of *C. goffiniana* traded before and after the bird was listed in Appendix I CITES and protected by Indonesia's law. The results showed that the number of exported *Cacatua goffiniana* for 38 years to 34 countries was 151,684. Furthermore, the United States of America was the largest importer with a total of 118,356/78.03%. It was discovered that the number of birds legally exported by Indonesia has decreased dramatically since 1990 because these animals are protected by Indonesian law. Consequently, there was a significant difference between the number traded before and after their designation as protected species. The nonparametric correlation between protection status and Appendix I CITES listing to the number of these animals traded was statistically significant. Finally, existing conservation practices involve efforts to restock the population by means of captive breeding programs. However, as conservation agencies have shown little success in breeding these species, the efforts are not sufficient to fulfill the demand. Therefore, illegal trade is still a major threat to the natural populations.

Keywords: Cockatoo, protection, harvesting, trade, conservation

INTRODUCTION

The main threats to biodiversity conservation are habitat destruction, hunting, and wildlife trade (Nijman and Shepherd 2010; Wilcove et al. 2013). Furthermore, this trade is carried out to satisfy the market demands for food, luxury goods, tourist attraction, medicines, and pet animals (Nijman 2010; Harris et al. 2015). The international illegal wildlife trade earns billions of dollars annually (Wilson-Wilde 2010), while the legal bird trade and business contribute USD 78.8 million to the national economy of Indonesia within the same period (Jepson et al. 2011).

Wildlife trade has caused a decline in the populations of several species in many countries in Asia, South America, and Africa (Alves et al. 2013; van Balen et al. 2013; Shepherd et al. 2013; Martin 2018), and contributes to the risk of biological invasion (García-Díaz et al. 2017). Furthermore,

when this trade is carried out illegally, it leads to the destruction of habitats and the unsustainable exploitation of many species (Ogden and Linacre 2015). Nearly 66 parrot species worldwide are now classified as threatened due to population declines caused by illegal trade (Pires 2012). Moreover, based on the IUCN Red List, 112 of the 398 species of this bird are categorized as Threatened, 55 as Vulnerable, 39 as Endangered, 18 as Critically Endangered, 60 as Near Threatened, while 226 are of Least Concern (Birdlife International 2018). Consequently, regulations have been implemented at the international, national, and local levels to combat this illegal trade. Internationally, wildlife trade is regulated under CITES (Hitchens and Blakeslee 2020). Meanwhile, in Indonesia, the Act of the Republic of Indonesia Number 5 of 1990 and Ministry of Environment and Forestry regulation number P.106/MENLHK/SETJEN/KUM.1/12/2018 have been implemented to protect several flora and fauna species.

Birds are one of the favorite pet animals due to their color, vocalization, and intelligence. Furthermore, Southeast Asia is a global hotspot for wild bird trade (Harris et al. 2015), while Indonesia is one of the largest pet bird trade centers (Jepson et al. 2011). Parrots including macaw, cockatoos, and lorries are the most popular in commerce, followed by flamingos, eagles, toucans, and songbirds.

In 2018, the Natural Resources and Conservation Agency (BKSDA) Maluku rescued about 1,135 birds, of which 96% were parrots. Also, the Maluku Islands are targets for illegal trade of the wild members of this bird because 34 out of 82 of its species in Indonesia are found in those Islands (Setiyani and Ahmadi 2020). Meanwhile, according to Tamalene et al (2019), a total of 327 members of the four species of this bird in Ternate Island, North Maluku Province were illegally traded between 2013 and 2015. Parrots are notable pet birds because of their colorful plumage, lifelong capacity for learning, vocalization ability, and charismatic character (White et al. 2011).

