Household Captive Breeding: Women Empowerment in Wildlife Conservation

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Abstract. Conservation activities involving women are often less addressed. Considering site-level conservation is very important, women have higher opportunities to be engaged in household conservation activities due to higher leisure time. Women also have nurtured and caring personalities, variables necessary for wildlife survival in captive breeding. This study analysed protected bird captive breeding profiles and determined the roles of women involved and their impacts on the survival of the birds in captivity. The study was conducted from January to April 2017 at 90 protected bird captivities with 122 respondents comprised of 24 breeders in Bogor City and District, and 98 in Klaten District. Harvard gender analysis was used to analyse the roles of women, while qualitative analysis was used to determine the profiles of the captive breeding and the women involved. The relation between women’s involvement and the percentage of bird survival was analysed using t-test with two independent samples of a 5% standard error. The percentage of women involved in captive breeding was between 34.17 to 56.25%. Women contributed to the family's income both as workers (35-100%) and owners (30-100%). They are 31-40 years of age, hold high school diplomas, married with the youngest child in elementary-junior high school. At the household scale, women contributed to 68.76% of the total breeding activities. Results showed that the percentage of birds’ surviving at household captive breeding is higher under the care of women. This study justified the importance of involving women in wildlife conservation, which would contribute to decreased forest and environmental degradation.

1. Introduction
In the past three decades, more and more of Indonesia wildlife have been included in the IUCN’s endangered list and CITES Appendix list. The excessive use of natural resources has triggered the rapid extinction of wildlife, which requires immediate conservation efforts. Conservation itself can be conducted in both, the natural habitats (in-situ) and outside the natural habitats (ex-situ). Currently, ex-situ conservation efforts are carried out to support in-situ conservation [1-3] since an association between ex-situ and in-situ conservation has been proven to be very effective in species conservation [4]. One of the ex-situ conservation efforts is captive breeding, which is expected to reduce poaching for illegal trading, and hence reducing the degradation of forest and environment as a whole. In 2015-2018, the total value of illegal hunting has exceeded IDR 13 trillion annually [5].

Among the ASEAN countries, Indonesia has the National Biodiversity Index of 1, indicating that Indonesia is the highest biodiversity country in Southeast Asia [6]. In addition, [7] has enlisted the
Indonesian wildlife protected by law, based on various acts and regulations from the periods of the Dutch colonization to the Indonesian Government Regulation No.7 of 1999. The list included 616 species, of which 63.31% were birds. By 2018, the list amounted to 794 species through the Regulation of Ministry of Environment and Forestry No. P.20/MENLHK/SETJEN/KUM.1/6/2018 on Protected Flora and Fauna Species, of which 71.03% comprised of birds. Birds are in great demand because they have high economic value based on the morphological potential, sound, behaviour, and sources of animal protein [8].

Between the years 2006-2012, the bird was also the most traded animal in the global market, especially as pets, comprising up to 585 species [9]. In the same line, bird breeding has been widely developed in Indonesia. In 2014, it has reached about 27.96% of the total captive breeding activities and has absorbed a total workforce of 2,170 people [10]. One of the regions in Indonesia that have carried out bird captive breeding activity is Klaten District. The efforts of the villagers in conducting household captive breeding have earned the district to be declared as the centre of national bird captive breeding on November 20, 2016.

One indicator of the success of the captive breeding management unit is the number of surviving animals in captivity [11]. Unfortunately, deaths are still commonly found in captive breeding, although animals in captivity should benefit from the presence of veterinarians, the absence of predators and regularity of food supplies [12, 13]. Reference [14] finds that bird mortality in captivity was significantly correlated with not just operational costs, but also the frequency and quality of bird nurturing and caring, which were indicative of the significant role of the bird caretaker. Research by [15] also highlights the important effects of the actions of animal care staff on animal welfare. As stated by [16], human factors are becoming increasingly recognized as important determinants of animal welfare.

