NUSANTARA BIOSCIENCE
Vol. 17, No. 1, pp. 103-117
May 2025

ISSN: 2087-3948
E-ISSN: 2087-3956
DOI: 10.13057/nusbiosci/n170111

Bird identification and conservation in Semarang Traditional Markets, Indonesia

HUSNA' PUTRI NUR 'AZIZAH[1], IFFAH NABILA[1], KHARISMA DAMAYANTI[1], IKHLASUL AQMAL KHAWARIZMI[1], MUCHAMMAD SHOLIQIN[1], MUHAMMAD INDRAWAN[1], TITI WAHYUNI[1], JOHAN ISKANDAR[2], AHMAD DWI SETYAWAN[1,3,♥]

[1]Department of Environmental Sciences, Faculty of Mathematics and Natural Sciences, Universitas Sebelas Maret. Jl. Ir. Sutami 36A, Surakarta 57126, Central Java, Indonesia. Tel./fax.: +62-271-663375, ♥email: volatileoils@gmail.com
[2]Department of Biology, Faculty of Mathematics and Natural Science, Universitas Padjadjaran. Jl. Dipati Ukur No.35, Bandung 40132, West Java, Indonesia
[3]Biodiversity Research Group, Universitas Sebelas Maret. Jl. Ir. Sutami 36A, Surakarta 57126, Central Java, Indonesia

Manuscript received: 26 November 2024. Revision accepted: 2 May 2025.

Abstract. *Nur 'Azizah HP, Nabila I, Damayanti K, Khawarizmi IA, Sholiqin M, Indrawan M, Wahyuni T, Iskandar J, Setyawan AD. 2025. Bird identification and conservation in Semarang Traditional Markets, Indonesia. Nusantara Bioscience 17: 103-117.* Birds are one of the wildlife species that humans widely utilize as food, pets, economic resources, and for their aesthetic value. Bird markets in Indonesia have become an integral part of people's lives, but this can also be a threat if not properly controlled. The objectives of this study were to identify bird species traded in bird markets, assess their selling prices, analyze the conservation status and endemicity of traded species, and evaluate the sustainability of bird markets. This research was conducted in three traditional markets in Central Java Province, Indonesia, i.e., (i) Banyuputih Market in Salatiga City; (ii) *Pasar Pon* Ambarawa in Semarang District; and (iii) Kartini Market in Semarang City, using a descriptive qualitative method with a survey and observation approach. The collected data were grouped based on several categories, such as the type of bird species, conservation status, and the location where the species was found. The results of this study showed 46 families with 136 bird species, of which 18 species are non-endemic and 118 species are endemic. Based on the conservation status, according to IUCN, several species are rare (23 species), namely endangered (9 species), vulnerable (3 species) and near threatened (11 species); as well as 13 species are included in Appendix II of CITES; and 14 species are nationally protected according to Permen LHK No.P.20/2018. Most birds come from wild hunting (106 sp.) instead of breeding (30 sp.). Two endemic bird species, including rare according to the three institutions, are *Pycnonotus cyaniventris* (*cucak kelabu*) and *P. zeylanicus* (*cucak rawa*). Suppliers and traders need to pay attention to the sustainability of the bird trade through biological conservation by providing more breeding birds. Efforts are needed to apply the principles of sustainable development that include economic, social, and environmental aspects in the bird trade in bird markets.

Keywords: Birds, conservation, diversity, trade, traditional market

INTRODUCTION

Birds are a group of animals that can be found all over the world, and their species can live in all kinds of places, including urban areas that have no natural counterparts (Lees et al. 2022). The presence of birds serves as a balance in the ecosystem, as they act as apex predators, seed decomposers, pollinators, and pest controllers (Adelina et al. 2016). According to Kartono et al. 2020, the number of bird species in Indonesia increased from 1,771 species in 2018 to 1,777 species in 2019; 168 species were declared endangered, and 30 species are in crisis status by the IUCN. Keeping birds is an option that is often chosen by some Indonesians because it is believed that its cultivation is relatively easy compared to other animals (Putranto et al. 2024). Interest in keeping birds arises from various factors, such as attractive colors and patterns or melodious sounds. In addition, the Indonesian tradition of keeping birds has been around for a long time (Fikriansyah and Wismarini 2023).

In urban areas, biodiversity is an important resource that serves as an environmental buffer and balancer, which is influenced by the characteristics of the ecosystem (Wuisang 2015). Semarang City has varied geographical conditions, including coastal areas, flat urban areas, and hilly areas, contributing to the city's high biodiversity (Suwarso et al. 2019). Birds are one of the many species of animals that can be found in Semarang City. Some common bird species traded in Semarang City include *Lonchura punctulata* (Linnaeus, 1758), *Columba livia* f. *domestica*, and *Serinus canaria* subsp. *domestica* (Ghifari et al. 2016). The economic value of birds can be seen from the bird trade that takes place in various regions, especially in big cities. Various bird species are traded, both for hobby keeping and contests, creating markets and bird stalls (Delfiah et al. 2024). Along with the increasing demand for keeping birds, bird markets have emerged in many parts of Indonesia (Iskandar et al. 2020). As such, bird markets symbolize a particular culture or society by reflecting, on a small scale, the diversity of cultures and birds present in an area (Albuquerque et al. 2014).

Bird markets in Indonesia play a crucial role in the lives of many, particularly in cities like Semarang, where they serve as hubs for social interaction and community bonding

(Iskandar et al. 2019). These markets also host chirping competitions, attracting enthusiasts and celebrating the beauty of bird sounds. However, the popularity of these markets brings challenges such as overexploitation and poaching, which threaten wild bird populations (Humaero et al. 2023). For instance, *Garrulax leucolophus* (Hardwicke, 1816), an endemic species from Sumatra, is nearing extinction due to uncontrolled trade (Bušina et al. 2018). It is essential to enforce regulations that protect bird populations and promote ethical trade practices (Damara et al. 2022). Researchers can utilize direct observation methods and qualitative data collection to assess bird diversity without relying on ecological analyses like biodiversity indices, researchers can utilize direct observation methods and qualitative data collection. Qualitative research is a research approach that produces data in the form of descriptive data sourced from observations in written, oral or behavioral form from research subjects.

This approach involves recording bird species, their behaviors, and interactions within their environments. Studies indicate that factors such as habitat complexity, food availability, and predator presence significantly influence bird diversity. For example, urban bird diversity is closely linked to the quality and quantity of green spaces (Thompson et al.2022). Furthermore, direct observations can reveal how species adapt to environmental changes (Alba et al. 2022). Conservation efforts must be prioritized due to the increasing threat to bird diversity in Indonesia (Iskandar et al. 2021), conservation efforts must be prioritized. Collaborative actions among government bodies, communities, and individuals are vital to maintaining bird biodiversity, which offers ecological, economic, and cultural benefits for future generations (Setiawan et al. 2024). Birds represent not only Indonesia's identity and heritage but also symbolize a commitment to nature conservation (Yapsenang et al. 2022). The research that focuses on bird species diversity and conservation status is crucial for understanding market sustainability. Hence, using observation methods like point counting, researchers can document species presence and behavior while also examining vegetation variations that affect bird habitats (Ridwan et al. 2015; Kurnia et al. 2021). This research aims to contribute significantly to bird conservation efforts and support local ecosystem preservation.

MATERIALS AND METHODS

Study area

This research was conducted in September 2024 at three markets in Salatiga and Semarang, Central Java Province, Indonesia (Figure 1), i.e., (i) Banyuputih Market located in Sidorejo Sub-district, Salatiga City; (ii) *Pasar Pon* Ambarawa in Ambarawa Sub-district, Semarang District; and (iii) Kartini Market in East Semarang Sub-district, Semarang City. Geographically, Banyuputih Market is located at 7°18'50.367 S, and 110°29'5.233 E. Then *Pasar Pon* Ambarawa is located at 7°14'55.348 S and 110°25'15.593 E; Kartini Market is located at 6°59'5.638 S and 110°26'16.026 E. Based on the data available in the Central Bureau of Statistics (CBS Semarang Regency 2024), Banyuputih Market has an area of about 2,586 m^2, *Pasar Pon* Ambarawa has an area of about 240,000 m^2, and Kartini Market has an area of about 12,288 m^2.

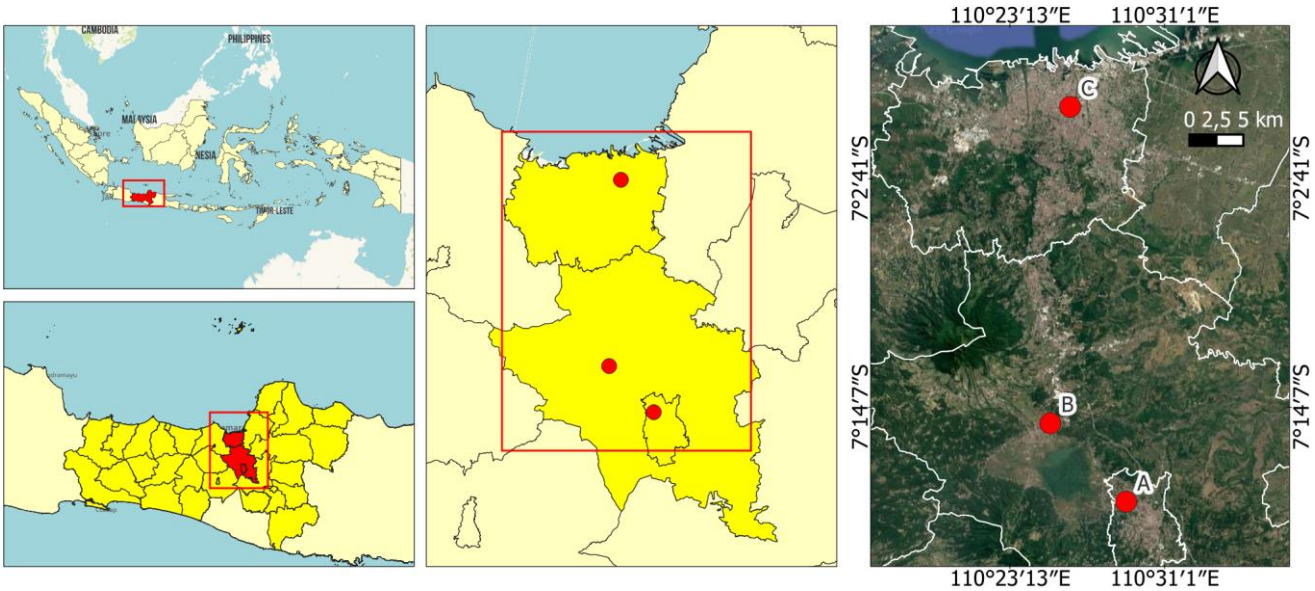

Figure 1. Research locations in Semarang Traditional Markets, Central Java, Indonesia: A. Banyuputih Market in Salatiga City; B. *Pasar Pon* Ambarawa in Semarang District; C. Kartini Market in Semarang City

Procedures

This research was conducted using a descriptive qualitative method with a survey and observation approach. In each market, the types of birds traded were recorded and identification of bird species in each market was also carried out. The data collection process was carried out using the interview method and direct observation in the field. Interviews were conducted with 150 informants with 50 informants at each market. The respondents ranged in age from 22 to 81 years old. The frequency of the study was carried out for 3 consecutive days. Each market gets a duration of 1 day for observation. Observations were carried out from 07.00 to 14.00. This is related to the market productivity scheme that applies in the three locations. The study was conducted at a time related to increasing market productivity, especially on Saturday and Sunday.