Cacatua goffiniana (Roselaar & Michels, 2004) is one of the parrots that are in high demand as a pet and are valued for their small size and curious behavior. Furthermore, this species is endemic and has been traded for several decades. Studies on *C. goffiniana* have been carried out in their natural habitats and captivity, concerning the bird's cognition and behavior in the laboratory (Auersperg et al. 2012, 2013a,b, 2014; Rössler et al. 2020), genetic identity (Zein et al. 2017), natural foraging, and socio-ecology (Mioduszevska et al. 2019, O'Hara et al. 2019). However, specific research and detailed harvesting data on the bird are still extremely limited. Therefore, this study aims to review the data on the harvesting of *C. goffiniana* for legal trade, illegal poaching, and investigate ex-situ conservation and captive breeding. It also aims to analyze the difference in the trade of this bird after its establishment as a protected species by Indonesian law and after it was listed in the CITES Appendix I.

MATERIALS AND METHODS

Data

Data on the legal trade of *C. goffiniana* from 1981-2018 was obtained from the CITES Trade Database (UNEP-WCMC 2019) and downloaded on May 15, 2020. The categories used to obtain the data are year range (1981-2018), exporting country (Indonesia), importing countries (all countries), and all sources, purposes, and trade terms. CITES classified these terms into four types namely live, bodies, feather, and specimens. Also, the sources of the birds were divided into six source codes namely captive (C), wild (W), unspecified (U), born in captivity (F), pre-convention (O), and confiscation (I). Lastly, the birds were traded for seven purposes including to be kept in zoos, and for personal, commercial, scientific, circus, captive breeding, and unspecific purposes.

Data collection on the illegal trade of *C. goffiniana* between 2009 and 2020, and its utilization by zoos and captive breeders was conducted in 2018-2020. Furthermore, the data were obtained from the WCS-IP, Natural Resources and Conservation Agency, and various

media reports. Finally, data on the conservation efforts of ex-situ to preserve this bird was obtained from the Indonesian Zoos and Aquariums Association (IZAA), while breeder data were obtained through inspection of several breeders in West, Central, and East Java, and Bali.

Analysis

The review on the trade of *C. goffiniana* was assessed using descriptive analysis. Furthermore, data were tested for normality using the Kolmogorov-Smirnov Test, while Independent Samples T-Test was used to determine the differences between the number of *C. goffiniana* traded before and after the bird was listed on Table S1 and protected by Indonesia's law. Univariate Analysis of Variance was used to determine the effect of protection and CITES listing on the number of trades conducted. Finally, analyses were performed using IBM SPSS Statistic 22 software (IBM Corp. Released 2013).

RESULTS AND DISCUSSION

Results

The total number of legally traded *C. goffiniana* reported to CITES from 1981-2018 was 151,681, from 209 events. Meanwhile, the number from 1981-1990 was 141,441, while only 10,240 were traded after the species was established as a protected bird by Indonesian law in 1990. Since 2004 there have been no more legal exports of this bird by Indonesia. There are differences in the amount reported by exporters and importers because some trading transactions were only reported by the exporting or importing country. The number of legally traded *C. goffiniana* reported to CITES from 1981-2018 is presented in Figure 1 and Table S1.

According to CITES Trade Database, information on the purpose and source of most of the traded birds is not clearly stated. Consequently, over the years, the designation of *C. goffiniana* trade was highest for not specified (58.6%), followed by commercial (41.4%), personal (0.002%), and zoo (0.001%). The traded birds were obtained primarily from wild-caught members (6.4%), followed by captive breeding (0.032%), and confiscations (0.011%).

A total of 141,949 individual records (93.6%) did not include information on their source. These records were primarily those where the exporting country (Indonesia) was the source. Therefore, it is likely that those birds originated from the wild because breeders in Indonesia have not developed the capacity to export in such large quantities (see details in Table 1).

Cacatua goffiniana from Indonesia was imported by 34 countries. Furthermore, Figure 2 presents the top ten countries importing the bird by the total number of individuals (> 0.5%). It shows that the United States of America was the largest importer with a total of 118,356 (78.0%). Meanwhile, the remaining 24 countries (others) imported only 3,667 individuals (2.4%) combined. A detailed list of importing countries and numbers of individuals is presented in Table S2.

