Transaction records as a tool for bird trade monitoring in supporting bird’s conservation and sustainable use

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Abstract. Birds market survey has been proofed to be effective as a complementary method to evaluate the population of birds in the wild. We implemented this method to monitor the birds trade in Jambi. Rather than direct observation to the market, we examine the transaction records from three wholesalers to obtain data. Our results show that during the period of January–September 2017 the total birds traded is 11,660 specimens and transaction value is Rp 941,932,900.00. Number of generic species is 76 in which some names refer to same species. From those generic species, we can identify about 26 species and the rest of birds is grouped according to their genus or family by which consist of 11 kind of birds. There are 4 species (and group of species) that traded over 1000 specimens i.e Acridotheres javanicus (2,824), Chloropsis sp. (2,185), Garrulax mitratus (1,266), and Zosterops sp. (1,355). The expensive songbirds such as Pycnonotus zeylanicus and Kittacincla malabarica are absent but the least expensive species but favorable, Copsychus saularis, is only traded in small number (157 specimens). Combine field survey and market survey may give better picture of overall bird population that critical for setting up conversation strategy of Indonesian birds.

Keywords: Bird trade, jambi, market survey, monitoring, transaction records.

1. Introduction
Birds is the most favourite and popular pet in Indonesia at which in some extent this behaviour is culturally driven especially in Java. For many people in Java, especially in central Java, bird is one of five symbols of Javanese knight representing the balance in life and also pride [1]. Birds is accounted for 35.7% of household keeping pets in major cities of Indonesia and the most favourable type is songbirds followed by show chickens, pigeon and exotics [2]. As the demand for household keeping pets is increasing birds’ market is flooded by various species of birds.

The market for birds is at the biggest in Java. As many as 40,947 specimens comprising around 206 to 241 species were in display at Jakarta and Surabaya birds’ market [3, 4]. Many of which were birds that native to Indonesia including the protected and endemic species. During that periods some of the Javan montane species were detected thus indicating there was a shifting in harvesting birds from lowland to montane region as the lowland species become scarcer [4]. Those huge volume of bird’s trade generates multiple economic effects which involving many players at various level activities and millions of rupiahs of assets.
Bird keeping hobbies has proven to stimulate economic activities and improving livelihood for those are engaging in the business [5]. While the chain of markets is very long from the hunter that collected birds from the wild until the bird keepers in the city, the economic stimulation is significantly apparent for specimens and families in lower socioeconomic groups. They play important role in providing food supplies, cage birds, and others apparels for birds keeping activities. In addition, they also create birds’ farms, especially for songbirds [6, 7]. Bigger entrepreneurs may provide the markets with more satisfactory food supplies and facilitating bird’s song contest and magazines.

The passion for bird keeping indeed has proven to be prospecting business and engaging many level of socioeconomic groups. Nonetheless, as most of the birds traded in the market are from wild harvesting, the pressure for wild population is high. Therefore, trade driven extinction is apparent at least for some of the species in Sundaic region of Indonesia. At least 13 species and 14 subspecies had been identified as at risk of global extinction such as Hill Myna (Gracula religiosa), White-rumped shama (Copsychus malabaricus) and some of the parrot’s species [8]. In response to high trade volume of songbirds in Indonesia, the First Asian Songbird Trade Crisis Summit was held in September 2015 in Singapore and resulted a list of 28 taxa most threatened by trade [9]. Based on expert opinion and what is currently known of wild populations, population trends and levels, and types of threat, 12 taxa were identified as being of highest priority (Tier 1) and in need of immediate action, with the remaining 16 also being of high conservation concern but requiring further research before proceeding with taxon-specific action planning (Tier 2) [9].

To prevent the extinction and provide the legal basis for sustainable harvesting, government of Indonesia regulate the wild plant and animal harvesting trough the ministerial decree No. 447/ 2003. Wildlife harvest is set based on yearly quota at which the volume is given based on the evaluation of species population. Population survey and monitoring in bird’s habitat provide real time condition that can be applied for the evaluation on harvesting volume as well as conservation measurement [10, 5]. In addition, market survey is proven to be effective as complimentary methods to population survey and may gave global pictures of wild population from inferring the trade traffic over period of times [11–14].

Indonesian Intitute of Sciences (LIPI) as Indonesian scientific authority has developed guidance for surveying and monitoring bird population [15]. This guidance offers range of option for users especially staffs from Ministry of Forestry to use in certain field condition at the site. Market survey and monitoring is one of the methods that can be applied on the budget compare to field monitoring. Therefore, bird’s market monitoring should be feasible as long term monitoring program.

