WHISPERING CITY: AN ANALYSIS OF BIRD TRADE LEVELS AND CONSERVATION STRATEGIES IN URBAN AREAS (A CASE STUDY OF BANDA ACEH CITY)

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ABSTRACT

The study aims to map the threat levels to birds in urban environments and to formulate appropriate conservation strategies, focusing on the city of Banda Aceh in the province of Aceh. The introduction highlights the critical role of birds as environmental indicators and the need for protection in urban avian habitats. The research methodology involves field observations by walking along transects and establishing observation points with a 20-meter radius. The findings reveal complex interdependencies between the physical, social, and natural environments in organic cities like Banda Aceh, where physical and social changes significantly impact bird populations. Urban birds are natural components vulnerable to environmental degradation. Increased attention from the community and ornithologists is required to protect the diversity of bird species in urban areas, including Banda Aceh. Proper conservation strategies must be developed to ensure the survival of birds in urban habitats. The conclusion emphasizes the need for awareness of the importance of conserving birds in urban areas and the necessity for concrete steps to protect their habitats and populations. With a better understanding of the interactions between the environment and bird presence, conservation efforts can be effectively implemented to preserve biodiversity in urban settings, particularly in the city of Banda Aceh, Aceh Province.

Keywords: *Birds, Urban Ecology, Biodiversity, Banda Aceh*

INTRODUCTION

Birds, as an important element of Indonesian biodiversity, play a crucial role in ecosystems, including controlling insect populations, flowering, and seed spread. (Mariyappan et al., 2023). They not only contribute to ecological balance but also have significant value in scientific, economic, recreational, as well as artistic and cultural aspects. Their close interaction with the human environment makes them essential wildlife to preserve, mainly because of their adaptive capabilities that enable their presence in various habitats, including urban areas, emphasising the importance of bird conservation in the sustainability of the human habitat. (Abdullah et al., 2024; Mariyappan et al., 2023).

Banda Aceh, a city in the province of Aceh, has experienced rapid growth and development following the tsunami disaster and conflict in Aceh (Amri & Giyarsih, 2022). The city witnesses continued construction activities every year, ranging from individual houses to residential complexes, and the revitalization of office buildings and public social facilities by the local government. Experts (Arif, 2017) argue that urban areas such as Banda Aceh have significant potential as unplanned areas characterised by unscheduled development. This spontaneous urban growth, driven by diverse and interdependent interests, resulted in an organically evolving city in its unique form. In the context of organic cities such as Banda Aceh, according to Wu et al. (2017) there is a significant interdependence between physical, social, and natural environments, in which both physical and social changes occur spontaneously and interact. Disruption in one aspect can trigger disruption in the whole system, forcing the search for a new balance. (Afriyani et al., 2023) In particular, the Green Open Space (RTH) in Banda Aceh, which often undergoes changes and adaptation to the current conditions of the city, shows how biotic components such as birds play an important role in the dynamics of urban environmental adaptation.

Urban birds (James Reynolds et al., 2019) that live side by side with humans in urban environments need adequate habitats and are protected from disturbances to survive. Their presence in cities has ecological significance, reflected in the food chain they follow, which forms the natural ecosystem in which they are. Almost all forms of life have connections with birds, making them easy to find in various locations. Because of their sensitivity to environmental change, birds are often considered an ecological health indicator, with environmental degradation affecting them directly. Despite the importance of urban birds as environmental indicators, their presence is often overlooked by urban communities and even by bird observers. Only a few major

cities in Indonesia have complete data on these birds. Variations in the composition of bird species across cities reflect the extent to which each city supports bird life, which is also influenced by the history of species spread in the region. (Canedoli et al., 2018). Therefore, a better understanding of the existence and needs of urban birds can strengthen conservation efforts and improve the environmental quality of human life.

Numerous studies related to birds in Banda Aceh City have been conducted (Abdullah, 2013); (Ahadi, 2018); (R., Ahadi & Sarong, 2019); (Gagarin et al., 2022); (Khairunisak et al., 2022); (Hayati et al., 2022), with previous research focusing on avifauna in the Urban Forest of Banda Aceh and the surrounding campus environment, carried out during morning and evening periods. However, there are still gaps in research regarding the species of birds traded in urban areas, both in terms of frequency and limited accessibility to information, making this research important to conduct.