The Indonesian government encourages various parties to preserve *C. goffiniana* through ex-situ conservation in zoos, safari parks, eco-parks, and captive breedings. Based on data from the IZAA, 10 of the 51 member conservation agencies are in possession of only 46 individuals of this bird. Furthermore, only six breeders are definitively known to have tried to breed the bird in captivity, thus the number available for breeding is low, as only 56 males, 36 females, and 4 unknown sex individuals are in captivity (breakdown in Table 2). This amount is not sufficient to produce a second generation that could supply the local or international legal trade markets.

To date, *C. goffiniana* has not been bred successfully by the ex-situ conservation agencies or breeders in order to increase the population available for trade. There are also no records of the number of hatchlings produced by these bodies. However, market demand still exists for the species, thus supply is made via illegal trade and captive breeding outside of Indonesia. Illegal trade and direct capture from the wild population still occur even though this species is protected and included in Appendix I of

CITES. Therefore, in this study, after monitoring the media, NGOs, and tabulating confiscations by Natural Resources and Conservation Agency (BKSDA), it was recorded that 237 individuals were illegally traded between 2009 and 2020 (see Table 3).

Table 1. Purposes, sources, and trade term for international trade of *Cacatua goffiniana*

Type	Detail	Number of individuals	Percentage (%)
Purposes	Commercial	62,756	41.400
	Personal	3	0.002
	Zoo	2	0.001
	Unspecific	88,900	58.600
	Breeding	20	0.013
Sources	Unknown	141,949	93.600
	Captive Breeding	48	0.032
	Confiscations	17	0.011
Trade term	Wild	9,667	6.373
	Live	151,639	99.900
	Bodies	42	0.028