Bird care activities are not only carried out by men but can also be done by women, as stated by [17] that around 66.66% of bird keepers in Bandung City area are assisted by their wives and children in caring for the birds. According to [18], the nature of nurturing and caring tends to be exhibited more by women, where these traits have opt women to generally show greater concerns for wildlife [18, 19]. In addition, the opportunity for women to be involved in household activities is greater because it has been shown through various research that women have higher leisure time at home after completing household chores [20]. Women also do more domestic activities related to care such as caring for children, family and other household matters, which usually comprised 32%-50% of their total activities [21, 22], which biologically make women as better caregivers [23].

Based on this, it is strongly suspected that women would have an important role in natural resource conservation activities, especially related to wildlife conservation through household bird captive breeding activities. Currently, conservation activities by Indonesian women have not been given much attention because of the lack of information about them. Therefore, this research is important, with the objectives to (1) determine the profile of captivity involving women in their activities; (2) identify the profile of women involved in captivity activities; and (3) determine the role of women in captive breeding activities and their impacts on the success of the captivity.

2. Methodology
The tools used in this study consisted of a voice recorder and camera, while the research instruments comprised of interview guides and Harvard gender analysis tool. Primary data were obtained from respondents through direct interviews using an interview guideline, in addition to the direct observation. The study was conducted from January to April 2017 at 90 protected bird captivities with 122 respondents comprised of 24 breeders in Bogor City and District, and 98 in Klaten District.

The roles of women in captive breeding were analysed using Harvard gender analysis to determine the gender profile of the social group by identifying gender roles, decision making/control, access to resources and benefits obtained [24]. Determination of the captive breeding profiles and the profiles of the women involved, were done by describing all data that has been obtained qualitatively. The relationship between the female captive breeders with the percentage of captivity success that is in the form of breeding success and breeding success of puppies were analysed using the statistical t-test on
two independent samples, with a standard error of 5%. The different t-test uses the hypothesis that H0: There is no difference between captivity involving women and those not involving women. H1: There is a difference between captivity involving women and those not involving women. The limitation of this study is meant by breeding women, namely women involved in bird breeding activities.

3. Results and Discussion

3.1. Profile of captive breeding that involve women

Bird breeding activities have developed in several regions in Indonesia as an alternative business carried out by the community, including in the Klaten and Bogor areas. Bird breeding business in Klaten Region is numerous and spread across its region, which is different from bird breeding in Bogor Region, which is still small in number. This study distinguished breeding business based on the size of the business into a household scale consisting of micro and small businesses, and medium or large business scale. Limitation of micro, small and medium businesses are based on Act Number 20 of 2008 concerning Micro, Small and Medium Enterprises. Based on the business scale, only a few breeding birds in Klaten are included in the medium/large business scale, which formed around 2.53%, while the remaining 97.47% were categorized as a small scale (household). The opposite was found with captive breedings in Bogor, where 63.64% were included in the medium/large scale business, and 36.36% in a household scale.

The number of bird captive breeding in Klaten that involved women was 100% in the medium/large scale and 62.33% at the household scale, while captive breeding in Bogor was 57.14% in the medium/large scale and 50% at the household scale. Although each region has involved women in bird breeding, however, when compared with the total number of human resources involved in the captivities, the involvement of women in the medium/large scale was still small, only ranging between 34.17% - 35% (Table 2) as compared to the household scale that showed a higher rate of between 50-56.25%.

Table 1 Profile of bird captive breedings that involve women

| Scale          | Area    | No. of women workers (%) | Number of bird species | Number of parent stock (pair) | Period of business (year) |
|----------------|---------|--------------------------|------------------------|-------------------------------|---------------------------|
|                |         |                          | Protected              | Not protected                |                           |
| Medium/Large   | Klaten  | 35                       | 2                      | 3                             | 125                       | 7.5                       |
|                | Bogor   | 34.17                    | 1                      | 2                             | 113                       | 6                         |
| Household      | Klaten  | 56.25                    | 2                      | 1                             | 39                        | 8                         |
|                | Bogor   | 50                       | 1                      | 2                             | 17                        | 6.5                       |