B. RESEARCH METHOD

1. Research Location and Time

The research was conducted in 9 districts of Banda Aceh City, namely Baiturrahman, Banda Raya, Jaya Baru, Kuta Alam, Kuta Raja, Meuraxa, Syiah Kuala, and Ulee Kareng. These locations were selected due to their high number of bird shop encounters compared to other rural areas (Gagarin et al., 2022), and they also feature various types of habitats (Abdullah, 2013).

2. Data Collection

a. Threat Data Collection (Trade and Hunting)

I. Market Survey

We will survey the market in nine districts in Banda Aceh: Baiturrahman, Banda Raya, Jaya Baru, Kuta Alam, Kuta Raja, Lungbata Meuraxa, Syiah Kuala, and Ulee Kareng. We've built good relationships with some of the community, including students, and we're going to do the most intensive surveys there. For the validity of market survey data, we'll do three surveys. (Rentschlar et al., 2018). The team of researchers generally followed the main road, visiting the market as they found it at each of the sites they visited during the observation.

II. Questionnaire

We used qualitative surveys given to bird trappers, traders, and bird sellers to assess temporary changes in price and volume of species, with the intention of using this information to conclude wild population trends as shown by Harris et al. (2015) and Rentschlar et al. (2018). For this research, we consider only species that are listed three times or more as answers to the following four questions, with a primary focus on protected birds only:

1. What species of bird do you catch or sell the most?
2. Which species is the hardest to find?
3. Which five species are priced higher?
4. Which five species have had a drop in sales price?

In the analysis, we include images of species being hunted (based on personal communication with hunters) and that can be identified to the species level (Van Kuijk et al., 2022).

3. Data Analysis

I. Species Diversity Index (Ĥ)

The analysis process to determine variations in species composition across the research station is carried out by calculating the diversity index. Species diversity is a parameter that can be used to compare different communities, especially to know the stability of communities. Species diversity (Ĥ) in a community using the following formula: (Barbour M. G. et al., 1999; Melati, 2007)

$$\hat{H} = \sum pi \ln pi$$

Where pi = total individual bird for all species and ln pi = number of birds for species to i.

number of birds for the i-th species. To interpret the meaning of the Shannon-Wiener Species Diversity Index (Ĥ), the following criteria are used: (Barbour M. G. et al., 1999) The value of Ĥ ranges from 0-7. If $\hat{H} \leq 1$, the category is very low; if $\hat{H} \geq 1$-2, the category is low; if $\hat{H} \geq 2$-3, the category is medium; if $\hat{H} \geq 3$-4, the category is high; and if $\hat{H} \geq 4$, the category is very high. The data analysis of bird and tree diversity will be presented in table form and accompanied by photos of each bird and tree species found at the research station.

C. RESULT AND DISCUSSION

Market surveys show that there are a wide variety of bird species traded that are used for a variety of purposes, such as hobbies and breeding. However, it should be noted that certain trade activities, especially illegal ones, can have a negative impact on biodiversity. Unauthorised or illegal bird trafficking could threaten the survival of bird populations and the integrity of their ecosystems. A number of countries have established regulations to control the bird trade, with the primary aim being the conservation of endangered species. Here is a list of bird species commonly traded in Banda Aceh City.