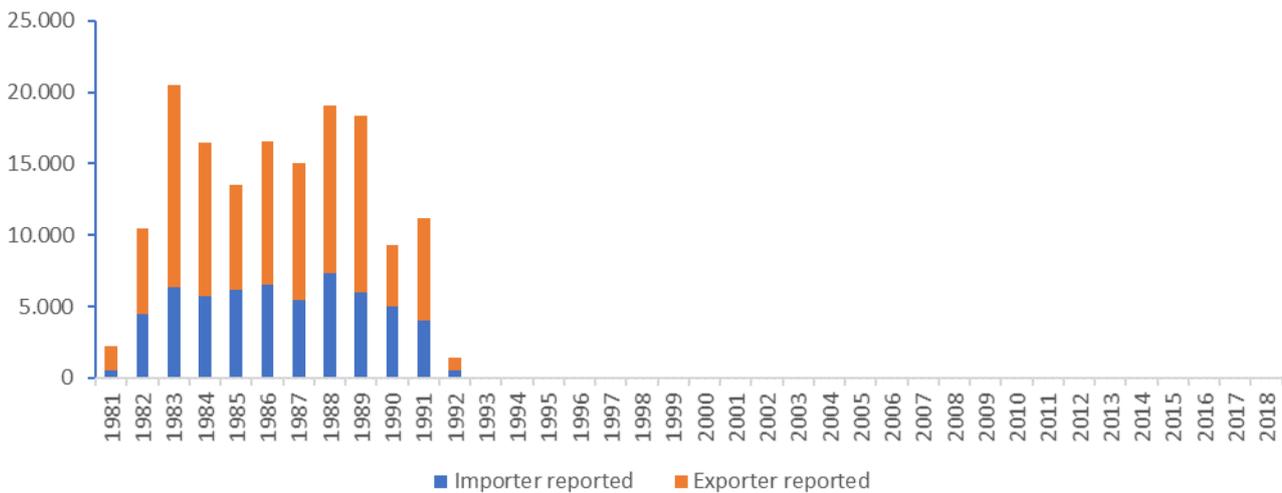


Figure 1. The trend of *Cacatua goffiniana* trade from Indonesia 1981-2018

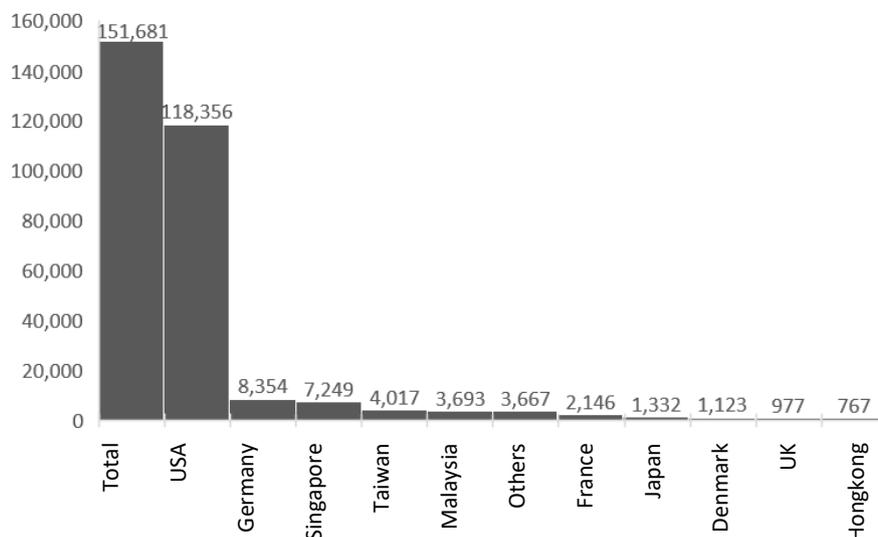


Figure 2. Top importer countries of *Cacatua goffiniana* came from Indonesia 1981-2018

Table 2. Ex-situ conservation agency which has a collection of *Cacatua goffiniana*

Ex-situ conservation agency	Male	Female	Unknown	Total
Zoo				
Safari Park II Indonesia	8	10		18
Surabaya Zoo	2	2	3	7
Ragunan Zoo	2	2	2	6
Sinka Island Park, Singkawang			3	3
Pancuranmas Educational Ecotourism Park	1	1	1	3
Bandung Zoo	1	1		2
Jurug Solo Zoo	1	1		2
Citra Bird Park	1	1		2
Bali Zoo			2	2
Cikembulan Animal Park			1	1
Total	16	18	12	46
Breeder by location (number)				
West Java (1)	1	1		2
East Java (1)	47	27	3	77
Central Java (3)	7	7	1	15
Bali (1)	1	1		2
Total	56	36	4	96

Table 3. Illegal trade of *Cacatua goffiniana* 2009-2020

Year	Data level	Location of data source	Number	Data sources
2009	Local trade (Smuggling)	Banten	1	WCS-IP
2009	Local trade	East Java	3	(Viva 2019)
2010	Pet	Banten	1	WCS-IP
2013	Local trade (online)	Jakarta	2	WCS-IP
2013	Pet	West Java	1	WCS-IP
2016	International trade (smuggling)	Yogyakarta	4	WCS-IP
2017	Local trade	Central Java	3	WCS-IP
2018	Local trade (online)	East Java	2	WCS-IP
2018	Local trade	Jakarta	3	WCS-IP
2018	Breeding	East Java	78	WCS-IP
2018	Local trade	Maluku	61	Natural Resources and Conservation Agency (BKSDA) Maluku
2019	Local trade (Smuggling)	East Java	50	WCS-IP
2019	Local trade (online)	South Sulawesi	13	WCS-IP
2020	Local trade	Maluku	15	Natural Resources and Conservation Agency (BKSDA) Maluku
Total			237	

From the independent samples t-test, it was ascertained that there were significant differences in the number of *C. goffiniana* traded internationally before and after the bird was protected by Indonesian law and listed in Appendix I CITES in 1992 (Sig. 2-tailed $0.000 < 0.05$). Furthermore, the Univariate Analysis of Variance determined that the significant decrease in the number of birds exported by the country was affected by protection (sig $0.011 < 0.05$) and CITES listing (sig $0.000 < 0.05$).