The questions asked to the informants included the types of birds sold, where the birds were obtained from, and the market price of the birds. Furthermore, bird morphology observations were conducted to determine bird characteristics such as color and shape as well as market conditions such as the number of stalls, market conditions, and market layout, Indonesia name of bird, selling price, bird sources, and population of dominate.

Prior to the research, we conducted a preliminary survey. At the *Pasar Pon*, it was deliberately carried out to coincide with the Javanese date, namely the *Pasar Pon* or called a special day for buying and selling livestock, one of which is birds at *Pasar Pon* Ambarawa. So that the study directly relates to the peak of the day where the traders sell all their birds in large quantities. Based on the results of a direct survey in the field, Banyuputih Market consists of 21 stalls, while *Pasar Pon* Ambarawa has 52 stalls, and Kartini Market consists of 40 stalls. Banyuputih Market and Kartini Market are markets that specialize in selling various types of birds. At the same time, *Pasar Pon* Ambarawa sells not only birds but also other types of animals, such as rabbits, goats, cows, clothes, medicines, and tools. In the Banyuputih Market, some traders' stalls have been converted into warehouses, but many traders continue to sell in this market. *Pasar Pon* Ambarawa itself is a market that sells a variety of animals, but bird traders are located in the same location. This market has a large number of bird traders who sell with fixed building stalls or not. Kartini Market is a specialized market for bird trading, but now, some of the stalls have closed and are not operating. Bird species data obtained totaled 136 species spread across three markets.

Data analysis

In this study, primary data were obtained from interviews and observations at Banyuputih Market, *Pasar Pon* Ambarawa, and Kartini Market. Researchers made direct observations and also took photos of several bird species as visual data to support the observation results. Then, the results of the interviews from several different informants were compared. Then, the collected data were grouped based on several categories, such as the type of bird species, conservation status, and the location where the species was found. The conservation status of each bird species refers to the Minister of Environment and Forestry Regulation (Permen LHK No. P.20/MENLHK/setjen/ Kum.1/6/2018) and SKJB field guidebook for national level status (MacKinnon 2010), then to the IUCN Red List (Kasambe 2014; IUCN 2024) and CITES Appendix II for international level status. The data were then presented in the form of tables, photos, and descriptive analysis to describe the diversity of bird species distributed in the three markets.

RESULTS AND DISCUSSION

Bird species traded

Based on direct observation/survey and interviews conducted with the bird traders in Banyuputih Market, Salatiga, a total of 35 bird species representing 20 families were found. On the other hand, *Pasar Pon* has the highest number of species, with 84 species representing 35 families. Kartini Market also shows a high number of bird species, with 63 species representing 34 families. With an overall total of 136 bird species representing 46 families, it shows that *Pasar Pon* is superior in terms of the number of bird species. In comparison, Kartini Market is superior in terms of the number of families, as shown in Table 1 and some bird images are shown in Figure 2. The most commonly traded bird species in Banyuputih Market are from the families Cisticolidae (4 species), Columbidae (4 species), and Pycnonotidae (3 species). Meanwhile, in *Pasar Pon*, the most commonly traded bird species are from the families Cisticolidae (5 species), Phasianidae (6 species), Pycnonotidae (7 species), Timaliidae (6 species), and Zosteropidae (8 species). Whereas in Kartini Market, the most commonly traded bird species are from the families Pycnonotidae (6 species) and Sturnidae (5 species). Of the total families in the three markets, the families Timaliidae and Zosteropidae were most commonly traded, with 10 bird species each.

In addition, the ratio of dominant and non-dominant bird species showed that non-dominant species outnumbered the dominant species. Dominant and non-dominant species were determined based on their abundance in the three markets. Some of the bird species in the three markets are protected birds. It can be concluded that even though some bird species in Indonesia have protected status, it cannot guarantee that these bird species are not traded freely. Indonesia is an archipelagic country known for its diversity of animals protected by the government, as well as being a habitat for endemic animals that have characteristics in each region and are not found in other regions (Hardjasoemantri 2009). This is supported by research by Laksono and Ucuk (2023) that although the government protects many species, it is inversely proportional to the amount of illegal trade and crime of protected animals. In 2021, the Biodiversity Conservation Officer noted that 179 bird species were categorized as endangered in Indonesia. This is an alarming number, especially given the rampant illegal trade of protected bird species in international markets. This poses a major threat to the sustainability of these bird species, with many of them at risk of extinction if the situation continues (Al Fasha et al. 2023).

Table 1. Bird species found in Banyuputih Market, *Pasar Pon* Ambarawa, and Kartini Market

Family	Species	Indonesian name	Common name	Selling price (x Rp.1000)	Bird sources	Conservation status				Population	Market location
						IUCN	App. II of CITES	Permen LHK No.P.20/2018	Endemicity		
Aegithinidae	*Aegithina tiphia* (Linnaeus, 1758)	*Sirtu*	Common iora	25-300	Wh	LC	●	-	●	D	PPA
Alaudidae	*Mirafra javanica* Horsfield, 1821	*Branjangan*	Mirafra javanica	1-5	Wh	LC	●	-	●	ND	BM, KM
Artamidae	*Artamus leucorhynchos*	*Kekep babi*	The white-breasted wood swallow	250-700	Wh	LC	-	-	●	ND	KM
Campephagidae	*Lalage nigra* (J.R.Forster, 1781)	*Kapasan kemiri*	Pied triller	280-380	Wh	LC	-	-	●	ND	KM
Campephagidae	*Pericrocotus speciosus* (Latham, 1790)	*Mantenan*	Scarlet minivet	35-145	Wh	VU	-	-	●	ND	PPA
Chloropseidae	*Chloropsis cochinchinensis* (Gmelin, 1789)	*Cucak ranting*	Blue-winged leafbird	250-400	Wh	LC	-	-	●	ND	KM
Chloropseidae	*Chloropsis hardwickii* Jardine & Selby, 1830	*Cungkok*	Chloropsis hardwickii	2-3400	Wh	LC	-	-	●	ND	KM
Chloropseidae	*Chloropsis sonnerati* Jardine & Selby, 1827	*Cucak ijo meranti*	Large leaf cica	250 -400	Wh	LC	-	-	●	ND	BM, PPA, KM
Chloropseidae	*Chloropsis venusta* (Bonaparte, 1850)	*Kinoi*	Blue-masked leafbird	250	Wh	NT	-	-	●	ND	PPA
Cisticolidae	*Orthotomus ruficeps* (Lesson, 1830)	*Prenjak kepala merah*	Ashy tailorbird	110-246	Wh	LC	-	-	●	D	BM, KM
Cisticolidae	*Orthotomus sutorius* (Pennant, 1769)	*Prenjak lumut*	Common tailorbird	15-30	Wh	LC	-	-	●	ND	BM, PPA, KM
Cisticolidae	*Prinia atrogularis* (Moore, 1854)	*Ciblek gunung*	Eurasian tree cigun	60-1	Wh	LC	-	-	●	ND	BM, PPA
Cisticolidae	*Prinia familiaris* (Horsfield,1821)	*Ciblek kristal*	Bar-winged prinia	200-1	Br	NT	-	-	●	ND	PPA
Cisticolidae	*Prinia flaviventris* (Delessert, 1840)	*Ciblek tebu*	Prinia flaviventris	60-85	Wh	LC	-	-	●	ND	BM, PPA
Cisticolidae	*Prinia inornata* Sykes, 1832	*Ciblek sawah*	White-browed wren-warbler	60 -100	Wh	LC	-	-	●	ND	BM, PPA, KM
Cisticolidae	*Prinia polychroa* (Temminck, 1828)	*Ciblek kebun*	Brown prinia	85-250	Wh	LC	-	-	●	ND	BM, PPA
Columbidae	*Columba livia* J.F.Gmelin, 1789	*Merpati*	Domestic pigeon	35-100	Br	LC	-	-	-	D	BM, KM
Columbidae	*Ducula badia* (Raffles, 1822)	*Pergam gunung*	Mountain imperial pigoen	60-80	Br	LC	-	-	●	D	PPA
Columbidae	*Geopelia striata* (Linnaeus, 1766)	*Perkutut*	Zebra dove	180-500	Br	LC	-	-	●	D	BM, PPA
Columbidae	*Streptopelia bitorquata* (Temminck,1809)	*Tekukur*	Island collared dove	20-50	Wh	LC	-	-	●	D	PPA
Columbidae	*Streptopelia risoria* (Linnaeus, 1758)	*Puter*	Zebra dove	170-600	Br	LC	-	-	●	D	BM, KM
Columbidae	*Streptopeliachinensis* (Scopoli, 1786)	*Derkuku*	Spotted dove	25-30	Wh	LC	-	-	●	D	BM, KM
Columbidae	*Treron vernans* (Linnaeus, 1771)	*Punai*	Green pigeon	50	Wh	LC	●	-	●	ND	PPA
Corvidae	*Cissa thalassina* (Temminck, 1826)	*Engkek keling*	Pioden werdd gynffonfer	500	Wh	EN	-	●	●	ND	PPA
Corvidae	*Corvus corone* Linnaeus, 1758	*Gagak*	Carrion crow	850	Wh	LC	-	-	●	ND	PPA
Corvidae	*Platylophus galericulatus* (Cuvier, 1816)	*Cililin*	Crested jayshrike	2	Wh	NT	-	-	●	ND	KM
Cuculidae	*Cacomantis sepulcralis*	*Kedasih*	Plaintive cuckoo	160-250	Wh	LC	●	-	●	ND	KM
Dicaeidae	*Dicaeum cruentatum* (Limnaeus, 1758)	*Kemladean merah*	Scarlet-backed flowerpecker	125	Wh	LC	-	-	●	ND	PPA, KM
Dicaeidae	*Dicaeum trochileum* (Sparrman, 1789)	*Bangsit*	Scarlet-headed flowerpecker	100-300	Wh	LC	-	-	●	ND	PPA
Dicruridae	*Dicrurus macrocercus* Vieillot, 1817	*Sri gunting*	Black drongo	300	Wh	LC	-	-	●	ND	PPA

