

**THE INFLUENCE OF FREE-ROAMING DOGS TO THE  
CONSERVATION OF CRITICALLY ENDANGERED  
BAWEAN DEER AND HUMAN HEALTH**

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BOGOR  
2018**



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## ABSTRAK

ANNISA DIVA PUTRI MURBARANI. Pengaruh Anjing Peliharaan yang Dilepasliarkan terhadap Konservasi Rusa Bawean yang Terancam Punah dan Kesehatan Manusia. Dibimbing oleh DEDE AULIA RAHMAN dan ARDILASUNU WICAKSONO.

Rusa Bawean *Axis kuhlii* merupakan rusa yang paling terisolasi didunia dan statusnya terancam punah. Salah satunya penyebab kelangkaannya yaitu ancaman predator oleh anjing *Canis lupus familiaris* yaitu anjing peliharaan yang dilepasliarkan. Penelitian ini dilakukan pada bulan Maret hingga April 2018 untuk mengetahui penyebaran geografis serta interaksi kedua spesies menggunakan *camera traps*, dan mengukur KAP (Pengetahuan, Sikap, Praktik) untuk mengidentifikasi faktor-faktor dari pemilik anjing yang mempengaruhi praktik pemeliharaan anjing di Pulau Bawean, Indonesia. Nilai RAI *camera traps* yaitu 0,15 (Rusa Bawean) dan 0,24 (anjing peliharaan yang dilepasliarkan). Tidak ada interaksi signifikan selama perekaman ( $p > 0,05$ ). Hasil survei KAP, sebanyak 198 (99,0%) pemilik anjing memiliki praktik buruk. Praktik buruk berdampak pada satwaliar dan kesehatan manusia khususnya oleh anjing karena rentan terhadap rabies. Faktor-faktor signifikan yang berkaitan dengan praktik yaitu pada tingkat pendapatan ( $r = 0,479$ ;  $p < 0,005$ ), pengetahuan ( $r = 1,000$ ;  $p < 0,005$ ), dan sikap ( $r = 0,848$ ;  $p < 0,005$ ). Pengetahuan, sikap dan praktik dikategorikan tidak baik karena berkaitan dengan peran anjing dalam masyarakat Bawean.

Kata kunci: Anjing peliharaan yang dilepasliarkan, *camera traps*, KAP, Rusa Bawean.

## ABSTRACT

ANNISA DIVA PUTRI MURBARANI. The Influence of Free-roaming Dogs to the Conservation of Critically Endangered Bawean Deer and Human Health. Supervised by DEDE AULIA RAHMAN and ARDILASUNU WICAKSONO.

Despite being the most isolated deer in the world, the critically endangered Bawean deer *Axis kuhlii* has received several threats in the habitat. Bawean deer were attracted to settlements by agricultural crops which places them at risk from the free-roaming dogs *Canis lupus familiaris*. The cross-sectional study was carried out from March to April 2018 to report the geographic spread and interactions of both species using camera traps, also to measure KAP (Knowledge, Attitude, Practice) to identify the most influential factors of dog owners pertaining their dog-keeping practices in Bawean Island, Indonesia. The RAI for Bawean deer and Free-roaming dogs was 0.15 and 0.24, respectively. There was no significant relationship or interactions occurred in between both species during the record ( $p\text{-value} > 0.05$ ). From the KAP survey, 198 (99.0%) of dog owners had poor practice. The poor practice may affect wildlife and human particularly because dogs are the main rabies vector. The significant factors found on the level of monthly income ( $r=0.479$ ;  $p<0.005$ ), knowledge ( $r=1.000$ ;  $p\text{-value}<0.005$ ), and attitude ( $r=0.848$ ;  $p\text{-value}<0.005$ ). The knowledge, attitude and practice were not found adequate due to the role of dogs in the traditional Bawean culture.

Keywords: Bawean deer, camera traps, free-roaming dogs, KAP.

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CONSERVATION OF CRITICALLY ENDANGERED  
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Undergraduate thesis  
submitted as a partial academic fulfillment of the  
requirements for the degree of  
Bachelor of Forestry  
at  
The Department of Forest Resources Conservation and  
Ecotourism

**DEPARTMENT OF FOREST RESOURCES CONSERVATION AND ECOTOURISM  
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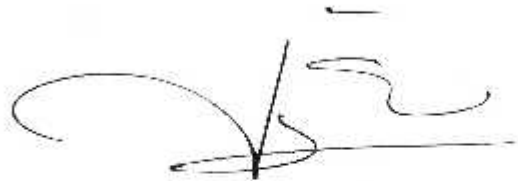


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## ACKNOWLEDGEMENTS

All praise is due to Allah for His grace and mercy that allowing me to finish this study and obtain my bachelor's degree from the Department of Forest Resources Conservation and Ecotourism, Bogor Agricultural University. I am totally sure that this work would have never become truth without His guidance.

The complex task of writing this thesis has been an interesting and challenging journey. Allow me to extend my sincere gratitude to the following list of people, who one way or another were very supportive to my research efforts here. My most sincere appreciation goes to my supervisory team; Dede Aulia Rahman PhD and drh Ardilasunu Wicaksono MSi for their guidance of ideas and encouragement during the period of my research. My appreciation also goes to the moderator on my seminar and thesis defense; Dr Ir Arzyana Sunkar, MSc along with my thesis examiner; Dr Ir Cahyo Wibowo, MSc F.Trop. I deeply thank people at Resort Konservasi Wilayah 11 in Bawean Island (Mas Rahim, Pak Maskur, Pak Nur, Pak Hassim, Pak Halim) and all staffs for their assistances during my field research.

My wholehearted thanks to my unwavering family, without which I would not have succeeded at this endeavor. My parents (Heldi & Syofniar) who never stop giving of themselves in countless ways. My beloved brothers (Ikhsan & Irfan) who stands by me when things look bleak. To my dearest grandmother (Nurhayati El Amin SH) and all the family in Pekanbaru who encourage and support me.