Table 1. Types of bird finds traded in the Banda Aceh City Bird Market

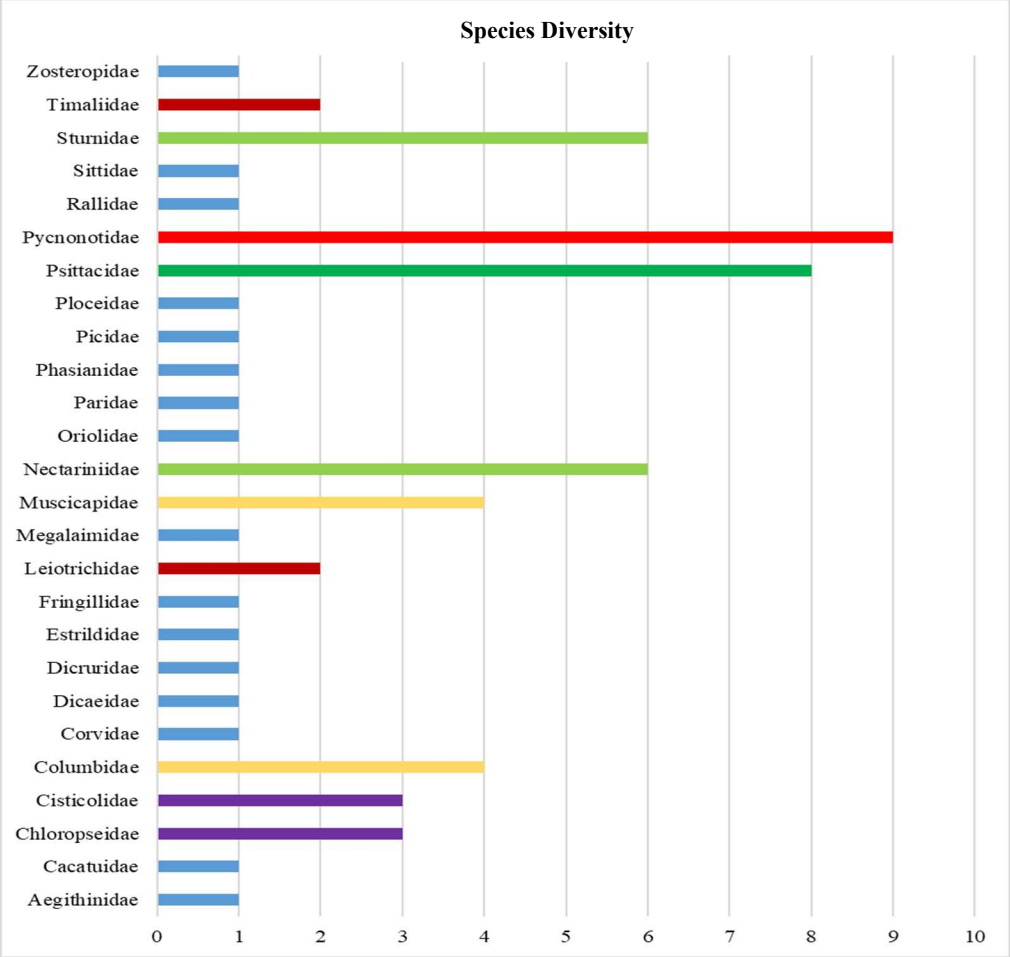
No	Species Name		Σ
	Scientific Name	English Name	
1	*Acridotheres javanicus*	Javan Myna	82
2	*Aegithina tiphia*	Common Iora	13
3	*Aethopyga siparaja*	Crimson Sunbird	1
4	*Aethopyga temminckii*	Temminck's Sunbird	3
5	*Agapornis fischeri*	Fischer's Lovebird	91
6	*Alexandrinus krameri*	Rose-ringed Parakeet	1
7	*Alophoixus tephrogenys*	Grey-cheeked Bulbul	2
8	*Amaurornis phoenicurus*	White-breasted Waterhen	2
9	*Anthreptes malacensis*	Brown-throated Sunbird	3
10	*Aplonis panayensis*	Asian Glossy Starling	1
11	*Arachnothera crassirostris*	Thick-billed Spiderhunter	3
12	*Aratinga solstitialis*	Sun Parakeet	2
13	*Belocercus longicaudus*	Long-tailed Parakeet	3
14	*Brachypodius atriceps*	Black-headed Bulbul	4
15	*Chloropsis cyanopogon*	Lesser Green Leafbird	14
16	*Chloropsis moluccensis*	Blue-winged Leafbird	14
17	*Chloropsis sonnerati*	Greater Green Leafbird	6
18	*Cinnyris jugularis*	Olive-backed Sunbird	13
19	*Cissa chinensis*	Common Green Magpie	1
20	*Columba livia*	Rock Pigeon	105
21	*Copsychus malabaricus*	White-rumped Shama	14
22	*Copsychus pyrropygus*	Rufous-tailed Shama	1
23	*Copsychus saularis*	Oriental Magpie-robin	10
24	*Coturnix coturnix*	Common Quail	19
25	*Cyanoderma bicolor*	Grey-hooded Babbler	1
26	*Dicaeum trigonostigma*	Orange-bellied Flowerpecker	2
27	*Dicrurus leucophaeus*	Ashy Drongo	1
28	*Eos bornea*	Red Lory	1
29	*Garrulax bicolor*	Sumatran Laughingthrush	4
30	*Geopelia striata*	Zebra Dove	87
31	*Gracula religiosa*	Common Hill Myna	2
32	*Gracupica jalla*	Javan Pied Starling	7
33	*Iole charlottae*	Buff-vented Bulbul	1
34	*Leptocoma brasiliana*	Van Hasselts Sunbird	24
35	*Leucopsar rothschildi*	Bali Myna	1
36	*Lonchura maja*	White-headed Munia	9