Estrididae	*Erythrura gouldiae* (Gould, 1844)	*Gould amadine*	Gouldian finch	1	Br	NT	-	-	-	ND	KM
Estrildidae	*Lonchura malacca* (Linnaesu, 1766)	*Red Papua*	Black headed munia	85	Wh	LC	-	-	●	ND	PPA
Estrildidae	*Lonchura oryzivora* (Linnaeus, 1758)	*Gelatik belong*	Java sparrow	85-125	Br	EN	-	●	●	ND	PPA
Estrildidae	*Lonchura punctulata* (Linnaeus, 1758)	*Pipit*	Scaly-breasted munia	3-20	Wh	LC	●	-	●	D	PPA, KM
Estrildidae	*Neochmia phaeton* (Hombron & Jacquinot, 1841)	*Finch Papua*	Crimson finch	350-600	Br	LC	-	-	●	D	BM
Fringillidae	*Carduelis cucullata* (Swainson,1820)	*Red siskin*	The red siskin gynffonfer	1	Br	EN	-	-	-	ND	PPA
Fringillidae	*Crithagra leucopygia* Sundevall, 1850	*Sanger*	Yellow-rumped seedeater	550-1200	Br	LC	-	-	-	ND	KM
Fringillidae	*Eophona personata* (Temminck & Schlegel, 1848)	*Pipit Jepang*	Japanese grosbeak	150	Br	LC	-	-	-	D	KM
Fringillidae	*Serinus atrogularis* (A.Smith,1836)	*Black throat*	Serinus atrogularis	100-2300	Br	LC	-	-	-	ND	KM
Fringillidae	*Serinus canaria* (Linnaeus, 1758) subsp. *domestica*	*Kenari lokal*	American singer canary	500-2500	Br	LC	-	-	-	D	KM
Laniidae	*Lanius schach* Linnaeus, 1758	*Cendet*	The long-tailed shrike	160-2	Wh	LC	-	-	●	ND	PPA, KM
Leiothrichidae	*Garrulax canorus* (Linnaeus, 1758)	*Hwamei*	Chinese hwamei	3	Wh	LC	●	-	●	ND	KM
Leiothrichidae	*Garrulax chinensis* (Scopoli, 1786)	*Poksay hongkong*	Chestnut-backed laughing thrush	200-500	Wh	LC	-	-	-	ND	PPA
Leiothrichidae	*Garrulax leucolophus* (Hardwicke, 1816)	*Poksay jambul*	White-crested laughingthrush	1100	Wh	LC	-	-	●	ND	PPA, KM
Leiothrichidae	*Garrulax mitratus* (S.Muller,1836)	*Poksay genting*	Chestnut- capped laughingthrush	200-700	Wh	NT	-	-	●	ND	PPA, KM
Leiothrichidae	*Garrulax palliatus* (Bonaparte, 1850)	*Poksai mantel*	Sunda laughingthrush	500	Wh	NT	-	-	●	ND	BM
Leiothrichidae	*Garullax lugubris* (S.Muller, 1836)	*Poksay rambu*	Black laughingthrush	350	Wh	LC	-	-	●	ND	PPA
Leiothrichidae	*Leiothrix lutea* (Scopoli, 1786)	*Robinhun*	Red-billed leiothrix	125	Wh	LC	-	-	●	ND	PPA
Leiothrichidaes	*Heterophasia pulchella* (Godwin-Austen, 1874)	*Murai air*	Beautiful sibia	150	Wh	LC	-	-	●	ND	PPA
Locustellidae	*Megalurus palustris* Horsfield, 1821	*Dempyak*	Striated grassbird	400	Wh	LC	-	-	●	ND	PPA
Meliphagidae	*Lichmera limbata* (S. Muller,1843)	*Cucak kombo*	Brown honeyeater	135-1100	Wh	LC	-	-	●	ND	PPA
Meropidae	*Merops leschenaulti* Vieillot, 1817	*Kerik kerik senja*	Blue-tailed bee-easter	130	Wh	LC	-	-	●	ND	PPA
Muscicapidae	*Copsychus malabaricus* (Scopoli, 1786)	*Murai batu*	White-rumped shama	2-10	Br	LC	●	-	●	ND	BM, KM
Muscicapidae	*Copsychus saularis* (Linnaeus, 1758)	*Kacer*	Oriental magpie-robin	600	Wh	LC	-	-	●	ND	KM
Muscicapidae	*Copsychus saularis* (Linnaeus, 1758)	*Kacer poci*	Javan grey-magpie robin	350-3	Wh	LC	-	-	●	ND	BM
Muscicapidae	*Copsychus sechellarum* A.Newton, 1865	*Kacer ireng*	Robin frith y seychelles	500-2500	Wh	EN	●	-	●	ND	BM, PPA
Muscicapidae	*Cyanoptila cyanomelana* (Temminck, 1829)	*Sulingan*	Brown-chested the blue-and-white flycatcher	190-540	Wh	LC	-	-	●	ND	PPA
Muscicapidae	*Cyornis herioti* R.G.W.Ramsay, 1886	*Sulingan gunung*	Blue-breasted blue flycatcher	1	Wh	LC	-	-	●	ND	KM
Muscicapidae	*Cyornis sanfordi* Stresemann, 1931	*Srikatan*	Brown-chested jungle-matinan blue flycatcher	150	Wh	EN	-	●	●	ND	PPA
Muscicapidae	*Rhinomyias olivaceus* (Hume, 1877)	*Sikatan rimba dada coklat*	Blue-breasted blue flycatcher	430-575	Wh	LC	-	-	●	ND	KM
Nectariniidae	*Aethopyga temminckii* (S.Muller,1843)	*Kolibri ekor merah*	Temminck's sunbird	21-116	Wh	LC	-	-	●	D	KM
Nectariniidae	*Anthreptes malacensis* (Scopoli, 1786)	*Kolibri manggar*	Brown-throated sunbird	30-50	Wh	LC	-	-	●	ND	BM, PPA, KM
Nectariniidae	*Anthreptes singalensis* (Scopoli, 1786)	*Kolibri muncang*	Ruby-cheeked sunbird	150-500	Wh	LC	-	-	●	ND	PPA
Nectariniidae	*Arachnothera longirostra* (Latham, 1790)	*Pijantung pisang*	Little spiderhunter	50	Wh	LC	-	-	●	ND	PPA
Nectariniidae	*Cinnyris jugularis* (Linnaeus, 1766)	*Kolibri canting*	Garden sunbird	25-150	Wh	LC	-	-	●	ND	BM
Nectariniidae	*Leptocoma calcostetha* (Jardine, 1843)	*King konin*	Copper-throated sunbird	350-2	Wh	LC	-	-	●	ND	BM, PPA