We applied market monitoring to assess the birds trade Jambi Province. Jambi, as well as other major cities in Sumatera, is indicated as source for birds’ market in Java [16]. The methods used here is slightly different from those that have been conducted. Instead of direct observation and conducting interview with the traders, we examined transaction records that we acquired from several main bird wholesalers in Jambi. We expect to obtain more data in detail thus the trend of bird trade can be identified to inferred the condition of birds’ exploitation in Jambi. We will look for the data as follows number of species, volume and price.

2. Materials and methods

Transaction records were acquired from three wholesalers in Jambi. One transaction record is defined by one day transaction on certain date as written on the receipt (figure 1). This method is operable in Jambi because those wholesalers are registered at the Balai Konservasi Sumber Daya Alam (BKSDA) Propinsi Jambi. Data were collected between January – September 2017. Data is mostly analyzed descriptively. Non-parametric statistic analysis is applied when appropriate (statistic tools online http://www.socscistatistics.com)
3. Results and discussion

A total of 52 transaction records have been collected during survey periods from three wholesalers. The records showed that within nine months as many as 37 groups of birds (26 species and 11 kind of birds at family or genus level) comprising 11,660 specimens had been traded and it resulted a total of transaction value of Rp 941,932,900.00 (Appendix 1 and Appendix 2). Three wholesales are significantly different in volume capacity (wholesales 1 = 1,062 specimens, wholesales 2 = 1,825 specimens, and wholesales 3 = 8,773 specimens; Kruskal-wallis, H=24,2417, p<0.05) and transaction values (wholesales 1 = Rp 58,082,00,00, wholesales 2 = Rp 154,475,000,00, and wholesales 3 = Rp 729,375,900,00; Kruskal-wallis, H=25,098, p<0.05). Number of species traded from each wholesale as follows wholesales 1 is traded 17 species, wholesales 2 traded 21 species and wholesales 3 traded 25 species. There is an indication that the more species traded the higher the volume and transaction values. Although the capacity of three wholesales in Jambi is different, the range and average values for each species is generally similar. Therefore, all trade data is pooled for next analysis.

The result showed that the highest traded volume was *Acridotheres javanicus* (2,824 specimen) while the lowest volume were *Psilopogon* sp. and Sp 2 (1 specimen). There are 4 species (and group of species) that traded over 1000 specimens i.e *Acridotheres javanicus* (2,824), *Chloropsis* sp. (2,185), *Garrulax mitratus* (1,266), and *Zosterops* sp. (1,355). The expensive songbirds such as *Pycnonotus zeylanicus* and *Kittacincla malabarica* are absent but the least expensive species but favorable, *Copsychus saularis*, is only traded in small number (157 specimens). One transaction recorded that *Copsychus saularis*’s price was very expensive (Rp1,396,750.00). The birds which price more than Rp600,000.00 were *Eurystomus orientalis*, *Gracula religiosa*, *Platylophus galericulatus*, Sp 3 while the cheapest specimen was *Pycnonotus aurigaster* (Rp2,500.00).

### 3.1 Composition and status of birds traded in Jambi

Monitoring the status of birds trade from transaction records showed the tendency to be differ from direct observation at the market. A total of species observed from this methods is 40 groups of birds with, at the current moment, only 26 species are identified correctly while others still in larger group of kind of birds either genus or even family. For example, the genus *Chloropsis* sp. (leaf birds) consist of many species and it is likely all species from Sumatera occurs on the trade. The wholesales can identify with local name up to 4 species, namely Cucak ranting/ ranting, Cucak Ijo/ Ijo, Ijo Mini/Mini.
and Kepala Kuning. Moreover, for each species they can categorize them into four level of quality by alphabet notation for example Cucak Ijo A, Kepala Kuning A and soon. The price is also higher for A quality specimen. This condition is different from direct observation on birds market.

Four days survey done in 2017 at 22 birds stalls showed about 43 species and a total 323 specimens [15]. The surveyor can identity most of the birds until species level. However, since this kind of survey usually conducted undercover, they may not be able to optimize the variable of surveys such as exact volumes or values of transaction. Moreover, birds’ stalls tend to sell any species they can have from the collectors or hunters since most of the hunters will catch as many birds as possible from the forest. Therefore, birds stall are not really selective in selling birds. Interviews which were conducted between March and July 2013 to 49 birds trapper in 21 villages in North Sumatera province showed about 54 species of which photographs were shown to the trappers during interviews [10].