3.2. Profile of the women captive breeders

3.2.1. Age and Level of Education

The breeders were not only limited to women of childbearing age, but in the Klaten area there were women over the age of 60 who were still involved in these activities. The results showed that both in Klaten and Bogor, the majority of women breeders were within the age group of 31-40 years (productive age) with the formal education background being high school (SMA)/equivalent (Figure 1). The dominating age group and education level of the women in this study indicated that they would be able to absorb new information and innovations. As shown by [25], the productive age of the goat breeders in Leihitu, North Maluku have made them able to think and accept innovations that were useful for the progress of their business. Furthermore the level of education can be used as a benchmark to indicate the ability of women in dealing with problems. The level of education was divided into 4, i.e public school (SD), junior high school (SMP), high school (SMA) and vocational/undergraduate (S1).
Figure 1. Comparison of the total women breeders with age group and education level

Based on the level of final education, women breeders in the Bogor region are more educated, namely completing junior high school education, while in Klaten there are still women with the last elementary education. Figure 1 shows that both age and education level are not a limiting factor for the involvement of women breeders.

3.2.2. Time spent and length of involvement
Important factors needed in bird breeding activities are time and attention in bird maintenance [26, 27]. The average time spent by women to take care of bird breeding is around 5.38 hours or 322 minutes (Table 3). The difference in time spent between medium/large captive breeding and household-scale is due to the number of birds handled. The difference in time flow in household scale breeding in Klaten and Bogor is due to the more intensive maintenance of birds in Bogor. The more intensive a captive breeding is, the more time it takes. When starting a bird breeding business done by men, but over time, women began to get involved because they have free time and provide a promising income. The average length of time a woman is involved in 5.63 years or 67 months.

Table 2. Daily time spent and length of involvement in captivity

| Scale of business | Area  | Daily time spent (hrs) | Length of being a breeder (yr) |
|-------------------|-------|------------------------|-------------------------------|
| Medium/Large      | Klaten| 6                      | 4                             |
|                   | Bogor | 7                      | 7                             |
| Household         | Klaten| 3                      | 5                             |
|                   | Bogor | 5.5                    | 6.5                           |
| Average           |       | 5.38                   | 5.63                          |
3.2.3. Activity profile

Time spent in breeding activities will affect the profile of the women's daily activities. To find out the profile of the activities carried out, it was necessary to know the division of gender within the households (who does what), as well as location and time of the task performed (Figures 2 and 3). The activities carried out were grouped into three, namely productive, reproductive (domestic), and social [24]. Activities in bird breeding are classified as production activities because the business produces cash income from the sale of bird chicks. As [28] argues, productive activities are activities carried out to make a living and/or meet the needs of families with income in the form of money or in kind. In reproductive (domestic) activities such as caring for children and taking care of the household, women devote much time to these activities. Social activities are activities related to social activities both related to social and society in general and related to bird breeding activities. Figure 2 and 3 indicated that time spent on productive activities on medium/large scale captivities were higher than of the household’s, amounting to 25.52% for medium/large scale and 19.22% for household.

![Figure 2. Daily activity profile of women breeder of captive birds in Klaten](image)
Women breeders who worked as labourers in medium/large scale captivity were rarely involved in social community activities, as shown by the relatively little time spent in social activities with only 2.78% used for these activities. For household captive breeders, time spent on reproductive and social activities were similar, with 16.67%. The low percentage of reproductive activities was due since respondents have grown-ups children, thus the activities carried out only related to taking care of the household.

As many as 96% of women breeders in Klaten area are married, while 4% are widowed. For married women, generally they were involved in captivity activities to help the men/ husbands or other families. For women whose husbands worked outside the area, all activities related to captivity were carried out on their own, while for women with widow status, all activities were carried out supported by other family members, namely the children. The marital status of 66.67% of female breeders in Bogor is married. Similar to captivity in Klaten, female breeders in Bogor with married status were involved in captivity to help the men/husbands.