My life in Bogor has been so colorful, proper thanks to my colleagues and organizations; all class mates KSHE 51 the *Ornithoptera croesus*, Himakocan (Umi, Ana, Devina) along with my caretakers (Merisa & Aini) for the sweet and uplifting moments we shared, all the IFSA peeps (which is unfortunately too long to list here) they made my university life billion times better and more over to my partner in crime (Azzam) also to the two manuscript writing sidekicks (Shofi & Farhan).

Last but not least, deepest thanks go to all people who took part in making this manuscript real.

Bogor, September 2018

*Annisa Diva Putri Murbarani*



# CONTENT

LIST OF TABLES	xii
LIST OF FIGURES	xii
APPENDICES	xii
INTRODUCTION	1
Background	1
Rationale	2
Objective	2
Benefit	2
MATERIALS AND METHODS	3
Location and Period of Research	3
Study Design	4
Data Collection	5
Camera Trap	6
KAP Survey	6
Data Analysis	7
Camera Trap	7
KAP survey	8
Instrument Validity	8
RESULT AND DISCUSSION	9
Distribution of Bawean Deer and Free-roaming Dogs	9
Household and Individual Characters Including Dog Ownership	11
Dog Management Practices in Bawean Island	12
Factors Influencing Dog Management Practice	14
CONCLUSION AND RECOMMENDATION	17
Conclusions	17
Recommendations	17
REFERENCES	18
AUTHOR BIOGRAPHY	47

## **LIST OF TABLES**

1. Population proportion with sample size	7
2. Relative Abundance Indices of Bawean deer and free-roaming dogs	10
3. Presence and absence or interactions of Bawean deer and free-roaming dogs	10
4. Result of demographic characters of dog owners	11
5. Result of the demographic characters of respondents towards dog-keeping practices in Bawean Island	15

## **LIST OF FIGURES**

1. Research location in BINR-WS Indonesia	3
2. The framework of camera trap survey	4
3. The correlation between variables of KAP survey	5
4. Distribution mapping of Bawean deer and free-roaming dogs	9
5. Responses of whole sample regarding dog-keeping	12
6. Responses of whole sample regarding dog's food	13
7. Responses of whole sample regarding dog's treatments	14

## **APPENDICES**

1. KAP Survey Questionnaire	21
2. Demographic characters	26
3. The responses of whole sample regarding Knowledge	34
4. The responses of whole sample regarding Attitude	38
5. The responses of whole sample regarding Practice	42
6. Documentation	46

# INTRODUCTION

## Background

As the world's most isolated deer and the only endemic deer species in Indonesian tropical rainforest, Bawean deer *Axis kuhlii* (Temminck 1836) is categorized as Critically Endangered according to the IUCN Red list (Semiadi *et al.* 2015). According to CITES (2016), the Bawean deer is listed under Appendix I and is one of the 25 species prioritized legally protected for conservation by the Indonesian government on the basis of the threatened species status (Decree SK.180/IV-KKH/2015, Ministry of Environment and Forestry 2015). This endemic species is reported to cover over a very small area restricted to the tropical rainforest of Bawean Island Nature Reserve and Wildlife Sanctuary (BINR-WS). The protected area is relatively close to human settlements. Not surprisingly, this has made the Bawean deer habitat vulnerable to human activities with all its inevitable challenges from the surroundings. Population threats such as habitat loss due to a result of illegal logging, disturbance by hunters and the free-roaming dogs *Canis lupus familiaris* are also not uncommon in the forest habitat.

Introduced species are being well-recognized challenges to global biodiversity conservation (Butchart *et al.* 2010). However, when the introduced species are domesticated animals such as free-roaming dogs, they pose a greater conservation challenge due to their close associations with humans. Free-roaming dogs are defined as any dogs seen in public areas that are not permanently restrained or confined to its owner's house and are not currently under direct human control and they either owned or unowned by human (Tenzin T *et al.* 2015). However, they also interact with the water and food resources that people either purposely or inadvertently provide for them. The last study that has been conducted by Rahman *et al.* (2016) found that the main threats of disturbance by free-roaming dogs and hunters are ongoing in Bawean island. In most developing countries, the main function of dogs is to protect property. According to Potgieter *et al.* (2016) the dogs kept as protecting livestock have been observed to negatively affect many wildlife species. While dogs in the Bawean Island culture are used for guarding and protecting livestock and crop land from wild animals and thereby reducing the human-wildlife conflicts that are inevitable in areas where humans and wildlife coexists. The influence of dogs on wildlife is dependent on the nature and management whether domestic or on-leash, free-roaming, total or partial dependence on human mediated resources or completely independent of human subsidies, and where they are located that is proximity to natural or protected areas. The presence of free-roaming dogs within protected areas and their subsequent impacts on native fauna is significant at the borders thereby exacerbating edge effects. According to Preisser *et al.* (2005) dogs' presence without supervised by human is perceived as a threat in an environment because they may instinctively hunt wildlife and can affect wildlife in very deleterious ways such as competition, disturbance, and hybridization. Additionally, free-roaming dogs can also be a considerable problem to human itself as they suffer from extremely poor welfare and that can contribute to zoonotic disease transmission such as rabies. The last study that has been conducted by Susilawathi *et al.* (2012) the rabies virus has been

reported in Indonesia and endemic in various islands surrounding Bali, including Sumatera, Java, Kalimantan, Sulawesi and Flores. The case found that 104 patients were died of rabies in Bali from November 2008 until November 2010.

The possible impact of how free-roaming dogs and wild species interact has never been investigated in the Indonesian protected area. In case to improve the future conservation of Bawean deer and management of the area, knowledge is fundamental to clarify and mitigate some of the potential risks that free-roaming dogs may pose to the wildlife and natural environments, particularly for the conservation of Bawean deer and human health. Such knowledge may be essential for the future management plans and conservation of many unique area not only in Bawean island but also in many areas in Indonesian tropical rainforest where they are facing the same threats. Conservation actions focusing on reducing human-wildlife conflicts and dog-wildlife interactions will be a challenging task, due to the role of dogs in the traditional Bawean culture. To create public awareness within the local communities in Bawean island about the potential impacts of dogs and possible conflict, is believed to be fundamental for enhancing the understanding, acceptance and support of the management strategies in the future.