Oriolidae	*Oriolus chinensis* Linnaeus, 1766	*Podang emas*	Black naped oriele	500	Wh	LC	-	-	●	ND	KM
Oriolidae	*Oriolus xanthornus* (Linnaeus, 1758)	*Kepodang kerudung hitam*	Black hoodedoriele	300-1600	Wh	LC	-	-	●	ND	PPA
Pachycphalidae	*Pitohui dichrous* (Bonaparte, 1850)	*Cucak Papua*	Todirhamphus sanctus	30-35	Wh	LC	-	-	●	ND	BM
Paridae	*Melanochlora sultanea* (Hodgson, 1837)	*Gelatik batu sultan*	Sultan tit	400	Br	LC	-	-	●	ND	KM
Paridae	*Parus major* Linnaeus, 1758	*Gelatik batu*	Great tit	35-300	Wh	EN	-	-	●	ND	PPB, PPA
Passeridae	*Passer domesticus* (Linnaeus, 1758)	*Burung gereja*	Eurasian tree sparrow	60	Wh	LC	-	-	●	D	PPB, KM
Pellorneidae	*Alcippe pyrrhoptera* (Bonaparte, 1850)	*Flamboyan*	Javan fulvetta	35-40	Wh	LC	-	-	●	ND	BM
Pellorneidae	*Malacocincla sepiaria* (Horsfield, 1821)	*Salakan*	Horsfield's babbler	100	Wh	LC	-	-	●	ND	BM
Phasianidae	*Chrysolophus pictus* (Linnaeus, 1758)	*Ayam golden pheason*	Chinese pheasant	9400	Wh	LC	-	-	-	ND	KM
Phasianidae	*Coturnix ypsilophora* (Bosc,1792)	*Puyuh lokal*	Coturnix coturnix	15-50	Br	LC	-	-	●	ND	PPA
Phasianidae	*Excalfactoria chinensis* (Linnaeus,1766)	*Puyuh Canada*	Blue-breasted quail	200-500	Br	LC	-	-	-	ND	PPA
Phasianidae	*Gallus domesticus* Linnaeus, 1758 *var ketawa*	*Ayam ketawa*	Laughing chiken	105-950	Br	LC	-	-	●	ND	PPA
Phasianidae	*Gallus domesticus* Linnaeus, 1758 *var pelung*	*Ayam pelung*	Pelung long crower	100- 2	Br	LC	-	-	●	ND	PPA, KM
Phasianidae	*Gallus gallus* (Linnaeus, 1758)	*American silkie*	Silkie	170-315	Br	LC	-	-	-	ND	KM
Phasianidae	*Gallus gallus* (Linnaeus, 1758) f. *domesticus*	*Ayam serama*	Malaya serama	35-400	Br	LC	-	-	●	ND	PPA
Phasianidae	*Gallus varius* (Shaw, 1798)	*Ayam hutan*	Red partridge	75-150	Wh	LC	-	-	●	ND	PPA
Phylloscopidae	*Phylloscopus inornatus (Blyth, 1842)*	*Cikrak polos*	Inornate wabler	40-50	Wh	LC	-	-	●	ND	BM
Phylloscopidae	*Phylloscopus trivirgatus* Strickland, 1849	*Blereng*	Mountain leaf-warbler	60	Wh	LC	-	-	●	ND	PPA
Picidae	*Dendrocopos macei* (Vieillot, 1818)	*Pelatuk sampit*	Fulvous-breasted woodpecker	85	Wh	LC	-	-	●	ND	PPA
Picidae	*Dinopium javanense* (Ljungh, 1797)	*Pelatuk bawang*	Common flame back	290-779	Wh	LC	-	-	●	ND	PPA
Picidae	*Picus puniceus* (Horsfield, 1821)	*Pelatuk sampit*	Crismon wingned woodpecker	150	Wh	LC	-	-	●	ND	KM
Psittacidae	*Aratinga solstitialis* (Linnaeus, 1758)	*Sun conure*	Sun parakeet	3	Br	EN	-	-	-	ND	KM
Psittacidae	*Nymphicus hollandicus* (Kerr, 1792)	*Falk*	Cockatiel	600	Br	LC	-	-	-	ND	PPA
Psittacidae	*Psittacula krameri* subsp. *manillentis* (Bechstein, 1800)	*Indian ringneck*	Rose-ringed parakeet	4	Br	LC	-	-	-	ND	KM
Psittacidae	*Pyrrhura molinae* (Massena & Souance, 1854)	Green cheek conure	Green-cheeked parakeet	1250	Br	LC	-	●	-	ND	KM
Psittacidae	*Pyrrhura rupicola* (Tschudi, 1844)	Cinnamon conure	Conure	1250	Wh	LC	-	-	-	ND	KM
Psittacidae	*Trichoglossus rubritorquis* (Vigors & Horsfield, 1827)	*Perkici leher merah*	Red collared lorikeet	300	Br	LC	-	-	-	ND	KM
Psittaculidae	*Agapornis* sp.	*Love bird*	Love bird	125-2	Br	LC	-	-	-	ND	BM, PPA, KM
Psittaculidae	*Loriculus galgulus* (Linnaeus, 1758)	*Srindit*	Blue-crowned hanging parrot	100	Wh	LC	-	●	●	ND	PPA
Psittaculidae.	*Melopsittacus undulatus* (Shaw, 1805)	*Parkit*	Budgerigar	65-80	Wh	LC	●	-	●	D	PPA
Pycnonotidae	*Alophoixus ochraceus* (Moore, 1854)	*Cucak jenggot*	Grey-cheeked bulbul	400-680	Wh	LC	-	-	●	ND	PPA, KM
Pycnonotidae	*Alophoxius bres* (Lesson, 1831)	*Jenggot mini*	Brown-cheeked bulbul	40	Wh	LC	-	-	●	ND	BM
Pycnonotidae	*Pycnonotus aurigaster* (Vieillot, 1818)	*Kutilang*	Sooty-headed bulbul	10-65	Wh	LC	-	-	●	ND	BM, PPA, KM
Pycnonotidae	*Pycnonotus bimaculatus* (Horsfield, 1821)	*Rengganis*	Orange-spotted bulbul	60-80	Wh	LC	-	-	●	ND	PPA
Pycnonotidae	*Pycnonotus cyaniventris* Blyth, 1842	*Cucak kelabu*	Ixodia cyaniventris	100	Wh	NT	●	●	●	ND	PPA
Pycnonotidae	*Pycnonotus flavescens* Blyth, 1845	*Merbah*	Flavescent bulbul	1050	Wh	LC	-	-	●	ND	PPA
Pycnonotidae	*Pycnonotus goiavier* (Scopoli, 1786)	*Terucuk*	Yellow-vented bulbul	30-60	Wh	LC	-	-	●	D	BM, PPA, KM
Pycnonotidae	*Pycnonotus melanicterus* (Gmelin, 1789)	*Kutilang emas*	Black-capped bulbul	40-50	Wh	LC	-	-	●	ND	BM, KM
Pycnonotidae	*Pycnonotus plumosus* Blyth, 1845	*Kapas tembak*	Olive-winged bulbul	500-1	Wh	LC	-	-	●	ND	PPA, KM
Pycnonotidae	*Pycnonotus zeylanicus* (Gmelin, 1789)	*Cucak rawa*	Straw-headed bulbul	7	Br	VU	●	●	●	ND	PPA, KM

Rallidae	*Amaurornis phoenicurus* (Pennant, 1769)	*Ruak ruak*	White-breasted waterhen	50	Wh	LC	-	-	●	ND	KM
Renidae	*Irena puella* (Latham, 1790)	*Cucak biru*	Asian fairy bluebird	300	Wh	LC	-	-	●	ND	PPA
Rhipiduridae	*Rhipidura javanica* (Sparrman, 1788)	*Srikatan kipas*	Pield fantail	180-300	Wh	LC	-	●	●	ND	PPA
Sittidae	*Sitta frontalis* Swainson, 1820	*Rambatan doraemon*	Black-crested bulbul	150	Wh	LC	-	-	●	ND	PPA
Sturnidae	*Acridotheres javanicus* Cabanis, 1851	*Jalak kebo*	Javan myna	60	Wh	VU	-	-	●	ND	KM
Sturnidae	*Acridotheres melanopterus* (Daudin, 1800)	*Jalak putih*	Black-winged myna	300-1100	Wh	EN	-	●	●	ND	PPA, KM
Sturnidae	*Acridotheres tristis* (Linnaeus, 1766)	*Jalak nias*	Common myna	350	Wh	LC	-	-	●	ND	PPA
Sturnidae	*Aplonis panayensis* (Scopoli, 1786)	*Cucak keling*	Asian glossy starling	100	Wh	LC	-	-	●	ND	PPA
Sturnidae	*Leucopsar rothschildi* Stresemann, 1912	*Jalak bali*	Bali myna	2	Br	EN	-	●	●	ND	KM
Sturnidae	*Scissirostrum dubium* (Latham, 1802)	*Rio rio*	Grosbeak starling-grosbeak myna	350	Wh	LC	-	-	●	ND	PPA
Sturnidae	*Sturnus contra* (Linnaeus, 1758)	*Jalak suren*	Asian pied starling	500-600	Br	LC	-	●	●	ND	BM, KM
Sturnidae	*Sturnus sinensis*(Gmelin,1788)	*Jalak kapasan*	White shouldered starling	100-650	Wh	LC	-	-	●	ND	KM
Timaliidae	*Pomatorhinus montanus* Horsfield, 1821	*Cucak kopi*	Sunda cica-kopi	125	Wh	LC	-	-	●	ND	PPA
Timaliidae	*Stachyris grammiceps* (Temminck, 1828)	*Sniper*	White-breasted babbler	125	Wh	NT	-	●	●	ND	PPA
Timaliidae	*Timalia pileata* Horsfield, 1821	*Kaso-kaso*	Chestnut-capped babbler	85-290	Wh	LC	-	-	●	ND	KM
Trochilidae	*Arachnothera affinis* (Horsfield, 1821)	*Pijantung gunung*	Grey breasted spiderhunter	20-340	Wh	NT	●	-	●	ND	KM
Turdidae	*Geokichla citrina* (Latham, 1790)	*Anis merah*	Geokichla citrina	600- 6	Wh	LC	-	-	●	ND	BM, PPA, KM
Turdidae	*Geokichla interpres* (Temminck, 1828)	*Anis kembang*	Zoothera interpres	600	Wh	NT	●	-	●	ND	BM, PPA, KM
Turdidae	*Geokichla sibirica* (Pallas, 1776)	*Anis siberia*	Geokichla sibirica davisoni	100-150	Wh	LC	-	-	●	ND	PPA
Tytonidae	*Tyto alba* (Scopoli, 1769)	*Burung hantu serak sulawesi*	Barn owl	50	Wh	LC	-	-	●	ND	PPA, KM
Zosteropidae	*Heleia javanica* (Horsfield, 1821)	*Opior Jawa*	Javan grey-throated white-eye	50	Wh	LC	-	●	●	ND	PPA
Zosteropidae	*Lophozosterops javanicus* (Horsfield, 1821)	*Pia-pia*	Javan grey-throated white-eye	50	Wh	LC	-	-	●	ND	KM
Zosteropidae	*Zosterops chloris* Bonaparte, 1850	*Pleci lombok*	Lemon-bellied white-eye	50-150	Wh	LC	-	-	●	ND	PPA
Zosteropidae	*Zosterops flavus* (Horsfield, 1821)	*Pleci lokal*	Javan white-eye	250-1	Wh	NT	-	●	●	ND	PPA
Zosteropidae	*Zosterops japonicus* Temminck & Schlegel, 1845	*Pleci bustomi*	Warbling white-eye	100-150	Wh	LC	-	-	●	ND	BM
Zosteropidae	*Zosterops melanurus* Hartlaub, 1865	*Pleci*	Warbling white-eye	150	Wh	LC	-	-	●	ND	PPA, KM
Zosteropidae	*Zosterops montanus* Bonaparte, 1850	*Pleci monti*	Mountain white-eye	80-500	Wh	LC	-	-	●	ND	PPA
Zosteropidae	*Zosterops novaeguineae* Salvadori, 1878	*Pleci Papua*	Papuan white-eye	80-250	Wh	LC	-	-	●	ND	PPA
Zosteropidae	*Zosterops palpebrosus* subsp. *auriventer* Hume, 1878	*Pleci auriventer*	Indian white-eye	75- 350	Wh	LC	-	-	●	ND	PPA
Zosteropidae	*Zosterops wallacei* Finsch, 1901	*Pleci wallacea*	Yellow-ringed white-eye	157-690	Wh	LC	-	-	●	ND	PPA

Note: Common name: MacKinnon (2010). Bird sources: Wh: Wild hunting, Br: Breeding. Conservation status: IUCN: EN: Endangered, VU: Vulnerable, NT: Near Threatened, LC: Least Concern. App. II of CITES, Permen LHK No.P.20/2018, Endemicity: ●: present/listed, -: absent. Population: Dominant (> 100 individuals); Non-dominant (< 100 individuals). Market location: BM: Banyuputih Market; PPA: Pasar Pon Ambarawa; KM: Kartini Market.