Women's involvement in bird breeding activities is related to the age of the youngest child they bear (Table 3). When compared with other age groups, the age group of 21-30 years is the least involved in captivity (see Figure 1) because usually women of this age range have children under the age of five, hence, time was mostly spent caring for the children. This is in line with the statement of [29] that a child's age affects a mother's desire to work for a living because children in infancy, require greater attention and supervision, and mothers are considered more responsible for child care so that they have greater psychological burdens. Furthermore, most of the women have one or two children, with the smallest age at elementary school age (SD) to junior high school (SMP). At these ages, attention and supervision would be less than that of children under five. The low number of children requiring attention has caused the women to look for extra cash to do productive activities at home.

Figure 3. Daily activity profile of women breeder of captive birds in Bogor
Table 3. Number of women breeders with number of the youngest child

| Number of children | Number of women breeders (%) |
|--------------------|-----------------------------|
|                    | The youngest age of the child (Klaten) | The youngest age of the child (Bogor) |
|                    | Below 5/ kindergarten | Public-junior high | High school | Adult | Below 5/ kindergarten | Public-junior high | High school | Adult |
| 1-2                | 16.00 | 42.00 | 2.00 | 24.00 | 25.00 | 25.00 | 0.00 | 0.00 | 25.00 |
| 3-4                | 0.00  | 6.00  | 2.00 | 8.00  | 0.00  | 0.00  | 0.00 | 0.00 | 25.00 |

The study indicated that women in Klaten area were mostly motivated in bird breeders due to economic and social (leisure) reasons (Table 4), whereas in Bogor area, the motivation was purely (100%) economic. Similar results were found by [30] that economic factors and leisure effected the working motivation of 83.52% of women in fishery sectors.

Table 4. Reasons for the involvement of Klaten women in bird captivity activities

| Scale            | Economic (%) | Leisure (%) |
|------------------|--------------|-------------|
| Middle/Big       | 100          | 0.00        |
| Household        | 41.67        | 58.33       |

Motivation is an urge that consciously or unconsciously arises in a person, to take an action with a specific purpose. In Klaten, the women's motivation in a medium/large scale was also purely for economic reasons. This result was in line with the opinion of [31] that one of the reasons women work is economic. As many as 58.33% of the housewives stated that the biggest motivation for their involvement was the availability of time. Breeding activities were carried out during free time on the side-lines of household domestic activities. The availability of free time after doing domestic chores [19] is a potential that can be utilized to carry out productive activities at home, by not leaving their roles as wives and mothers. In a study conducted by [32], women who were involved in household industry activities felt unencumbered, despite the large amount of time spent, and contributed greatly to household income, since the work was done at home and could be alternated with household chores.

3.3. Role of women in bird captivity and the impacts on the captivity success

3.3.1. Role of women
The most important role conducted by women in the captive breeding in Klaten area, was taking care of the bird chicks, whereas in Bogor, in addition to taking care of chicks’ enlargement, they were also responsible of taking care of the bird parents (Table 5).

Table 5. Role of women in bird captivity

| Scale of business | Area     | Administration | Caring for chicks | Caring for bird parents | Caring for chicks and bird parents |
|-------------------|----------|----------------|-------------------|------------------------|-----------------------------------|
| Middle/large      | Klaten   | 0.00           | 50.00             | 0.00                   | 50.00                             |
|                   | Bogor    | 40.00          | 0.00              | 20.00                  | 40.00                             |
| Household         | Klaten   | 0.00           | 68.75             | 10.42                  | 20.83                             |
|                   | Bogor    | 0.00           | 0.00              | 0.00                   | 100.00                            |

As much as 100% involvement of the women breeders in Klaten were related to technical activities, while in Bogor, besides handling technical activities, women also handle administrative activities. In medium/large scale captive breeding in Klaten, administrative activities were carried out by male workers, while in Bogor, 40% of women carried out administrative activities in the form of financial
management and bird-related records. Similarly, at the household scale in Bogor, administrative activities were carried out by men/husbands, so that women only handled captive technical activities. Administrative activities were rarely carried out at the household scale captive breeding in Klaten, due to the limited information of breeders about breeder obligations such as ring installation, recording of pedigree on protected birds and breeding management that has not been done professionally.