### **Rationale**

The lack of long-term studies results in incomplete knowledge of the Critically Endangered Bawean deer population and how they survive to several threats that they are facing. Bawean deer were attracted to settlements by agricultural crops which places them at risk from the free-roaming dogs. According to the previous study that has been conducted by Rahman *et al.* (2016) photographed the free-roaming dogs in 12 grid cells and recorded two cases of Bawean deer killed by free-roaming dogs close to settlements. The threat should be taken seriously as free-roaming dogs are the main predators and became a thorny problem in conservation of Bawean deer.

### **Objective**

The purposes of this research were to:

1. Report the geographic spread and possible interactions of Bawean deer and the free-roaming dogs
2. Measure KAP (Knowledge, Attitude and Practice) as cross-sectional study to identify the most influential factors of dog owners pertaining their dog-keeping practices.

### **Benefit**

This research was expected to:

1. Propose any solutions to the management authority (East Java Natural Resource Conservation Agency Regional Office) for the future management strategies of Bawean deer and the free-roaming dogs
2. Create public health awareness through face to face discussion with the local communities about the possible impacts of human and free-roaming dogs' interactions.

## MATERIALS AND METHODS

### Location and Period of Research

The Bawean Island of Indonesia is a quite isolated island in the Java Sea (5°40'–5°50'S; 112°3'–112°36'E, Figure 1). According to Rahman *et al.* (2016) the island is centered with mountainous terrain at 400 to 630 meters in altitude which mainly covered by tropical forests of 4700 ha Nature Reserve and Wildlife Sanctuary (BINR-WS) covering 23% of the island, including teak *Tectona grandis* plantations. While the remaining forests area were confined to the steep sides and top of the higher hills and mountains. The primary cultivated lands were separated by broad valleys. Other forests area such as a mosaic of grassland, shrub, open and closed forest with understory were also found in the research area.

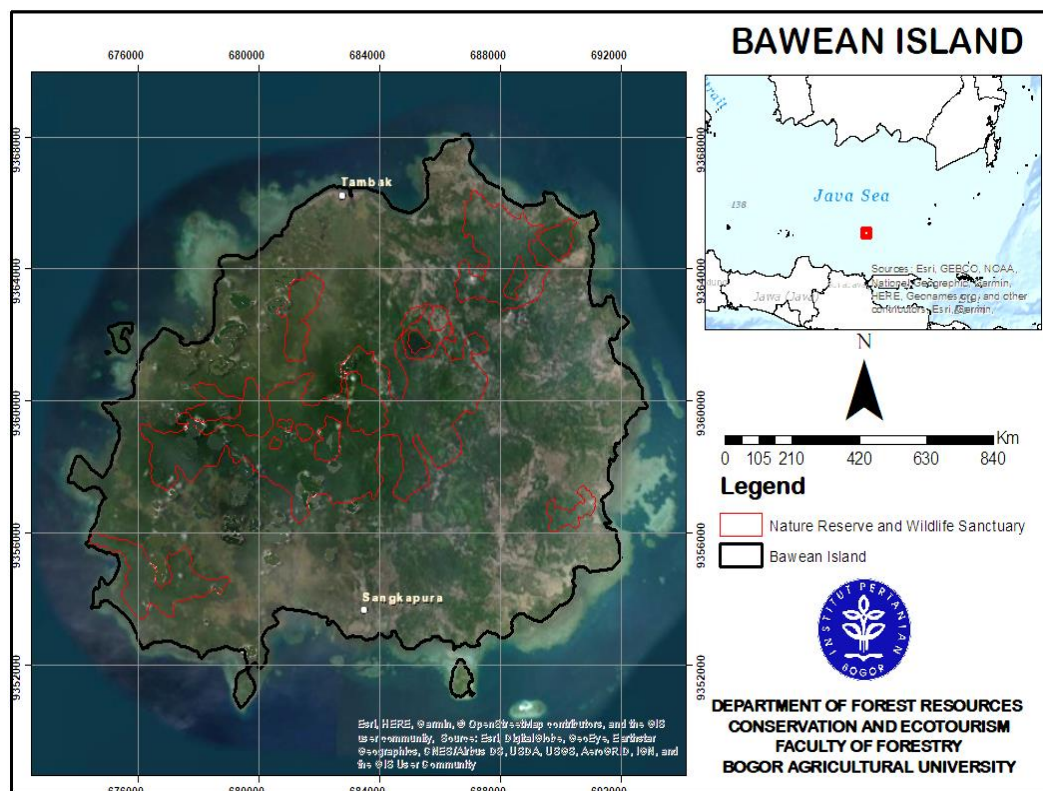


Figure 1 Research location in the BINR-WS Indonesia.

The research was also employed the KAP survey to enable face to face discussion with dogs' owners to assess dog-keeping practices in Bawean Island. The KAP survey were conducted across the Bawean Island districts in 15 villages of Sangkapura and 6 villages of Tambak. The areas were covering of approximately 122.72 km<sup>2</sup>, representing 62% of the island's land mass. These areas were inhabited by about 67,668 people (63% of Bawean population according to the 2016 national census). Those villages were located close to the BINR-WS. The research was carried out from March to April 2018.

### Study Design

This research was designed to see the geographic spread throughout the grids of camera traps and the possible interactions of Bawean deer and the free-roaming dogs with the evidence of direct and indirect presences of both species. Each of presences either direct and indirect were recorded and mapped such as feces, food remains, footprints and antler rubbing (Bawean deer). The framework of camera trap survey is presented in the below Figure 2.