Figure 2. The bird species found include. A. *Pycnonotus zeylanicus*; B. *Agapornis* sp.; C. *Geopelia striata*; D. *Cissa thalassina*; E. *Serinus canaria*; F.*Garrulax mitratus* ; G. *Lonchura oryzivora*; H. *Columba livia* f. *domestica*; I. *Aratinga solstitialis*; J. *Nymphicus hollandicus*; K. *Geokichla interpres*; L. *Pyrrhura molinae*

The high demand for birds from consumers encourages traders and bird catchers to use various methods to obtain supplies of bird species, often without regard to conservation principles (Pratiwi et al. 2021). Often, these methods are carried out without regard to conservation principles that should guide natural resource management. This practice not only harms threatened species but can also disrupt the ecosystem as a whole. Illegal bird capture and uncontrolled trade can cause imbalances in bird populations, which in turn disrupt food chains and other ecological interactions (Hughes et al. 2023). Government regulations play an important role in reducing exploitation and poaching, starting from the aspects of trade rules, species protection, and consequences of violations to more effective law enforcement. Therefore, government regulations serve as the main foundation for conservation efforts. Structured policies and consistent enforcement will support bird conservation efforts in the long term and create a more sustainable and responsible market.

Sales price

Based on Table 1, in Kartini Market, prices can reach up to Rp600,000 for *Geokichla citrina* (Latham, 1790) and around Rp170,000-Rp315,000 for *Gallus gallus* (Linnaeus, 1758). At Banyuputih Market, *G. citrina* is also sold at Rp600,000, while *Prinia atrogularis* (Moore, 1854) can be purchased from around Rp60,000 to Rp1,000,000. At *Pasar Pon*, *G. citrina* is also offered at Rp600,000, and *Gallus domesticus* are sold from Rp100,000 to Rp2,000,000. There are significant variations in bird prices across the three markets depending on the species and its conservation status. For example, *Chloropsis sonnerati* Jardine & Selby, 1827 in Kartini Market and Banyuputih Market are marketed at Rp250,000-Rp400,000, while in *Pasar Pon*, they are both around Rp250,000-Rp400,000. In addition, *Chrysolophus pictus* (Linnaeus, 1758) is only available in Kartini Market at Rp9,400,000; there are no records of sales in the other two markets. Overall, Kartini Market offered a wider range of prices for a variety of birds, including *G. gallus* and *G. citrina*. However, Banyuputih Market and *Pasar Pon* also provide competitive pricing options for some bird species, such as *P. atrogularis* and *C. sonnerati*. Therefore, market selection should be based on individual preferences regarding the type of bird you want to buy and your budget.

Bird sources

Based on the source of birds from this study, they are divided into species from the wild and breeding. The number of species originating from wild captures is 106 species and the results of breeding are 30 species of birds. The media used in the capture include nets, sticky rice, and snares. While breeding focuses on breeding in large numbers. Bird traders from the three markets admitted that they received a lot of bird supplies from hunters both from Java and outside Java. The types of wild-caught birds sold are mostly local species whose populations are still widely found in nature. While the breeding species are more dominant in types of birds originating from abroad such as *Serinus canaria* subsp. *domestica*, *Agapornis* sp., *Melopsittacus undulatu*s and other imported bird species. However, in Indonesia, breeding of bird species that are starting to become rare has begun. The types of birds that are bred are *Pycnonotus zeylanicus* and *Leucopsar rothschildi*. These two species have indeed begun to be bred because they are very difficult to find in nature. The cucak rowo species has been successfully bred by breeders in Indonesia with the aim of preserving and the value of its chirping. The difficult breeding character is still a slight obstacle to breeding this species (Lestari et al. 2017). Meanwhile, the Bali starling species is also carried out in Bali and all breeders in Indonesia who have received certification from the BKSDA. The Bali starling is still a vulnerable and sensitive species to breed because of its easily stressed character and the need for a comfortable environment (Milati 2024). However, many breeders continue to try to develop the potential existence of the *P. zeylanicus* and *L. rothschildi* species to prevent extinction. Market demand has indeed increased for these two types of birds. However, the number of species from breeding has not been able to meet the level of demand from traders in the market. Meanwhile, the type of wild-caught bird whose population is decreasing, namely *Zosterops flavus*, has indeed experienced a drastic decline due to the very high demand by consumers. The type of colony bird makes this species easy to catch in large numbers. So that its existence is getting thinner and harder to find, especially on the island of Java. Even this type of bird has begun to be bred because it is difficult to find. So, it can be predicted that the bird market will start to have difficulty getting a supply of birds that are of high interest, but availability in nature is decreasing, so breeding birds becomes one of the answers to balance these problems and conservation efforts.

Conservation status and endemicity of traded birds

In the three markets, 136 species were found to be traded and belonged to 46 families. The 136 bird species were then identified using IUCN, Appendix II of CITES, and Minister of Environment and Forestry Regulation No. P.20/MENLHK/setjen/Kum.1/6/2018. IUCN (International Union for Conservation of Nature) itself is a provider of assessment and analysis of comprehensive conservation data (Osipova et al. 2020). Meanwhile, CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) itself is an international trade convention that regulates wildlife trade, which was established to prevent species extinction (Sollund 2022). The Minister of Environment and Forestry Regulation No. P.20/MENLHK/ setjen/Kum.1/6/2018 contains the determination of which plant and animal species are protected.

IUCN red list

The conservation status of a species is an important issue that will determine how the species will survive. The determination of conservation status is not only based on the number of remaining populations but also the increase or decrease in population size in a certain period, the rate of breeding success, threats, and others (Yapsenang et al. 2022). After classification according to IUCN, 9 species were categorized as red or endangered, including *engkek keling* (*Cissa thalassina* (Temminck, 1826)), *gelatik batu* (*Parus major* Linnaeus, 1758), gelatik belong (*Lonchura oryzivora* (Linnaeus, 1758)), jalak bali (*L. rothschildi* Stresemann, 1912) jalak putih (*Acridotheres melanopterus* (Daudin, 1800)), kacer ireng (*Copsychus sechellarum* A.Newton, 1865), red siskin (*Carduelis cucullata*), Srikatan (*Cyornis sanfordi* Stresemann, 1931), and Sun Conure (*Aratinga solstitialis* (Linnaeus, 1758)). Next, 3 species fall into the vulnerable category, including cucak rawa (*P. zeylanicus* (Gmelin, 1789)), jalak kebo (*Acridotheres javanicus* Cabanis, 1851), and mantenan (*Pericrocotus speciosus* (Latham, 1790)). Further, 11 species fall into the near-threatened category, including anis kembang (*G. interpres*), ciblek kristal (*P. familiaris* Horsfield), cililin (*P. galericulatus*), cucak kelabu (*P. cyaniventris*), gould amadine (*E. gouldiae*), kinoi (*C. venusta*), kolibri (*Arachnothera affinis*), pleci lokal (*Zosterops flavus*), poksai mantel (*G. palliatus*), poksay genting (*G. mitratus*), and sniper (*S. grammiceps*). At the same time, other species fall into the least concern category.

This study found 9 endangered bird species that are still traded. At least 7 of the 9 species were found at *Pasar Pon* Ambarawa. Although these 9 species are endangered, 4 species are not included in the list of protected animals according to the Minister of Environment and Forestry Regulation No. P.20/2018. The four species are gelatik batu (*P. major*), kacer ireng (*C. sechellarum*), red siskin (*C. cucullata*), and sun parakeet (*A. solstitialis*). Policymakers must consider including these species in the list of protected animals to prevent further exploitation. In addition, the prices of these endangered species are not all classified as expensive; the cheapest is at Rp35,000, and the most expensive is at Rp3,000,000. The low selling price of these species can be caused by successful reproduction in captivity and also local economic conditions. The next category below endangered is vulnerable. In the three markets, three species were found in the vulnerable category. Of the four species, one of them is a protected animal, namely the cucak rawa (*P. zeylanicus*). In addition, cucak rawa also has a high selling value, reaching Rp7,000,000. In Indonesia, this bird has quite a lot of enthusiasts despite its high price (Yong et al. 2018). One of the strong reasons why this species has a high price is because of its melodious chirping, which is always a consideration for bird enthusiasts; the other three species have selling prices in the range of IDR 35,000-250,000. In addition, it is known that the four bird species are endemic birds. Then, under the vulnerable category is the Near Threatened category, where 11 bird species were found in the three markets. The price value of these birds is in the price range of IDR 20,000-2,000,000. Of the 11 bird species, only 5 are on the protected list, including *Platylophus galericulatus, P. cyaniventris, Chloropsis venusta, Z. flavus*, and *Stachyris grammiceps*. In all three markets, many traders sell bird species categorized as least concern conservation. This means that there are around 116 bird species that are safe to trade. This category refers to species that have stable populations and are not subject to threats that could disrupt their survival. Species in this category can survive due to their wide geographical distribution, active breeding, and good survival skills. The wide geographical distribution of these species is a reason for optimism about their survival.

Appendix II CITES

The identification results showed that 13 bird species were included in Appendix II of CITES[LT1]. These birds include *Aegithina tiphia, Mirafra javanica, Treron vernans, L. rothschildi , Lonchura punctulata, Garrulax canorus, Copsychus malabaricus, Copsychus sechellarum, Melopsittacus undulatus, P. cyaniventris, P. zeylanicus, A. affinis*, and also *G. interpres*. CITES Appendix II is a list of species that are not threatened with extinction but could be endangered if trade continues without regulation (Shivambu 2024). In other words, the list of species in this appendix indicates that trade permits can be granted if only they are not detrimental to the survival of the species in the wild. The species *M. undulatus* (Parakeet) is known to be the dominant bird in the *Pasar Pon* Ambarawa, which may indicate that the demand for this species is high in the local market.

Permen LHK No. P.20/MENLHK/setjen/Kum.1/6/2018

Around the world, wild-caught animals are traded in wildlife markets, but it's hard to tell what's legal and what's not (Nijman et al. 2022). Indonesia has a serious problem with illegal trade in wild plants and animals (Shepherd et al. 2020). This problem not only threatens the existence of various species but also disrupts the balance of ecosystems that are very important for the survival of life on Earth. This regulation functions as a legal basis to reduce the number of poaching and illegal trade. Based on the Minister's regulation, 14 bird species were found to be protected species in all three markets. The birds include *C. thalassina, L. oryzivora, C. sanfordi, Loriculus galgulus, P. cyaniventris, P. zeylanicus, Pyrrhura molinae, Rhipidura javanica, A. melanopterus, Gracupica contra, L. rothschildi, S. grammiceps, Z. flavus,* and *Heleia javanica.* However, despite strict regulations, observations show that these birds are still widely traded. In fact, two species were found in both markets, *P. zeylanicus* (*cucak rawa*) and *G. contra* (*jalak suren*), which is an indicator of the high demand for these two species.