Discussion

The results suggest that Indonesian legislation (Act of the Republic of Indonesia No. 5 of 1990) concerning the conservation of living resources and their ecosystems have likely reduced the number of legally traded *C. goffiniana* in the international market. Under Article 21, it is prohibited for anyone to capture, own, keep, trade, or export protected

animals from one place in Indonesia to another or even abroad. Therefore, protected animals could only be used when permission is obtained from the government.

The classification of *C. goffiniana* by CITES as an animal in Appendix I limits its use through regulation and restrictions. Moreover, CITES Appendix I includes the most endangered plant and animal species and all those threatened by trade. The body also prohibits international trade of specimens for commercial purposes. However, exclusions could be made for the purpose of scientific research. Captive-bred animals on Appendix I are considered as Appendix II, with associated requirements (Article VII CITES exemptions and other special provisions relating to trade). The requirement is that the scientific authority of the exporting country need to demonstrate scientifically that the export of animals would

have no adverse or detrimental impacts on the natural population (CITES 2018).

The total number of *C. goffiniana* exported between 1981 and 2018 was 151,681 individuals. This number is higher than that of *C. galerita* (Sulphur-crested Cockatoo) exported within the same period, which was only 12,798 (Rachmatika et al. 2020). The number of *C. goffiniana* legally exported by Indonesia from 1981-1990 reached 141,441 individuals (around 14,144 individuals per year). This amount was more than that predicted by Birdlife International (2018), which is that bird trade in the 1980s was around 10,000 birds per year.

The international trade of *C. goffiniana* was primarily for commercial purposes, such as making the bird available for purchase as a pet (41.4%), although the purposes of 88,900 individuals were not explained in detail. Finally, only a small number was traded for personal (3 individuals), zoo (2 individuals), and captive breeding (20 individuals) purposes.

In the natural habitat *C. goffiniana* are highly social, innovative, opportunistic feeding generalists that feed on a large diversity of items in the forest and on agricultural grounds (O'Hara et al. 2019; Mioduszezewska et al. 2019). Furthermore, studies under controlled laboratory conditions by Auersperg et al. (2014), showed that this bird rivals the intelligence of small children, monkeys, and crows in several cognitive domains. Thus, while *C. goffiniana* are popular for their inquisitive nature, ability to quickly form social bonds, their intelligence, and ecology, they are best not kept in captivity, unless adequate housing, enrichment and living conditions are provided. For opportunistic generalists, this species (as is the case for most cockatoos) have a great destructive ability and might be extremely vocal.

For the purposes of trade, CITES Trade Database reported that 20 individuals of *C. goffiniana* was sold to South Africa in 2003 for breeding. Moreover, from online searches, it was discovered in this study that several countries are also breeding this bird in captivity. Auersperg et al. (2014) for instance, obtained 14 individuals for behavioral research from CITES accredited breeders in Germany. The United States of America and Germany are the countries that imported the largest number of *C. goffiniana* from Indonesia within the period of 1981-2018, with a total of 118,356 and 8,354 individuals respectively.

Parrots are one of the birds commonly used as pets in the USA. Thus, the country was also the largest importer of Neotropical parrots at around 50,000-150,000 per year from 1980-1990 (Pires 2012). Finally, Rachmatika et al. (2020) reported that the United State of America was also the largest importer of *C. galerita* from Indonesia from 1981-2018.

The results of this study showed that the dominant source of traded birds was either wild-caught or unknown sources, as only 0.032% was reported to come from captive breeding. Furthermore, it showed that even a small proportion of captive breeding poses a serious threat to the wild population for these birds, and when demand is high, the supply would come from poaching in the natural habitat. Thus, the number of individuals traded from

captive breeding was lower than the general estimate by ProFauna (2009), which proposed that overall wildlife trade involves mostly (95%) wild individuals and 5% from captive breeding.

Cacatua goffiniana is near threatened, and extinction could occur because it is an endemic bird with a limited natural distribution of only around 9200 km² in the Tanimbar Islands. Furthermore, only small feral and reproducing population has been reported in Puerto Rico and Singapore (Birdlife International 2018).