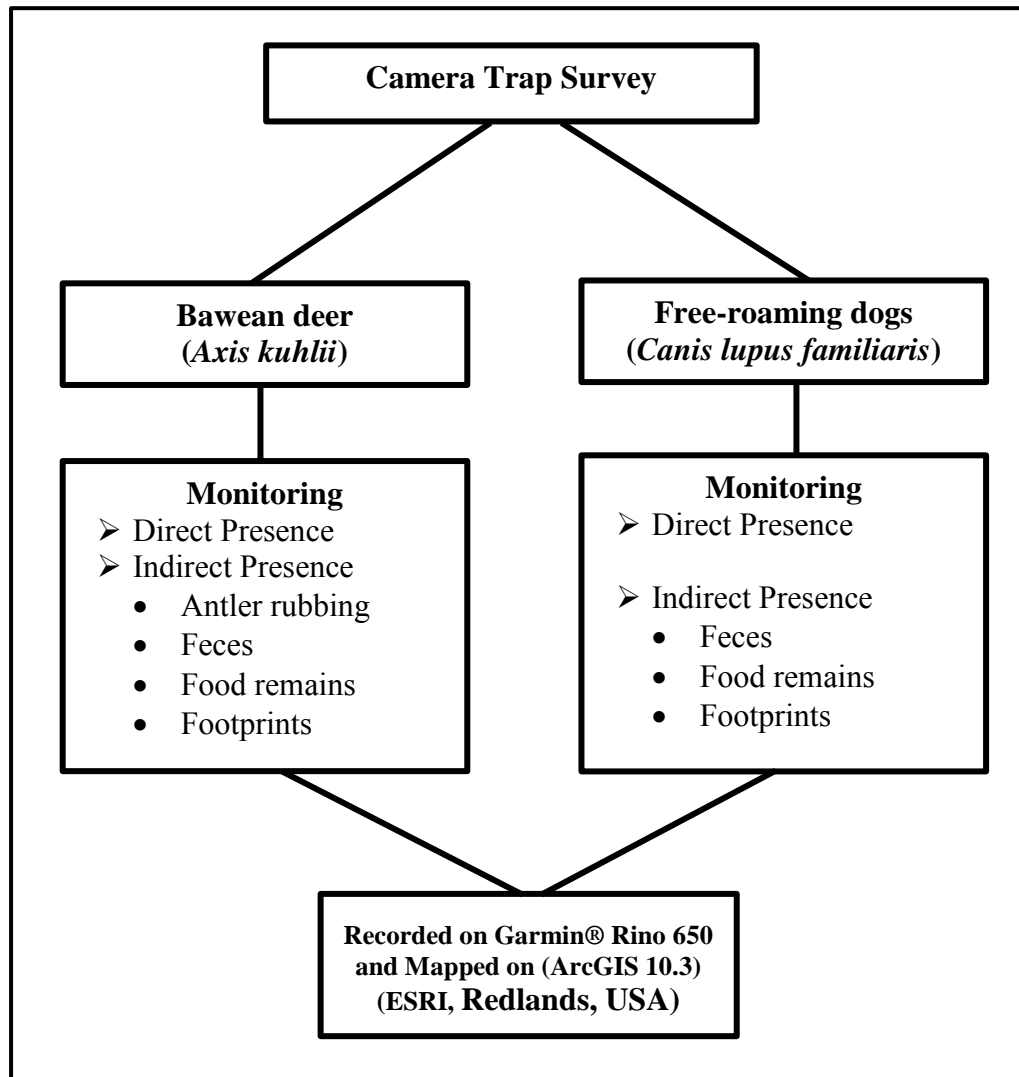


Figure 2 The framework of camera trap survey.

The research was also designed to assess the correlation between dog owners' demographic characters, knowledge and attitude towards dog-keeping practices in 21 villages of Bawean Island. The demographic characters consisted of gender, age, education level, occupation, monthly income, number of dogs owned, ownership duration, and information received related to dog-keeping practices. Eleven Likert scale questions with "yes", "no" or "don't know" were designed to elicit participant's knowledge in two key areas, including conservation of Bawean deer and human health management. As well as ten Likert scale questions with "agree",



“disagree” or “uncertain” to elicit participant’s attitude then further they were asked questions related to their dog-keeping practices. To elicit the knowledge, attitude and practice were based on how to be a responsible dog owner, conflicts between human-wild animals and Bawean deer-free-roaming dogs, and diseases prevention which possibly derived from the free-roaming dogs. The correlation between variables of KAP survey is presented in the Figure 3 below.