Endemicity

The majority of animals found in Indonesia are endemic to Indonesia, but there are also many non-endemic animals from various countries (Latifah et al. 2021). Endemic animals themselves are animal species that inhabit a region or area that make the region or area distinctive because of the presence of these species in it, and these animals are not found in other places (Hadi et al. 2024). In this study, 18 species were found to be non-endemic species, and 118 species were endemic. The non-endemic species include *G. gallus, C. pictus, Serinus atrogularis, Pyrrhura rupicola, Nymphicus hollandicus* (Kerr, 1792), *Erythrura gouldiae* (Gould, 1844), *P. molinae, Psittacula krameri* subsp. *manillensis* (Bechstein, 1800), *S. canaria, Agapornis* sp., *C. livia, N. hollandicus, Eophona personata* (Temminck & Schlegel, 1848), *Garrulax chinensis* (Scopoli, 1786), *Excalfactoria chinensis, C. cucullata, Crithagra leucopygia* Sundevall, 1850, and *A. solstitialis.* These bird species come from various countries such as South America, Vietnam, Cambodia, Japan, Australia, the Netherlands, Central America, Africa, India, and China. These non-endemic species can enter Indonesia for several reasons, such as legal international trade and also through natural migration. Regarding foreign bird species or imported birds developed in Indonesia, it can be said that they are not invasive if the species are released into the wild. This is because birds that come from abroad are mostly finch and hook-billed seed-eating species from breeding. When these breeding birds are released in Indonesia, they will have difficulty getting food in the wild, because this type of species is not used to the Indonesian environment and has been growing in cages for a long time (Yuliana et al. 2021). Indirectly, they will die if released into the wild without a food supply from humans.

Discussion

Market sustainability

Based on the results obtained, it can be seen in Table 2 that wild-caught birds rather than farmed birds dominate the source of birds marketed. This condition is quite threatening to the sustainability of trade activities, considering that the number of wild catches cannot be ascertained. Wild capture is also a threat to the extinction of bird species in the wild. The supply of birds from farms can be increased again to maintain the sustainability of bird trade in the market. With livestock, the market's need for birds can be met, while birds in the wild will be maintained. Hence, it will result in the sustainability of bird trade in the market.

Based on the results obtained, it can also be seen that trade still happens with birds that are protected according to IUCN, Appendix II CITES, and Regulation of the Minister of Environment and Forestry No. P.20/MENLHK/setjen/Kum.1/6/2018. These birds were obtained from wild catches, but some also come from farms. It is quite unfortunate that many protected bird species come from wild catches more than from farms. Wild-caught birds that are protected according to Regulation of the Minister of Environment and Forestry No. P.20/MENLHK/setjen/Kum.1/6/2018 include *P. galericulatus, P. cyaniventris, C. thalassina, Acridotheres tristis* (Linnaeus, 1766), *A. melanopterus, C. venusta, Z. flavus, S. grammiceps, R. javanica, L. galgulus.* Meanwhile, farmed birds include *G. gallus, P. zeylanicus, L. oryzivora, L. rothschildi,* and *G. contra.* The dominant bird species in the three markets is *Pycnonotus goiavier* (Scopoli, 1786). In the future, there could be an increase in the demand for birds on the market, which could potentially encourage illegal trade, especially when regulations are not enforced. The supply of birds is very important and has quite an influence on the continuity of trade in the bird market. Dependence on poaching to obtain birds can be an obstacle; this is because the population of birds in the wild, which is the main source, continues to decline. Therefore, it is necessary to increase the source of birds from farms. It is important to apply the principle of sustainable development, which includes economic, social, and environmental aspects in trade in the bird market (Iskandar et al. 2019).

Specific steps need to be taken with a regulatory, economic, and collaborative approach to ensure the sustainability of the bird market in Indonesia (Nijman et al. 2022). The first thing that can be done is to encourage sustainable bird breeding. The government needs to encourage legal and responsible bird breeding as a source of supply for birds in the public market. Then, the certification of captive-bred birds and its regulations are also made to ensure the welfare of birds and prevent exploitation practices. The second thing that can be done is to raise awareness of the importance of maintaining the sustainability of the bird market, and the third thing that can be done is to enforce the law against illegal trade. It is necessary to carry out regular supervision both in offline traditional markets and in online stores.

Table 2. The types of birds that are traded and take part in singing contests

Species	Selling price (x Rp. 1000)	IUCN conservation status
Geokichla citrina	60-600	LC
Mirafra javanica	100-500	LC
Lanius schach	16-200	LC
Copsychus sechellarum	50-250	EN
Copsychus saularis	35-300	LC
Serinus canaria subsp. *domestica*	50-250	LC
Leptocoma calcostetha	35-200	LC
Cinnyris jugularis	25-15	LC
Agapornis sp.	125000-200	LC
Copsychus malabaricus	200-1000	LC
Zosterops japonicus	Oct-15	LC
Orthotomus ruficeps	11-246	LC

Note: LC: Least concern, EN: Endangered

The government needs to increase supervision to detect and stop unlawful bird trade. Furthermore, it is necessary to collaborate between agencies such as the conservation center with the community and also traders. These steps, if carried out consistently and collaboratively, will be able to maintain the sustainability of the bird market in Indonesia and of course, preserve existing birds. When compared to the international scene, Indonesia is indeed considered to have a very diverse number of bird species. One country that imports birds is China, this bird trade is a step to develop bird variations based on the beauty of feather color, voice and physique and is associated with several countries including southern China, Myanmar, India and the Southeast Asian region (Ptak 2012). With the increasing trade in songbirds, this has led to the extinction of birds and the yellow-breasted bunting species can be used as a leading species in East Asia (Heim et al. 2021). Meanwhile, in the international arena, the Beo bird species has become a very hot issue because of the rampant trade, especially in West Asia, Southeast Asia, South Africa and Europe, which are the largest suppliers of this almost extinct species (Chan et al. 2021). So, the international world has set rules that ensnare beo caught by liars who must go through an accreditation system so that absolute extinction does not occur (Fiennes et al. 2024).

Naming and classification of birds

The scientific study of the interactions between birds and a particular society, both past and present, is known as ethnoornithology, which is a subdiscipline of ethnobiology (Thomsen et al. 2024). Banyuputih Market, *Pasar Pon*, and Kartini Market are located in Central Java, a region where the Javanese culture plays a significant role in bird naming. In society, the recognition or naming of bird species is generally influenced by the visual characteristics and sounds produced. Therefore, bird identification is often carried out at the genus level. However, there are also several types of birds whose names are not based on observable characteristics but rather come from fairy tales or folklore, such as the Lampung Java sparrow (*Cacomantis*

merulinus (Scopoli, 1786)) (Muhammad et al. 2020). The influence of Javanese culture on bird naming is profound, as it shapes the local languages, cultures, and traditions of the community. One species can have several different names in different regions, a result of the unique interactions and communication between local residents and immigrants, as well as the influence of bird sellers. The naming of bird species is generally based on the bird's vocalizations, feather color, morphological characteristics, habitat, and distinctive behavior (Putri et al. 2021).

Based on its morphology, *Oriolus chinensis* Linnaeus, 1766 is known as the golden oriole because it has a body dominated by bright yellow, similar to the color of gold. This bird also has black wings and a black stripe on the head that passes through the eyes, giving it a striking appearance. The name 'golden oriole' is significant in many cultures, symbolizing wealth and prosperity. In addition, *Streptopelia chinensis* is called a turtle dove because it has a descending tone that is repeated over and over again, which sounds like "*te-kukkuurrr*," which is elongated. The name 'turtle dove' is often associated with peace and love in various regions. This sound is one of the important identification characteristics of this species, in addition to its physical characteristics. Naming based on morphology and vocalization helps recognize and distinguish the two bird species. Based on its vocalization, *Orthotomus ruficeps* (Lesson, 1830) is called a ciblek because the bird's voice can be heard in various vibrations, such as "*trrriii-yip*" and "*trrrri*," which have a high tone. In addition, this bird also produces sounds similar to "*ciiii-blék, ciii-blék*" and the nasal sound "*cicicici*," which further adds to the uniqueness of its vocalization. In comparison, *L. punctulata* is called emprit because it is known for its distinctive vocalization, producing the sound "*priit ... priitt*" (Muhammad et al. 2020). This sound is an important identification for this species and is often a characteristic that bird watchers easily recognize. Based on its habitat, *Cyornis* herioti R.G.W.Ramsay, 1886 is called the mountain flute because it is often found in mountainous areas or highlands. In addition, *L. rothschildi* is called the Bali starling because the bird's native habitat is the tropical forests of Bali and the bird species is closely related to its original habitat. Some birds are classified based on their behavior and habits. For example, *Passer montanus* (Linnaeus, 1758) is commonly called the sparrow bird because the bird is often found in places of worship, especially on church roofs. Because it is often found around churches, many people call it a sparrow. This bird has physical characteristics such as a brick-red head, a black throat with a white neck edge, and a grayish-white belly. Female birds have a slightly paler color than males. People also believe that sparrows bring good news regarding fortune, work, and soulmates (Fatimah and Muhammad 2023). *Tyto alba* (Scopoli, 1769) are called owls because these birds are often active at night. They generally perch on trees and are often used to guard agricultural land or rice fields by farmers to eradicate pests. *Tyto alba* have unique physical characteristics, such as large eyes that allow good vision at night, a flat disc-shaped face, and soft and thick feathers that support quiet flight. Their beak is small and sharp, while their large, sharp claws function to catch prey. Their feather colors vary, generally consisting of brown, gray, and white, which helps in camouflage (Sangster et al. 2013). The ciblek species belong to the same family but have differences in some physical colors and sound characteristics. In Banyuputih Market and *Pasar Pon* Ambarawa, two similar bird species were found, namely ciblek kebun (*Prinia familiaris*) and the ciblek kristal (*P. familiaris*). The ciblek kebun bird species has a physical color with yellow in the rectum to the chest, the sound characteristics possessed by the ciblek kebun are relatively dominant in the sound of reason. While the ciblek kristal is dominated by relatively dark feathers on the black and white patterns on the wings and does not have a yellow color in the rectum to the chest, but a pure white color. The eye color of the ciblek kristal is dominantly red with a typical long shot chirping sound. However, both species have the same posture, fighting style, and solitary nature.