Meanwhile, wholesales will buy birds from the collectors/ hunters which have high values in term of economic turn over following specific demand or request by larger wholesales in Java. This condition can be explained by the absent of desirable songbirds such as White-rumped Shama (Kittacincla malabarica) and Straw-headed Bulbul (Pycnonotus zeylanicus). Those two species are hard to get and the price is already skyrocketed at the hunters or collectors’ level Therefore, wholesales in Jambi consider those birds will not make any profit. In addition, serious buyer (some times they are breeders) will seek those species from breeders that can guarantee the quality of birds.

Birds traded by the wholesales consist of eight protected species by ministry decree No.P.92/2018, one species is previously protected under government decree No. PP.7/1999, three species are listed as Tier 1 and six species are listed as Tier 2. Tier 1 and tier 2 is birds status given as recommendation from the first Asian Songbird Trade Crisis Summit 2015 for conservation priority.

3.2 Detecting trade changes

We look closely at several species, especially, those which recommended as Tier 1 and Tier 2, if over nine months periods in 2017 changed in volume and price. Tier 1 species consist of group of Chloropsis sp., Gracula religiosa and Leiothrix laurinae. Group of Chloropsis sp. demonstrated the largest volume of all with a total volume of 2185 specimens (the average volume is 273 specimens/month), while the rest of the species are only traded in small numbers (9 specimens and 3 specimens respectively). The trend of trade for Chloropsis sp. is not clearly detected however there is tendency that the volume is getting smaller over time but the price is rather stable. As for G. religiosa and L. laurinae, they are low in volume but price for G. religiosa is rather high for Rp 750,000,00/ specimens, while L. laurinae is priced only for Rp 250,000,00.

Wholesales traded more of Tier 2 species than Tier 1 species. There are 5 species of Tier 2 i.e Acroderotheres javanicus, Garrulax palliatus, Alophoixus bres, Pycnonotus bimaculatus, Copsychus saularis and group of Zosterops sp. The most traded species is A. javanicus with a total of 2,824 specimens followed by Zosterops sp. with 1355 specimens, G. palliatus for 159 specimens, C. saularis for 157 specimens, A. bres for 57 specimens and P. bimaculatus for 35 specimens. The trend of Tier 1 species (figure 2) is similar to that of Tier 2 species (figure 3) at which the trend of increasing or decreasing in volume is difficult to detect. Nevertheless, there is a tendency for A. javanicus to increase in volume while the others species move to the opposite direction. The average price for each specimen from each species is also rather stable.

3.3 Management implication

The transaction records can provide the overall situation on the status of bird’s trade. Unlike direct observation to birds market, the number of species is less at the wholesale level. Nonetheless, the data is more exact in term of volume and values. However, the ability to identify bird’s species is important. Moreover, from this study, although small changes can be detected but not significantly, the one-year periods may not be enough to see the effect of wild harvest to the birds supply to the market. These matters may occur as collector or hunters may try to find resources anywhere possible. Looking at stable price and stable supplies may lead to wrong conclusion for wild population is at stable
condition if the monitoring rely only to this method. The evaluation of bird’s trade status may be reflecting the true condition of wild population if the market monitoring can be conducted simultaneously at every province. In doing so, the trade change in one province may affect their neighboring province in anyway possible whether in number of species, volume of specimens and price.

**Figure 2.** Tier 1 species consist of group of *Chloropsis* sp., *Gracula religiosa* and *Leiothrix laurinae*.

**Figure 3.** Tier 2 species consist of 5 species and 1 group of *Zosterops* sp.
4. Conclusion
Monitoring the status of birds trade from transaction records gives less number of species than direct observation in the market because wholesalers may have preferences over species that economically valuable. Traders also categorize some species into several level based on its quality and condition by alphabet notation. The species identification rather difficult because the traders use local names and one local name may represent more than one species. Trend of trade is detected but not statistically significant. Nevertheless the tendency whether the trade is increasing or decreasing can be predicted by the volume and the price for every species. The evaluation of bird’s trade status simultaneously and regularly may yield more data that potentially reflect the condition of wild population. Combined field survey and market survey is necessary to carried out as it shall give better picture of overall bird population that critical for setting up conversation strategy of Indonesian birds.

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