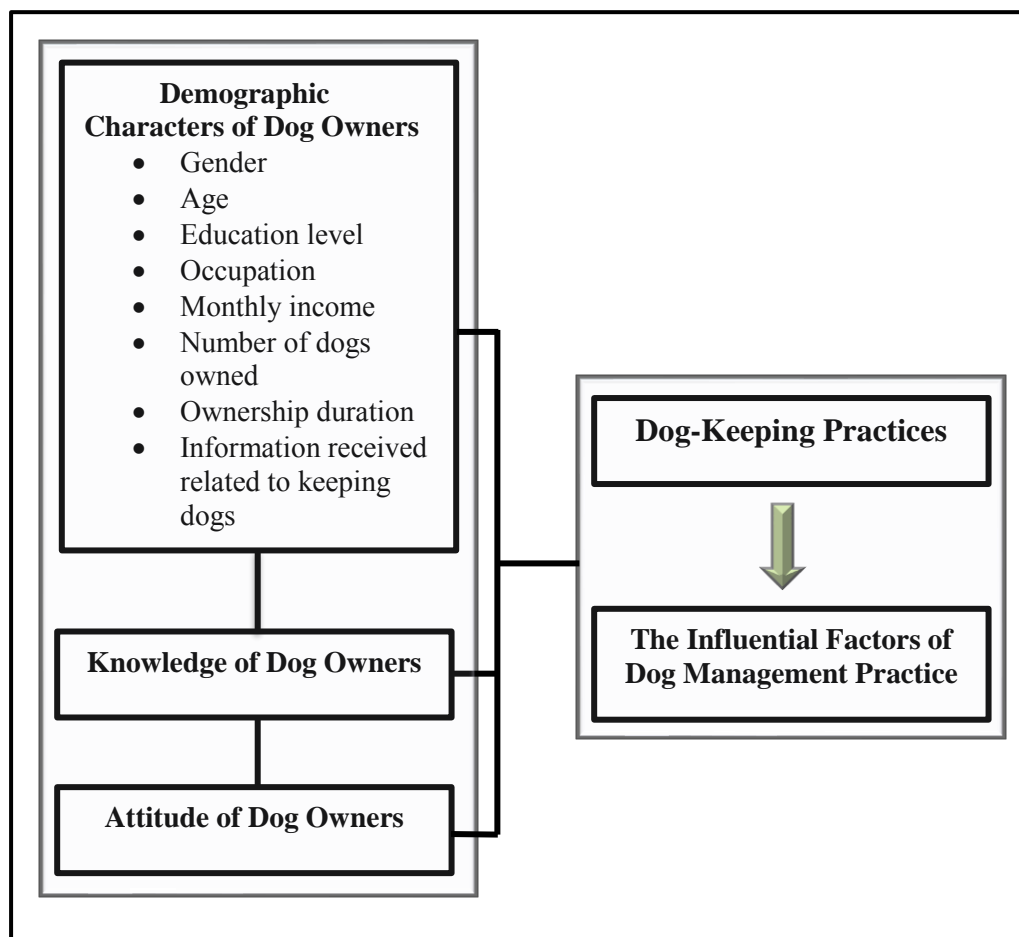


Figure 3 The correlation between variables of KAP survey.

### Data Collection

Quantitative research that involves the use of camera traps and linking environmental factors on the distribution of animals has been widely used in research related to the mitigation of human-wild animal and dog-wild animal conflicts (Karanth *et al.* 2012). The combination of interview method and camera trap survey certainly produced good research results that provide recommendations (Rahman *et al.* 2016 and Young *et al.* 2011) which was right targeted for the managers, particularly in terms of conflict management and conservation programs for Bawean deer in the future. The cross-sectional study was conducted using a questionnaire as a tool to measure the knowledge, attitudes, and practices of the dog owners (Lin *et al.* 2011).

## Camera Trap

The BINR-WS was gridded into 200 1- km<sup>2</sup> trap stations and 33 grids were used in the research using Geographic Information System (ArcGIS 10.3) (ESRI, Redlands, USA). The camera trap survey was conducted from March to April 2018. The twenty-one units Trophy Cam HD Max digital cameras (Bushnell Outdoor Products, Overland Park, USA) operated on passive infrared motion sensors were installed one or two per grid. The location of cameras was decided using a stratified random design, constrained by a minimum distance of 300 m in between camera traps. As explained by Rowcliffe *et al.* (2013), the camera traps can be positioned in less or more attractive places to animals as long as those were proportionally sampled in regards to the occurrence of animals in the studied ecosystem. Thus, using a grid and a stratified random design allowed ones to select positions where to install the cameras at random in regards to the animals (Rowcliffe *et al.* 2013). This research used three strata consisted of forest type (primary and secondary), distance to border of protected area, and free-roaming dog-used areas. Free-roaming dog-used areas included a buffer of 1000 m from the nearest human house or road that connected to human settlements. The purpose of this stratum was to secure that sample size was large in areas where dogs were likely to occur in order to detect spatial effects on Bawean deer in case they occurred. The cameras were set at approximately 30-50 cm above the ground, which was expected to work well both for Bawean deer and the free-roaming dogs. The cameras were set at each point for a period of 20 days for 2 months, after which they were moved to a new location. During installation, the evidence of direct and indirect presences (footprints, feces, food remains and antler rubbing on trees) of Bawean deer and free-roaming dogs was recorded throughout the grid using Garmin® Rino 650 and mapped using Geographic Information System (ArcGIS 10.3) (ESRI, Redlands, USA).

## KAP Survey

The Knowledge, Attitude and Practice (KAP) survey was a representative study of a specific population to collect information on what is known, believed and done in relation to a particular topic that have been widely used around the world for different applications, based on the principle that increasing knowledge will result in changing attitudes and practices (WHO 2008). The survey was designed to enable face to face discussion on dog-keeping practices in Bawean Island. The sample method was decided using a purposive sampling, the participants were selected in a directed way based on the criterion or rationale (WHO 2008). A total of 200 dog owners were interviewed to assess the knowledge, attitude, and dog-keeping practices. The sample size was obtained using software Win Episcope 2.0. with 95% of confidence level, 50% of population proportion of poor practice, and 7% of allowable error. This assumption was calculated using the formula:

$$n = \frac{1.96^2 \times p \times (1 - p)}{L^2}$$

n = sample size

p = population proportion of poor practice

L<sup>2</sup> = allowable error

Table 1 Population proportion with sample size

Bawean Island	$\Sigma$		
	Population	Proportion	Sample size
Sangkapura	69,281	69,281/107,264*200	130
Tambak	37,983	37,983/107,264*200	70
<b>Total</b>	<b>107,264</b>		<b>200</b>

Data were first collected via the 7-page household survey questionnaire which consisted of close-ended questions (multiple-choice and Likert scale). The questionnaire comprised of four compartments regarding the demographic characters and dog ownership, the conservation of Bawean deer, human health management and interactions with wild animals (Appendix 1). All respondents were asked questions on their knowledge, attitudes, and practices regarding dog-keeping. A Likert scale was used to gather attitudinal data via 21 questions across two domains: the predation influence to Bawean deer conservation and the effect caused to human health management. Scores were given according to the completeness and accuracy of respondents' answers, ranged from one to three depending on the nature of the question. For example, regarding the respondent's knowledge about dog-keeping in appropriate manner, a score of 2 if the owner was disagreed that dogs supposed to be continuously unleashed and a score of 1 if the answer was the opposite. If all answers were completed and accurate, a respondent would obtain overall score of 22 for knowledge, 30 for attitudes, and 16 for the practices. For a respondent to be classified as knowledgeable about dog-keeping practice, a score of 16.5 or more out of 22, a score of 22.5 or more out of 30 for attitude, and a score of 12 or more out of 16 for practice. These numbers had to be obtained which is equal to 75% of the sum according to the cut-off point of the Likert scale type (Wicaksono *et al.* 2017).

### Data Analysis

#### Camera Trap

Relative Abundance Indices (RAI) was used to determine the level of encounter in the area or point of camera location. From camera traps data, the RAI was calculated using the following formula according to Acrenaz *et al.* (2012) for Bawean deer and the free-roaming dogs:

$$RAI = \frac{\sum f}{\sum d} \times 100$$

Where (f) was the sum of all independent photographs, while (d) was a total number of camera days. The value of (100) were used to equalize the entire days during the installation period.