No	Species Name		Σ
	Scientific Name	English Name	
37	*Loriculus galgulus*	Blue-crowned Hanging-parrot	4
38	*Melopsittacus undulatus*	Budgerigar	23
39	*Microtarsus melanoleucos*	Black-and-white Bulbul	4
40	*Mixornis gularis*	Pin-striped Tit-babbler	1
41	*Muscicapa ferruginea*	Ferruginous Flycatcher	1
42	*Nymphicus hollandicus*	Cockatiel	9
43	*Oriolus chinensis*	Black-naped Oriole	3
44	*Orthotomus ruficeps*	Ashy Tailorbird	4
45	*Orthotomus sutorius*	Common Tailorbird	1
46	*Parus cinereus*	Cinereous Tit	7
47	*Picumnus innominatus*	Speckled Piculet	1
48	*Ploceus philippinus*	Baya Weaver	3
49	*Prinia familiaris*	Bar-winged Prinia	3
50	*Pseudeos fuscata*	Dusky Lory	2
51	*Psilopogon mystacophanos*	Red-throated Barbet	1
52	*Pterorhinus mitratus*	Chestnut-capped Laughingthrush	12
53	*Pycnonotus aurigaster*	Sooty-headed Bulbul	3
54	*Pycnonotus goiavier*	Yellow-vented Bulbul	22
55	*Pycnonotus plumosus*	Olive-winged Bulbul	2
56	*Pycnonotus simplex*	Cream-vented Bulbul	2
57	*Rubigula dispar*	Ruby-throated Bulbul	40
58	*Scissirostrum dubium*	Grosbeak Starling	1
59	*Serinus canaria*	Island Canary	51
60	*Sitta frontalis*	Velvet-fronted Nuthatch	3
61	*Spilopelia chinensis*	Eastern Spotted Dove	15
62	*Streptopelia decaocto*	Eurasian Collared-dove	36
63	*Zosterops melanurus*	Sangkar White-eye	1
Total Individuals			**810**

Table 1. presents data showing that a total of 810 individual birds consisting of 63 different species are registered for trade. This figure is very worrying, as it comes from only 10 bird shops in Banda Aceh City, Aceh Province. According to Google Earth records, there are 15 registered bird stores; this number does not include shops without a registered building name. Besides, bird trade in Banda Aceh is also productive online, with hundreds of ads for the sale of birds of various species and conservation status found on Facebook.

Survey studies indicate that the *Pycnonotidae* family *occupies* the top position in consumer preference for bird purchases, followed by the *Psittacidae* family, which is famous for its curved half-species. Species like beetles from this family are in great demand because of their ability to speak and significant levels of intelligence. In addition, the families Sturnidae and *Nectariniidae* also show an interesting variety of species in the context of bird trade. The analysis of species diversity provides important insights into the distribution of purchasing preferences based on bird family classifications, as shown in Table 2.

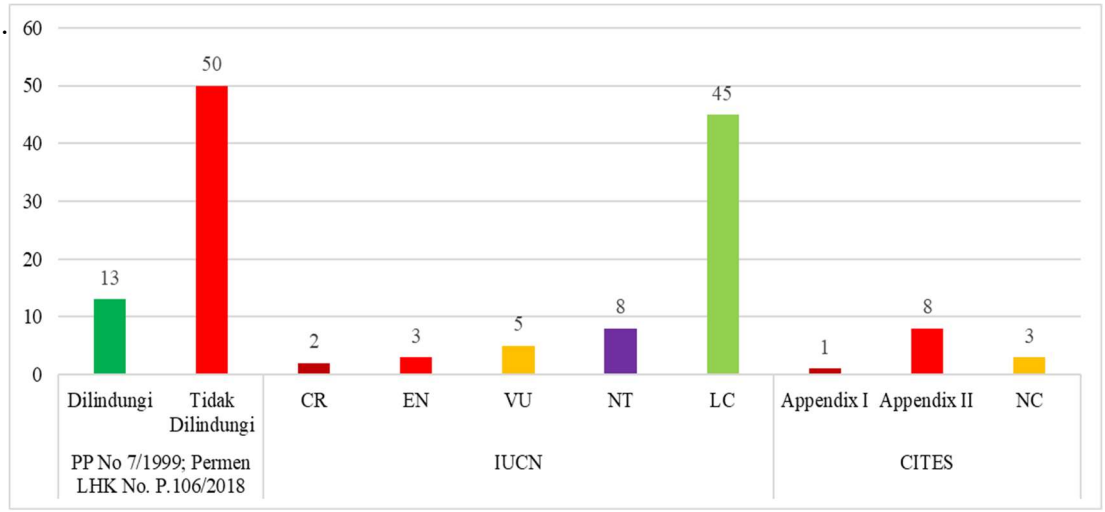
Table 2. Classification of species diversity by bird family