Market chain systems and conservation implications

The bird market chain system in Indonesia involves various factors that play an important role in the bird trade, from breeders to traders and consumers. The majority of birds sold in the market are farm products (Mulyadi and Dede 2020). Banyuputih Market, *Pasar Pon*, and Kartini Market are not only places for transactions but also centers of social interaction where knowledge about birds and care practices is shared. The dynamics of supply and demand in these markets can affect the price and sustainability of certain species. Not only that, the threat of an outbreak or disease is also a factor that can affect price spikes and the availability of species in the market (Ferlito and Respatiadi 2019).

Unmanaged bird trade can threaten bird populations in the wild, especially for endangered species. Many of the birds traded come from wild catches, which has the potential to reduce their populations significantly. Therefore, the application of sustainable development principles in the bird trade is very important. This includes strict monitoring of traded species, as well as enforcement of regulations that protect species protected by IUCN (Panigrahi and Jins 2018). As such, the bird trade must be conducted ethically and responsibly to ensure no species are threatened with extinction due to overexploitation. This conservation effort should utilize a community-based approach in Indonesia. This collaborative approach not only creates a sense of ownership and responsibility for bird conservation but also allows for solutions to conservation violations. With this approach, conservation strategies can be designed to remain in line with community customs without compromising animal conservation principles. Things that can be done to improve animal conservation include educating bird traders and buyers, enforcing regulations in bird markets, enforcing laws in the community, and developing ecotourism or nature-based activities without disturbing bird habitats (Marshall et al. 2020). As the public gains a better understanding of the impacts of the bird trade and the importance of protecting species and their habitats, there is hope for conservation awareness. This hope lies in the

potential for the community to play an active role in conservation and support sustainable trade practices. These practices can transform birds from mere cultural symbols to powerful testaments of our commitment to nature conservation. Collaborative efforts between the government, communities, and individuals are needed to ensure that bird biodiversity in Indonesia is maintained.

Sustainability of economic, social and environmental aspects in the bird market

From an economic perspective, bird trading activities in traditional markets, including Ambarawa Market, Pon Market and Kartini Market, are considered very good. The supply of birds from the wild is considered economically good by traders. This is because the purchase price from hunters is cheap and can be resold at a high price to general consumers. However, when compared to birds from breeding, it is indeed far, this is because birds from breeding will be sold at a fairly high price on the grounds that the results of official captivity are based on the breeder's ring (Delfiah et al. 2024). So that the sale is considered to have a small profit. However, for bird species with protected status, it will be more difficult to find because the selling value is very high and requires certification from the BKSDA institution. Sometimes traders also hesitate to sell protected birds because they violate applicable laws. So that especially rare birds will provide a high selling value or profit if they do come from official breeding. In terms of the economy, it has now entered the mode of buying birds from breeders that have rings because they are considered to have more economic value and are legally safe.

Socially, people will indeed be interested in wild-caught birds because they are considered cheaper than breeding birds. The market will be even more crowded if the variety of types of birds traded is quite diverse. However, wild-caught birds also have a risk of dying easily due to many factors, including: more sensitive endurance, easy to stress, difficult to adapt and takes a long time to make a sound (Setiawan et al. 2022). So some people also choose birds from breeding because they are easier to adapt and faster to make a sound, especially among bird chirping enthusiasts for competitions. Socially, the bird market will also apply warnings to traders and suppliers regarding protected bird species that cannot be traded. This is done so that traders and markets can be more compliant with the legality of the laws governing the trade in animals. Indirectly, traders will also pay attention to the rules so that social activities in the bird market are more conducive and safe.

The environmental aspect is also highly emphasized for traders and consumers themselves, especially on the principle of conservation. From now on, in general, the public has realized the importance of preserving the sustainability of the bird species in demand. Breeders have begun to emerge to compete to carry out breeding in order to reduce the purchase of wild-caught birds (Iskandar et al. 2015). In addition to high-value breeding results, it also has a positive impact on the sustainability of nature. Starting from the endemic or local bird species native to Indonesia that are starting to become extinct or imported birds. Sometimes breeders or bird lover communities also release birds into the wild so that their numbers increase. This is done so that sustainability in nature improves and minimizes the number of extinctions.

Based on research that has been conducted at Banyuputih Market, *Pasar Pon* Ambarawa, and Kartini Market, it was found that 46 families with 136 species of birds were traded at varying prices. On average, the birds are endemic animals, namely 118 species. Then, based on data analysis, it is known that 116 bird species are safe to trade, but there are still 11 species with near-threatened status, 3 species with vulnerable status, and 9 species are endangered. Therefore, from the source, traders need to pay attention to how the bird trade continues. Efforts are needed to implement the principles of sustainable development that include economic, social, and environmental aspects in trade in the bird market.

ACKNOWLEDGEMENTS

The author would like to thank the informants at Banyuputih Market, *Pasar Pon* Ambarawa, and Kartini Bird Market who have provided information used to support this research. In addition, thanks are expressed to all colleagues who helped the research process until the completion of this article.

REFERENCES

Adelina M, Harianto SP, Nurcahyani N. 2016. Bird diversity in community forest Kelungu Village Kota Agung Sub-district Tanggamus District. Jurnal Sylva Lestari 4 (2): 51-60. DOI: 10.23960/jsl2451-60. [Indonesian]

Al Fasha JI, Chandra EM, Ramadhani RH. 2023. Law enforcement against illegal trade in protected bird species in Indonesia. Bina Hukum Lingkungan 7 (2): 150-173. DOI: 10.24970/bhl.v7i2.324. [Indonesian]

Albuquerque UP, de Lucena RFP, de Freitas Lins Neto EM. 2014. Selection of research participants. In: Albuquerque U, Cruz da Cunha L, de Lucena R, Alves R (eds.). Methods and Technique in Ethnobiology and Ethnoecology. Springer Protocols Handbooks. Humana Press, New York. DOI: 10.1007/978-1-4614-8636-7_1.

Alba R, Kasoar T, Chamberlain D, Buchanan G, Thompson D, Pearce-Higgins JW. 2022. Drivers of change in mountain and upland bird populations in Europe. Ibis 164 (3): 635-648. DOI: org/10.1111/ibi.13043.

Appendices I, II and III. 2024. Convention on International Trade in Endangered Species of Wild Fauna and Flora.p23-35.

Busina T, Pasaribu N, Kouba M. 2018. Ongoing illicit trade of Sumatran Laughingthrush *Garrulax bicolor*: One-year market monitoring in Medan, North Sumatra. Illicit trade of Sumatran Laughingthrush 21: 27-34.

Chan DTC, Poon ESK, Wong ATC, Sin SYW. 2021. Global trade in parrots – Influential factors of trade and implications for conservation. Glob Ecol Conserv 30: e01784. DOI: 10.1016/j.gecco.2021.e01784.

Central Berau of Statistics Semarang Regency. 2024. Semarang Regency in Figures 2024.2024.0215-5796.33220.24002. [Indonesian]

Damara A, Iswandaru D, Harianto SP, Setiawan A. 2022. Protection status of birds traded (Case Study in Bandar Lampung City). Jurnal Belantara 5 (2): 219-231. DOI: 10.29303/jbl.v5i2.896. [Indonesian]

Delfiah F, Harun HR, Zahara SA, Ningsih SA, Yanti W, St Nurhalisa I, Amrullah SH, Alir RF. 2024. Diversitas dan etno-ornitologi burung bernilai ekonomis sebagai bentuk kearifan lokal masyarakat di Pasar