Indonesian captive breeding companies and zoos have shown limited interest in the captive breeding of *C. goffiniana* because this parrot species is less attractive than others that have vibrant colors. This is true as only ten zoos out of 51 members of IZAA have about 1-2 pairs of this bird with a total of 46 individuals, while six breeding companies have 96 in total.

Cacatua goffiniana have white feathers with a salmon-pink lore and light yellow suffusion under the tail and flight feathers, as well as dark brown iris in males and reddish-brown in female (Roselaar and Michels 2004). Furthermore, they are much smaller in size (30-32 cm) than other cockatoos (45-60 cm) and weigh about around 300 g. These traits are in contrast to other cockatoos which are larger with pronounced yellow crest (*Cacatua galerita* and *Cacatua sulphurea*) or are colored pale salmon-pink with a deep salmon-pink crest in their young (*Cacatua mollucensis*) (Eaton et al. 2016).

The Indonesian government provides opportunities for the captive breeding of birds through the Act of the Republic of Indonesia No. 5 of 1990 Article 36 paragraph 1 and Government Regulation No. 8, 1999, concerning the use of wild plants and animal species. Based on these regulations, the offspring of captive protected wildlife could be used for trade purposes when it is the second or subsequent generation.

According to the data reported by CITES, only 48 *C. goffiniana* sourced from captive breeds were exported within the period of 1987-1989 and 2003 (Table 1). Therefore, greater capacity within Indonesia to develop captive breeding, including additional conservation measures are needed for this endemic bird of the Tanimbar Islands. This study also discovered that the unavailability of these birds to legally supply markets is one of the reasons for the illegal trade in Indonesia.

Between 2009-2020, 237 *C. goffiniana* were illegally exported and confiscated from various sources. This number is different from that shown in the study by Setiyani and Ahmadi (2020) which found that in 2018, no *C. goffiniana* was illegally traded in Maluku. Burung Indonesia (2018) reported that in 2005, 10,560 individuals of this species were illegally poached and traded from this island. Meanwhile, based on the data recorded at CITES (2018), within that same year, there were no legal exports of the bird from Indonesia.

Indonesia is an archipelago with many islands, thus, illegal activities sometimes go undetected by the police and law enforcement. The borders are also not well controlled, and economic and the livelihood limitations of local people make it easier for these crimes to occur (Wilson-Wilde

2010). *C. goffiniana* uses agricultural land as foraging area, thus the bird could easily be trapped in the field.

Parrots generally are demand internationally, and the supply is largely satisfied by international CITES accredited breeders. Therefore, domestic demand for this bird is the largest driving force behind illegal trade (Pires 2012). The low record of confiscated *C. goffiniana* could be attributed to several factors, including effective law enforcement, the community switching to trade in songbirds, and the understanding that this bird is a protected species. Setiyani and Ahmadi (2020) reported that BKSDA Maluku conducted routine patrols and monitored targeted source area to prevent any illegal parrot harvesting.

Some studies reported that songbird species are traded in Indonesia (Shepherd 2011; Shepherd et al. 2016; Harris et al. 2015; Chng et al. 2016; Harris et al. 2017; Chng et al. 2018a,b; Nijman et al. 2018). Furthermore, Kristianto and Jepson (2011), estimated that Bali supplied 160,000 Orange-headed thrush *Zoothera citrina*, a prestigious songbird competition species in Indonesia within 2008-2009.

Rare and endangered species are targets of collectors and pets. Moreover, illegal wildlife trade could greatly damage the efforts of developing countries in managing their natural resources (Rosen and Smith 2010) and is thought to contribute to the threatened status of 66 parrot species worldwide (Gastañaga et al. 2011). Due to *C. goffiniana* being endemic to the Tanimbar Islands, the bird has the potential to act as a key species for developing ecotourism in those regions. Thus, subsequent illegal trade of this species including other Tanimbar's endemic birds would greatly harm future tourism development.