Enlargement of chicks carried out in captivity using hand-rearing method, would include the maintenance of tillers by breeders including feeding, cage management, health care and hygiene [33]. In general, breeding women in Klaten have the task of taking care of chicks, because it requires more attention and more time than caring for bird parent. However, this does not apply to all breeding places, because there are female breeders who only handle the chicks, while some concerned with handling both chicks and parents. For captive breeding in Bogor, there were no special women breeders to take care of the chicks and there were no specific divisions of work between men and women.

3.3.2. Impacts on the Success of Captivity

The success of a wildlife breeding unit can be assessed from the biological technical aspects, namely the success rate of chicks’ survival. To find out whether there was a difference in the captive breeding success associated with women’s involvement, a series of t-test was performed. Analysis of the relationship of women working in captivity in Klaten area, were tested only for household-scale captive breeding, since all medium/large scale captivity samples involved women.

| Scale of Business | Area     | Result of t-test | Remarks                        |
|-------------------|----------|-----------------|--------------------------------|
| Medium/large      | Bogor    | 0.320 > 0.10    | Women involvement did not affect the success of the captivity |
| Household         | Klaten   | 0.081 < 0.10    | Women involvement affected the success of the captivity |
|                   | Bogor    | 0.423 > 0.10    | Women involvement did not affect the success of the captivity |

Table 6 showed that at the household scale captive breeding in Klaten, there was a positive relationship between women involved with the success rate of the chicks. Limited capital and operational costs in household-scale captive breeding have resulted in an incomplete facility and infrastructure. Hence, to suppress bird deaths, especially of the chicks, efforts were being made to optimize the care of chicks by involving women, as shown previously in Figure 3, that the women in Klaten dedicated more of their time to care for the chicks. This is in accordance with the result of the research by [25] that longer duration of attention has reduced the mortality of captive straw-headed bulbul (*Pycnonotus zeylanicus*). The result was also supported by the findings of [15] that consistency and familiarities with the animal keeper, as well as treatment of the animal as individuals would result in higher animal welfare.

On the contrary, captive breeding in Bogor area, showed no relationship between women involvement and the success rate of chicks survival. The adequacy of capital has led to better and more complete infrastructure and intensive bird care. Various ways can be done to regulate the breeding of birds so that it is faster than the natural breeding period by providing sufficient food, protection against predators and parasites, accelerate incubation period, giving hormones [34], accelerating weaning, giving drugs and special treatment on parents [35], as well as feed quality will affect on the level of reproductive productivity [36]. All of these efforts would result in low mortality rate of the birds, as shown by the captivity of the straw-headed bulbul [25]. Furthermore, [37] showed that the magnitude of operational costs can have a positive effect on the breeding business.
4. Conclusions
Women in the study areas were involved in medium/large scale and household bird captive breeding, with a total female workforce of 34.17% -56.25 with the length of business ranged from 6-8 years. The typology of the women breeders is characterized by aged between 31-40 years backed up with a high school education, married with the youngest child in elementary-junior high school. All of the women (100%) working in medium/large scale captivities in both Bogor and Klaten areas for economic reasons, while at household scale in Klaten for economic reasons (41.67%) and free time (58.33%). The average woman is a breeder for 67 months, with an outpouring of 322 minutes per day.

In captivity in Klaten, women played the most role in raising and handling chicks (68.75%), while in Bogor they were all responsible for raising and handling chicks and parents (100%). The involvement of women at household-scale captive breeding in Klaten showed a strong relationship with the success rate of the captivity, namely the percentage of birds that survived. Women breeders contributed to household economic income both as workers (35-100%) and as owners (30-100%) of the captive breeding.

5. Recommendation
Women have the potential to be involved in bird breeding activities so they need to be given opportunities by the government, breeding managers and men/husbands to be involved in these activities. The need for similar research in other areas should be encouraged, to allow the availability of gender-disaggregated data is needed to analyse gender-responsive policies and programs within the environmental and forestry sectors. In addition, research is required about the risk of transmission of disease from birds to breeders, as well as efforts to overcome these risks.

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