As high levels of poultry trade pose a significant threat to the survival of a wide variety of bird species and the integrity of ecosystems, addressing this problem requires initial steps to raise public awareness of the adverse effects of such widespread bird trade. Implementing public education campaigns and awareness programmes can facilitate a broader understanding of the importance of preserving bird species and their habitats (Vaarst et al., 2015). It is vital for government agencies and environmental agencies to intensify monitoring and enforcing regulations against illegal bird trafficking. This includes taking firm action against wild hunters and smugglers, as well as dropping severe penalties for violations. (Saragih & Ali, 2021).

Analysis of the collected data indicates that in the context of trade in Banda Aceh City, 13 species of birds have been identified as protected in accordance with Government Regulation No. 7/1999 and the Regulation of the Minister of Environment and Forestry No. P.106/2018. Furthermore, according to the criteria of the International Union for Conservation of Nature

(IUCN), there are 2 species classified as critically endangered, 3 species as endangered, and 5 species classified as vulnerable that are involved in trade. Meanwhile, as per the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), one species is listed in Appendix I, eight species in Appendix II, and three species with NC status (Not Cited), which indicate a tariff that is not fully or only partially registered in the convention.



Note:

1. PP = Peraturan Pemerintah Nomor 7 Tahun 1999 (Government Regulation Number 7 of 1999)
   Peraturan Menteri LHK No. P.106/MENLHK/ SETJEN/KUM.1/12/2018 (Minister of Environment and Forestry Regulation No. P.106/MENLHK/SETJEN/KUM.1/12/2018)
2. IUCN (2023) = EN = Endangered; VU = Vulnerable; NT = Near Threatened; LC = Least Concern; NA = has not yet been assessed for the IUCN Red List.
   Population Trends: d = decreasing; i = increasing; s = stable; u = unknown.
3. CITES (2023) Appendix I = All endangered species are impacted if traded; trade is only permitted under certain conditions, such as for scientific research. Appendix II = Species that are not currently endangered but will become endangered if excessively exploited.

Figure 1. Classification of bird finds traded based on conservation status

Information about bird varieties kept by local communities plays an important role in the field of nature conservation and in-depth understanding of various bird species. This data set contributes significantly to conservation initiatives as it enables the identification of species that are vulnerable to external threats, including irregular hunting, natural habitat damage, or unauthorised trading activities. Knowledge of species protected by society facilitates scientists and conservation agencies to develop more effective and targeted conservation strategies.

The acquisition of detailed data on bird species domesticated by communities has the potential to strengthen public awareness and understanding of biodiversity. This information plays a crucial

role in public education about the urgency of avifauna protection and its habitat. Furthermore, the data is essential for the sustainable management of domestic bird populations, which can reduce the pressure on specific species and maintain ecological balance. (Guillaumet & Russell, 2022). This data is also an asset for governments and conservation agencies in formulating progressive policies for bird conservation and ecosystems that support their survival.

Fluctuations in avifauna populations can be regarded as indicators of changes in ecological conditions. Data related to bird hunting plays an instrumental role in monitoring environmental transformation, including deforestation, habitat degradation, environmental pollution, climate change, and other factors. This is in line with the opinion (Kéfi et al., 2014), and these data can serve as early warning signals for ecological issues requiring intervention. The significance of bird hunting data collected by the community underlines the importance of cross-sectoral participation in conservation and environmental protection initiatives. The active involvement of the public in the acquisition of bird data offers a solid foundation for efforts to preserve biodiversity and the integrity of our environment.

D. CONCLUSION

Market research conducted in Banda Aceh City revealed that the bird trade in Banda Aceh City includes 810 individuals of 63 different species, traded for a variety of purposes such as hobbies and pets, including illegal trafficking. These findings, which came from only ten bird stores, highlight the urgent need for stricter supervision and regulation in the bird trade to protect biodiversity and prevent illegal exploitation.

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