The relationship and possible interaction of both species found on each grid cells of camera trap were performed using the Fisher's Exact Test on Statistical

Package for the Social Sciences SPSS software v.22 (SPSS Inc. Chicago, Illinois, USA) with p-value of 0.05 was considered statistically significant.

### **KAP survey**

Data obtained from the survey interviews were entered into Microsoft Excel (Microsoft Corporation, Redmond, Washington, USA). All close-ended responses were coded to arrive at clusters to tabulate percentage responses. Statistical analysis was performed using the Chi-Square test (Roy and Hossain 2014) on Statistical Package for the Social Sciences SPSS software v.22 (SPSS Inc. Chicago, Illinois, USA) to see the correlation and significant relation between variables. While descriptive analysis was obtained from the information about dog owners' demographic characters and dog ownership. A p-value of 0.05 was considered statistically significant to the required information and Gamma test was used to measure the strength and direction of linear relationships between the pairs of associated variables at the ordinal level.

### **Instrument Validity**

To minimize response errors, questionnaires should be crafted in accordance with best practices. Validity indicated how well an instrument measure the construct it purports to measure, according to certain situations and objectives (Carole *et al.* 2008). The validity of the instrument was necessary to adjust the contents of the questions and statements in the questionnaire with the existing theoretical foundation and conditions at the targeted research location. The questionnaire was prior tested to 20 dog owners with similar characters before the conduct of actual survey in order to determine the estimated and the level of difficulty of the questions in the questionnaire. The questionnaire was also revised accordingly.

## RESULT AND DISCUSSION

### Distribution of Bawean Deer and Free-roaming Dogs

The results of 1260 trap days were accumulated a total of 1440 hours of camera trapping and a total of 1912 photographs were exposed (91.04 per camera trap) during the period of research, showing 92 wild and 3 free-roaming dogs (4.81% and 0.15, respectively), 9 humans (0.47%), and 4 squamates (0.20%). A large of photographs (94.37%) did not show any animals. Six species were detected and most frequent species was the long-tailed macaque *Macaca fascicularis* (n = 56 photographs) and was the only species photographed at all sites. This primate was followed by Javan warty pig *Sus verrucosus* (n = 34), humans (n = 9), squamates (n = 4), free-roaming dogs (n = 3), and Bawean deer (n = 2). The presence of Bawean deer and the free-roaming dogs on camera traps were recorded in two grid cells. More details about the distribution of Bawean deer and the free-roaming dogs either direct and indirect presences were shown in Figure 4.

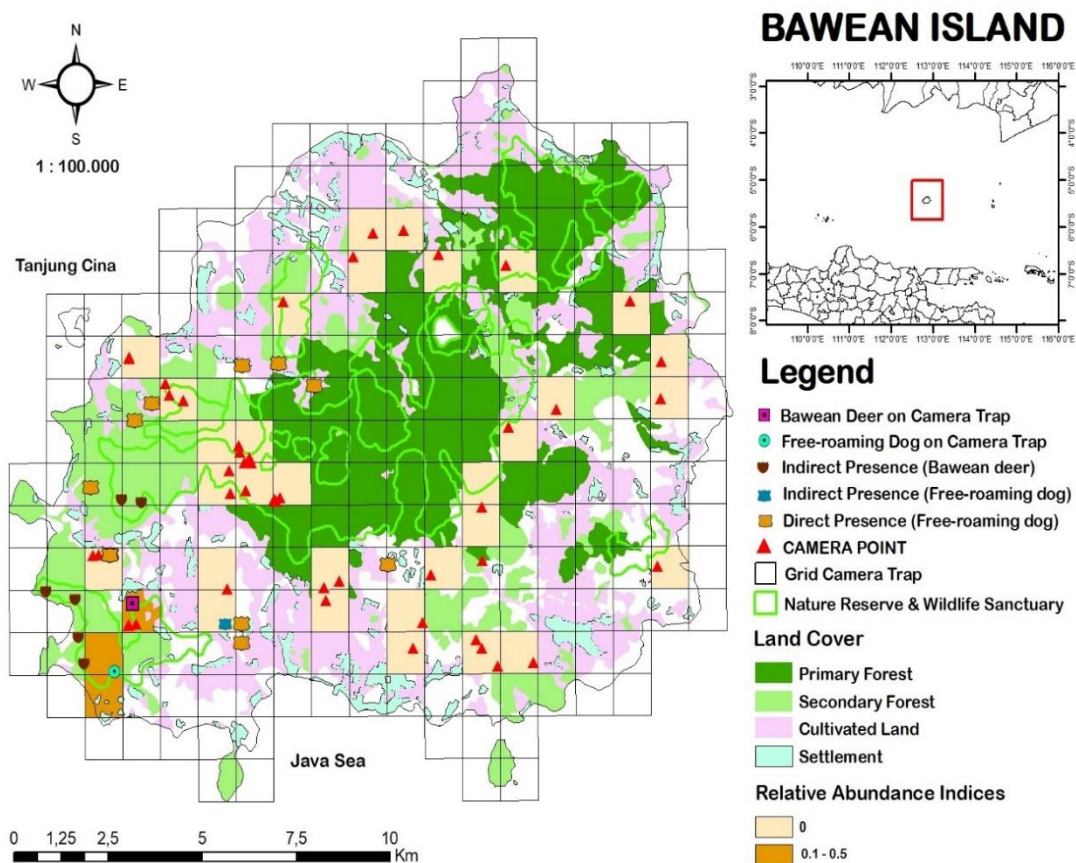


Figure 4 Distribution mapping of Bawean deer and Free-roaming dogs.

The records of both species through direct and indirect species were found narrowed in the south-western part of the Bawean Island. Those individuals of Bawean deer were recorded around 82.95 meters away from BINR-WS and approximately 225.079 meters away from the human settlements. While other individuals of free-roaming dogs were recorded about 56.89 meters away from the

BINR-WS. The indirect presences of Bawean deer such as feces, food remains and antler rubbing on trees were recorded in 5 grid cells. The free-roaming dogs were found directly in 13 grid cells and a footprint of free-roaming dog was recorded in 1 grid cell. The other species were not further identified.