Conservation implications

The threat of decline in plant and wildlife populations is due to a variety of reasons, such as pollution, deforestation, destruction of natural habitats, and climate change. Furthermore, wildlife trade also contributes greatly to this problem through uncontrolled hunting and harvesting. The trade of *C. goffiniana* has multiple implications for the species, human livelihoods, biodiversity, and governance. Therefore, bird and habitat protection need to be a part of a comprehensive approach to achieving sustainable use of biodiversity, community welfare and conservation. Handling confiscated birds from illegal trade requires high costs. Also, before the species could be returned to the wild, they need to be rehabilitated, and this costs much and bears the risk of spreading diseases to the natural populations.

The Conservation Act of the Republic of Indonesia No. 5 of 1990, Article 5, states that conservation should be carried through three primary activities, namely protection, preservation, and sustainable use. Protection status and being listed in Appendix I by CITES influenced the decline in the trade of *C. goffiniana*. However, the local and international demand for this species cannot be satisfied legally from Indonesia, therefore, illegal trade continues. The survival of *C. goffiniana* populations depends mainly on its protection, natural habitat, engagement with local

communities to reduce poaching of the bird, and the success of captive breeding.

The establishment of the Tanimbar Wildlife Sanctuary has preserved the natural habitat of the *C. goffiniana* in Yamdena Island, however, since these birds often use agricultural land as one of their foraging areas, they move outside their natural habitats. Therefore, the local community needs to be educated and involved in protecting this endemic bird species to prevent over-harvesting. The establishment of captive breeding for *C. goffiniana* on Tanimbar and the development of ecotourism would provide jobs and increased income, therefore, local communities could enjoy sustainable benefits due to the presence of this species on the Islands.

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Table S1. The number of legally traded *Cacatua goffiniana* reported to CITES from 1981-2018

Year	Quantity (individuals)		
	Importer reported	Exporter reported	Total
1981	545	1710	2255
1982	4487	5953	10440
1983	6326	14181	20507
1984	5707	10729	16426
1985	6205	7314	13519
1986	6495	10039	16514
1987	5479	9522	15001
1988	7301	11817	19118
1989	6010	12348	18356
1990	4965	4340	9305
1991	3985	7246	8794
1992	526	898	1424
1993	0	0	0
1994	0	0	0
1995	0	0	0
1996	0	0	0
1997	0	0	0
1998	1	0	1
1999	1	0	1
2000	0	0	0
2001	0	0	0
2002	0	0	0
2003	20	0	20
2004	0	0	0
2005	0	0	0
2006	0	0	0
2007	0	0	0
2008	0	0	0
2009	0	0	0
2010	0	0	0
2011	0	0	0
2012	0	0	0
2013	0	0	0
2014	0	0	0
2015	0	0	0
2016	0	0	0
2017	0	0	0
2018	0	0	0
	58053	96097	151681

Table S2. A detailed list of importing Countries of Cockatoo reported to CITES from 1981-2018

Importing countries	Number of individuals	Percentage (%)
United States of America	118356	78.030
Germany	8354	5.508
Singapore	7249	4.779
Taiwan	4017	2.648
Malaysia	3693	2.435
France	2146	1.415
Japan	1332	0.878
Denmark	1123	0.740
United Kingdom of Great Britain	977	0.644
Hongkong	767	0.506
Italy	550	0.363
Austria	524	0.345
Australia	513	0.338
Switzerland	384	0.253
Botswana	364	0.240
Spain	265	0.175
Thailand	214	0.141
South Africa	194	0.128
China	140	0.092
unknown	124	0.082
Sweden	110	0.073
Republic of Korea	90	0.059
Belgium	75	0.049
Greece	37	0.024
Bangladesh	32	0.021
Philippines	11	0.007
Yugoslavia	11	0.007
Pakistan	10	0.007
Guatemala	6	0.004
Nepal	5	0.003
Saudi Arabia	4	0.003
Deutsche Demokratische republik	2	0.001
Czechoslovakia	1	0.001
Paraguay	1	0.001
	151681	100