Hobi, Toddoppuli, Makassar. Anoa: J Anim Husb 3 (1): 17-32. DOI: 10.24252/anoa.v3i1.44574.
Fatimah IN, Muhammad GI. 2023. Ethno-ornithological study of birds in the Campus Area of Sutomo University Serang Banten as a form of community local wisdom. J Sustain Dev Issues 2 (1): 65-83. DOI: 10.56282/jsdi.v2i1.468. [Indonesian]
Ferlito C, Respatiadi H. 2019. Policy reforms in the poultry industry in Indonesia. Center for Indonesian Policy Studies, Jakarta. [Indonesian]
Fiennes S, Hardianto N, Ansari SD, Dwiyahreni AA, Jackson T, Holmes G, Birchall C, Hassall C. 2024. Rethinking extinction "crises": The case of Asian songbird trade. Camb Prism Extinct 2: e15. DOI: 10.1017/ext.2024.20.
Fikriansyah TA, Wismarini TD. 2023. Sistem penentuan juara kontes burung kicau murai menggunakan Metode Ahp-Waspas. JIPI (Jurnal Ilmiah Penelitian dan Pembelajaran Informatika) 8 (3): 828-838. DOI: 10.29100/jipi.v8i3.3880.
Ghifari B, Hadi M, Tarwotjo U. 2016. Keanekaragaman dan kelimpahan jenis burung pada taman Kota Semarang, Jawa Tengah. Jurnal Biologi 5 (4): 24-31. [Indonesian]
Hadi P, Suhariyanto D, Iryani D. 2024. Perlindungan terhadap Satwa Endemik yang Dilindungi Berdasarkan Undang-Undang No. 5 Tahun 1990 Tentang Konservasi Sumber Daya Alam Hayati dan Ekosistemnya. As-Syar'i: Jurnal Bimbingan & Konseling Keluarga 6 (1): 642-653. DOI: 10.47467/as.v6i1.1672. [Indonesian]
Hardjasoemantri K. 2009. Law on the Protection of Natural Resources and Ecosystem Conservation. Universitas Gadjah Mada Press, Yogyakarta. [Indonesian]
Heim W, Chan S, Hölzel N, Ktitorov P, Mischenko A, Kamp J. 2021. East Asian buntings: Ongoing illegal trade and encouraging conservation responses. Conserv Sci Pract 3 (6): e405. DOI: 10.1111/csp2.405.
Hughes A, Auliya M, Altherr S, Scheffers B, Janssen J, Nijman V, Shephard CR, D'Cruze N, Sy E, Edwards DP. 2023. Determining the sustainability of legal wildlife trade. J Environ Manag 341: 117987. DOI: 10.1016/j.jenvman.2023.117987.
Humaero S, Candri DA, Suana IW. 2023. Status konservasi burung yang diperdagangkan di Pulau Lombok. Jurnal Bios Logos 13 (3): 180-191. DOI: 10.35799/jbl.v13i3.52103.
IUCN. 2024. The IUCN Red List of Threatened Species.ISSN 2307-8235.
Iskandar BS, Iskandar J, Partasasmita R. 2019. Hobby and business on trading birds: Case study in bird market of Sukahaji, Bandung, West Java and Splendid, Malang, East Java (Indonesia). Biodiversitas 20 (5): 1316-1332. DOI: 10.13057/biodiv/d200522.
Iskandar J, Fathin AS, Silmi RH, Husodo T, Wulandari I, Megantara EN, Partasasmita R, Shanida SS. 2021. Bird diversity and ethno-ornithological knowledge of local people in Ciletuh-Palabuhanratu Geopark, Sukabumi, West Java, Indonesia. Biodiversitas 22 (8): 3409-3422. DOI: 10.13057/biodiv/d220838.
Iskandar J, Iskandar BS, Mulyanto D, Alfian RL, Partasasmita R. 2020. Traditional ecological knowledge of the bird traders on bird species bird naming, and bird market chain: A case study in bird market Pasty Yogyakarta, Indonesia. Biodiversitas 21 (6): 2586-2602. DOI: 10.13057/biodiv/d210631.
Iskandar, JOHAN, Iskandar BS. 2015. Pemanfaatan aneka ragam burung dalam kontes burung kicau dan dampaknya terhadap konservasi burung di alam: Studi kasus di Kota Bandung, Jawa Barat. In Prosiding Seminar Nasional Masyarakat Biodiversitas Indonesia 1 (4): 747-752. [Indonesian]
Kartono A, Soimin M, Rachman INA. 2020. Keanekargaman spesies burung di Kawasan Hutan Taman Wisata Karandangan. Jurnal Silva Samalas 3 (1): 22-27. [Indonesian]
Kasambe R. 2014. Updates in the IUCN Red List of threatened birds of India. Mistnet 15 (1): 10-6.
Kurnia I, Arief H, Mardiastuti A, Hermawan R. 2021. The potential of bird diversity in the urban landscape for birdwatching in Java, Indonesia. Biodiversitas 22 (4): 1701-1711. DOI: 10.13057/biodiv/d220415.
Laksono BD, Ucuk SY. 2023. Law enforcement against protected live life trade crimes. Intl J Multicultural Multireligious Understanding 10 (2): 428-433. DOI: 10.18415/ijmmu.v10i2.4448.
Latifah S, Valentino N, Setiawan B, Muddofir MRT, Hidayati E, Nuraini, Putra TZ. 2021. Species composition, structure and endemicity of flora Malesiana in the Udayana urban forest, Mataram City. IOP Conf Ser: Earth Environ Sci 637: 012088. DOI: 10.1088/1755-1315/637/1/012088.
Lees AC, Haskell L, Allinson T, Bezeng SB, Burfield IJ, Renjifo LM, Rosenberg KV, Viswanathan A, Butchart SHM. 2022. State of the World's Birds. Annu Rev Environ Resour 47: 231-260. DOI: 10.1146/annurev-environ-112420-014642.
Lestari DA, Masy'ud B, Hernowo JB. 2017. Model of success and management of Cucak Rawa (*Pycnonotus zeylanicus*) breeding. J Soc Econ For Res 14 (2): 99-100.
Marshall H, Collar NJ, Lees AC, Moss A, Yuda P, Marsden SJ. 2020. Characterizing bird-keeping user-groups on Java reveals distinct behaviours, profiles and potential for change. People Nat 2 (4): 877-888. DOI: 10.1002/pan3.10132.
MacKinnon J. 2010. Field Guide to the Birds of Sumatra, Java, Kalimantan and Bali. Birdlife, Cibinong. [Indonesian]
Milati NM. 2024. Upaya konservasi jalak bali (*Leucopsar rothschildi*) melalui kearifan lokal masyarakat Bali. In SEMBIO: Prosiding Seminar Nasional Biologi dan Pendidikan Biologi 3 (1): 7-12.
Muhammad GI, Mardiastuti A, Sunarminto T. 2020. Identification and classification of avifauna based on local knowledge at Gunung Pinang, Serang Regency, Banten. Zoo Indonesia 29 (2): 67-82. [Indonesian]
Mulyadi A, Dede M. 2020. Perdagangan burung di Kota Bandung (antara ekonomi, keanekaragaman hayati, dan konservasi). Jurnal Geografi Gea 20 (2): 105-112. DOI: 10.17509/gea.v20i2.28828. [Indonesian]
Nijman V, Morcatty TQ, Feddema K, Campera M, Nekaris KAI. 2022. Disentangling the legal and illegal wildlife trade-insights from Indonesian wildlife market surveys. Animals (Basel) 12 (5): 628. DOI: 10.3390/ani12050628.
Osipova E, Emslie-Smith M, Osti M, Murai M, Åberg U, Shadie P. 2020. IUCN World Heritage Outlook 3: A Conservation Assessment of all Natural World Heritage Sites. Gland, Switzerland.
Panigrahi M, Jins VJ. 2018. Status of birds in Agasthyamalai Hills, Western Ghats, Kerala, India. J Threatened Taxa 10 (1): 11166-11184. DOI: 10.11609/jott.3259.10.1.11166-11184.
Pratiwi SA, Manungjaya FM, Setia TM. 2021. Update study of traded birds at the bird shops in Jakarta. J Trop Biodivers 2 (1): 33-40. DOI: 10.59689/bio.v2i1.75.
Ptak R. 2012. Chinese bird imports from maritime Southeast Asia, c. 1000-1500. Archipel 84 (84): 197-245. DOI: 10.3406/arch.2012.4371.
Putranto HD, Brata B, Sutriyono, Nurmeiliasari, Indriana DS. 2024. Population distribution pattern analyses and reasons for cultivating female birds: Case study of white-rumped shama birds in Bengkulu City. Bul Pet Trop 5 (1): 31-39. DOI: 10.31186/bpt.5.1. [Indonesian]
Putri FK, Alicia F, Noven HJ, Sholiqin M, Himawan W, Javarendra RA, Liza N, Partasasmita R, Iskandar J, Naim DM, Setyawan AD. 2021. Conservation implication and traditional ecological knowledge on trading bird: A case study in Depok bird market in Surakarta, Central Java, Indonesia. Biodiversitas 22 (12): 5636-5648. DOI: 10.13057/biodiv/d221260.
Ridwan M, Choirunnafi A, Sugiyarto, Suseno W A, Putri RDA. 2015. The relationship between bird diversity and tree species composition on Kentingan campus Universitas Sebelas Maret Surakarta, Central Java. Pros Sem Nas Masy Biodiv Indon 1 (3): 660-666. DOI: 10.23960/jsl2451-60.
Regulation of the Minister of Environment and Forestry Number P.20/MENLHK/SETJEN/KUM.1/6/2018 concerning Protected Plant and Animal Species.
Sangster G, King BF, Verbelen P, Trainor CR. 2013. A new owl species of the genus *Otus* (Aves: Strigidae): from Lombok, Indonesia. PLoS One 8 (2): e53712. DOI: 10.1371/journal.pone.0053712.
Setiawan E. 2024. Perlindungan hukum terhadap satwa burung di Taman Nasional Alas Purwo. Jurnal Forest Island 1 (1): 1-9. DOI: 10.33387/foris.v2i1.82. [Indonesian]
Setiawan A, Syamsia PN, Iswandaru D. 2022. Threat status and composition of birds traded on the Central Sumatra Route in Lampung Province. Gorontalo J For Res 5 (1): 51-58.
Shepherd CR, Gomez L, Nijman V. 2020. Illegal wildlife trade, seizures and prosecutions: A 7.5-year analysis of trade in pig-nosed turtles *Carettochelys insculpta* in and from Indonesia. Glob Ecol Conserv 24: 01249. DOI: 10.1016/j.gecco.2020.e01249.
Shivambu N, Shivambu TC, Nelufule T, Moshobane MC, Seoraj-Pillai N, Nangammbi TC. 2024. A snapshot of the global trade of South African native vertebrate species not listed on CITES. Animals (Basel) 14 (19): 2782. DOI: 10.3390/ani14192782.
Sollund R. 2022. Wildlife trade and law enforcement: A proposal for a remodeling of CITES incorporating species justice, ecojustice, and environmental justice. Intl J Offender Ther Comp Criminol 66 (9): 1017-1035. DOI: 10.1177/0306624X221099492.

Suwarso E, Paulus DR, Widanirmala M. 2019. Kajian database keanekaragaman hayati kota Semarang. Jurnal Riptek 13 (1): 79-91. DOI: 10.35475/riptek.v13i1.53. [Indonesian]

Thomsen B, Copeland K, Harte M, Muurlink O, Villar DA, Mirin BH, Fennell SR, Deshwal A, Campbell P, Pekrul A, Murtough KL, Kulkarni A, Kumar N, Thomsen J, Coose S, Maxwell J, Zhang Z, Nickerson D, Gosler A. 2024. Decolonizing bird knowledge: More-than-Western bird–human relations. Ornithological Applications 126 (1): duad053. DOI: 10.1093/ornithapp/duad053.

Thompson R, Tamayo M, Sigurðsson S. 2022.Urban bird diversity: does abundance and richness vary unexpectedly with green space attributes? J Urban Ecol 8 (1): juac017. DOI: 10.1093/jue/juac017.

Wuisang C. 2015. Biodiversity conservation in urban areas: Evaluation of green corridor landscape in Manado City. Media Matrasain 12 (2): 47-60. DOI: 10.35793/matrasain.v12i2.9207.

Yapsenang D, Davinsa DA, Respati B, Kurniawan A, Maryani M, Mustagfirin. 2022. Ecological index, status and challenges of the bird conservation programs (avifauna) among indigenous peoples of the Moi Lemas Tribe, West Papua. Indones J Soc Responsibility Rev (IJSRR) 1 (2): 77-89. DOI: 10.55381/ijsrr.v1i2.36.

Yong DL, Lim KS, Lim KC, Tan T, Teo S, Ho HC. 2018. Significance of the globally threatened straw-headed Bulbul *Pycnonotus zeylanicus* populations in Singapore: A last straw for the species? Bird Conserv Intl 28 (1): 133-144. DOI: 10.1017/S0959270917000028.

Yuliana E, Yonvitner AS, Subing RA, Ritonga SA, Santoso A, Kouba A, Patoka J. 2021. Import, trade and culture of non-native ornamental crayfish in Java, Indonesia. Manag Biol Invasions 12 (4): 846-857.