Distribution mapping in this research indicated that RAI of Bawean deer and free-roaming dogs in Bawean Island was significantly lower. On this research, the RAI was **0.15** and **0.24** for Bawean deer and free-roaming dogs respectively (Table 2).

Table 2 Relative Abundance Indices of Bawean deer and Free-roaming dogs

Species	Camera trapping	
	Number of photographs	RAI
Bawean deer	2	<b>0.15</b>
Free-roaming dogs	3	<b>0.24</b>

Previous research conducted by Semiadi (2004), the Bawean deer were only recorded around Mount Bulu in the central mountain range, south-west part of Bawean Island. While the free-roaming dogs were recorded on less than 30 times record in BINR-WS boundary (Rahman *et al.* 2016). The existence of Bawean deer individuals on camera traps may possibly associated with increasing habitat quality in some protected areas where less disturbance and damage to vegetation. While the presence of free-roaming dogs was most likely associated with human activity. There was no sign of Bawean deer and free-roaming dogs has recorded elsewhere even though the cameras were moved to different location after 20 days. According to Si *et al.* (2014) showed that frequently replacing camera traps gives more efficient detection and the camera traps should be replaced at least every 30-40 days. Moreover, on these results can be assumed that the absence of detection of Bawean deer may also indicate to smaller population in the habitat than previous while higher population of free-roaming dogs recorded on direct-indirect presences. Other speculations perceived the locations of camera traps were less relevant to the presence of Bawean deer and free-roaming dogs and possibly a longer period of research may produce a better result on species detection on camera traps.

The distribution of Bawean deer and free-roaming dogs either through camera trapping or indirect presences were counted as presence and absence of both species more details about the interaction is presented in the (Table 3) below.

Table 3 Presence and absence or interactions of Bawean deer and free-roaming dogs

Bawean deer	Free-roaming dogs		Total	p-value
	Absence	Presence		
Absence	0	11	11	<b>0.057</b>
Presence	2	2	4	
Total	2	13	15	

The records with the p-value of **0.057**, which indicated that there was no significant relationship or interactions occurred in between both species during the record. Nevertheless, the evidence of indirect presences can be identified that there was sign of those species has been in the area. There were most likely the free-

roaming dogs entering the BINR-WS alongside their owners, since free-roaming dogs from surrounding villages would only forage short distances into the protected area. However, free-roaming dogs undoubtedly increase hunting pressure on prey species especially to the Bawean deer and also must be considered competitors of native scavengers. The free-roaming dogs are well known carriers for diseases such as rabies, canine distemper virus (CDV) and canine parvovirus. Similar case found on research that has been conducted by (Duarte *et al.* 2016), the interactions of wild animals and dogs emerged predation and infectious disease affecting upon 57 European wild ungulates (fallow deer, red deer, and mouflon). Based on Kate *et al.* (2011) home range sizes for the free-roaming dogs reported to be up to 10.5 km<sup>2</sup>, there was high potential should be aware for contact (direct or indirect) between free-roaming dogs and other wildlife especially Bawean deer that could lead to transmission of fatal infectious diseases.

### Household and Individual Characters Including Dog Ownership

A total of 200 dog owners were interviewed in the survey from 15 villages of Sangkapura district and 6 villages of Tambak district. More details about the demographic characters were shown in Table 4.

Table 4 Result of demographic characters of dog owners

Variable	Category	Frequency (%)
<b>Gender</b>	Male	178 (89.0)
	Female	22 (11.0)
<b>Age</b>	≤ 45	113 (56.5)
	>45	87 (43.5)
<b>Education Level</b>	Illiterate	28 (14.0)
	Elementary school	97 (48.5)
	Secondary school	27 (13.5)
	High School	35 (17.5)
	Graduate/above	13 (6.5)
<b>Occupation</b>	Student	3 (1.5)
	Dependent/housewife	16 (8.0)
	Labors	9 (4.5)
	Fisherman	16 (8.0)
	Farmer	119 (59.5)
	Business	11 (5.5)
	Teacher	12 (6.0)
	Government Employee	14 (7.0)
<b>Monthly Income</b>	< 1.000.000	131 (65.5)
	1.000.000 – 3.000.000	63 (31.5)
	> 3.000.000	6 (3.0)
<b>The number of dogs owned</b>	1	116 (58.0)
	2-4	61 (30.5)
	>4	23 (11.5)
<b>Duration (years)</b>	<3	77 (38.5)
	3-5	86 (43.0)
	>5	37 (18.5)
<b>Information received related to dogs' ownership</b>	Yes	7 (3.5)
	No	193 (96.5)

Population sample which age ranged from 45 years or less were categorized as young age and more than 45 years or more were categorized as old age (Halim 1992), comprised majority of 178 (89.0%) males and 22 (11.0%) females. Regarding their level of education, 28 (14%) were unable to write and read and higher percentages were educated at the elementary school 97 (48.5%). The majority of dog owners worked as farmers 119 (59.9%) and raised livestock including cow, sheep or goat as the primary source of their income. Other listed occupations included labors (4.5%), business (5.5%), teacher (6.0%), and government employee (7.0%).

Among all the participants, most of them 131 (65.5%) had income less than 1 million rupiah per month. Most people in rural area weren't having regular income as they raised livestock for their own consumption Jackman and Rowan (2007). Regarding their dog ownership, most of participants around (58%) only have at least 1 dog at their house due to protecting the agricultural crops. The majority of participants owned dogs for 3-5 years (43%) or less than 3 years (38%). Unfortunately, they haven't received adequate information regarding dog-keeping practices from the local government which was 193 (95.5%) of dog owners in Bawean Island. The information about dog-keeping practices in appropriate manner would be important to the dog owners due to a better dog-keeping practices in Bawean Island.

### Dog Management Practices in Bawean Island

The majority of 62% dog owners in Bawean Island reported that they had continuously unleashed their dogs. Most remaining respondents 37% had leashed their dogs and only 1% of dog owners had both leashed and unleashed their dogs (Figure 5). The dog owners of the Bawean Island agreed that all of the free-roaming dogs residing were owned by the household. These respondents assumed that on the basis that the dogs being roamed due to protecting the agriculture crops they belonged to because the ongoing threat to their crop land by wild animals such as Javan warty pigs *Sus verrucosus* and long-tailed macaque *Macaca fascicularis*.

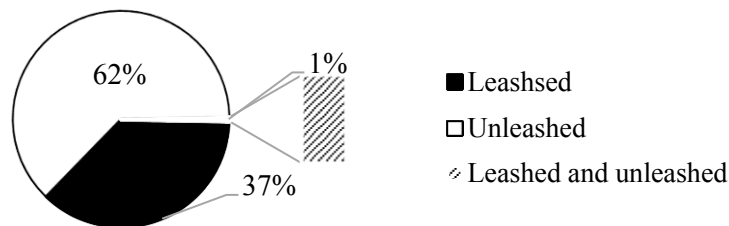


Figure 5 Responses of whole sample regarding dog-keeping.

According to Jackman and Rowan (2007) dogs living with humans may be classified into three or four categories: pets, community dogs, strays, and free-roaming. In developed countries the majority of dogs are pets as they are allowed in the house, given names, regarded as part of the family, and never eaten. While in most developing countries, the main function of dogs is to protect property. For example, in the Thungsong District of Thailand, 83 percent of households keep dogs as guard animals (Kongkaew *et al.* 2004). In Zimbabwe 60 percent view dogs



as guards, and 73.1% see dogs as a deterrent to wildlife that they perceive as pests, such as elephants, baboons, lions, and leopards (Butler 2000). Patterns of dog ownership in many developing countries differ, depends on the need of the owners.

In this research found that the farmer reported interactions between free-roaming dogs and wild animals were associated with their management and role on the farm and crop land. In terms of free-roaming dogs' interactions, the free-roaming dogs that belonged to households with livestock had a higher likelihood of interacting with wild animals (Sepulfeda *et al.* 2014). In fact, the dog owners encouraged their free-roaming dogs to chase the wild animals seen as threats to their livestock. The fact that the presence of free-roaming dogs was perceived by farmers to reduce wild animals caused livestock losses may also result in a reduced retaliatory killing of wild animals, suggesting that free-roaming dogs whose primary function was to guard livestock indirectly contributed to reducing human caused mortality of wild animals. In addition, some dog owners reported that their free-roaming dogs killed domestic livestock, which was a frequent problem happened in the Bawean Island. Thus, although the free-roaming dogs could play an important role in protecting livestock and farms from wildlife pests and thereby minimize human-wildlife conflict and retaliatory killing of wild animals, the free-roaming dogs also have direct impacts on wildlife and livestock populations through predation (Ritchie *et al.* 2014). This hunting activity is generally considered undesirable by dog owners and is an activity that can be minimized through a change in diet and management. This provides an interesting opportunity to manage dog populations in a way that maximizes wildlife conservation while also protecting the rural farmers' way of life and livelihoods.

This study investigated the free-roaming dogs in Bawean Island tend to be fed. Almost all owned of 87% free-roaming dogs had been fed by their owners and the remaining of 13% had not been fed and relaying on food leftovers instead (Figure 6). However, most of fed dogs were not given a proper animal food. According to Silva-Rodriguez and Sieving (2011) that well-fed dogs killed prey species less often than those fed on low-quality food such as wheat bran or household leftovers. While in this study detected a similar association for free-roaming dogs and wild species interactions, showed that their interactions were better predicted by livestock ownership than food provision.

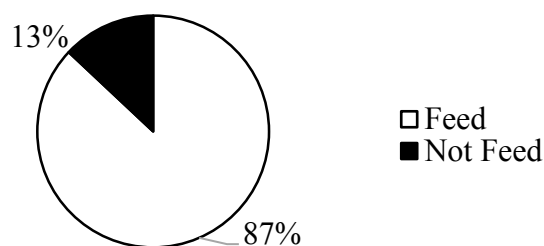


Figure 6 Responses of whole sample regarding dog's food.

Some of dog owners reported that most of dogs were fed individually at the household on a regular basis. The free-roaming dogs were reported to be fed regularly at least two times a day but they were not provided with a specific food. The owners tend to provide them with human meals such as rice and fish. If they were not fed, the low nutritional value of the refuse and extremely poor body

condition of most of free-roaming dogs not owned by households, also suggests that environmental resources were probably inadequate to meet the energy requirements of those dogs not fed properly by an owner and that these dogs would not be able to survive in these environments without provisioning and high potential should be aware for predation.

A key finding was that almost all of the identified free-roaming dogs were owned by households in the study area. Despite the vast majority of 98% dogs were being free-roaming, the dogs were also not accessible for treatments evaluation or vaccination. Only the remaining 2% of free-roaming dogs were given treatments (Figure 7). In this study identified that the free-roaming dogs who are allowed to roam are even less likely to receive veterinary care. Free-roaming dogs who suffered from disease may pose risks of zoonoses, contact injuries, and environmental pollution to human population. Rabies is worried to be the most lethal of canine transmitted diseases in the area where dogs had not been given a particular treatment. Free-roaming dogs are also associated with a variety of other bacterial, viral, and parasitic infections that may pose a risk to humans. According to Jackman and Rowan (2007) the disease spreads to humans through ingestion of dog feces. Increasing vaccination especially along preserve boundaries, reduction of dog populations through birth control, and improvements in waste disposal would reduce transmission of canine rabies to wild animals.

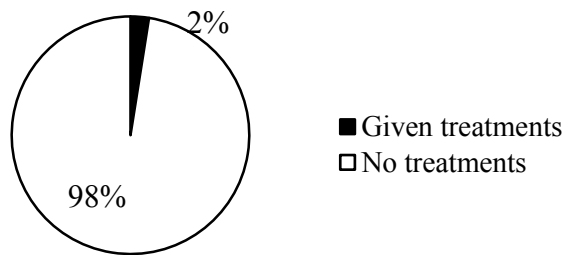


Figure 7 Responses of whole sample regarding dog's treatments.

In this research reported that the owners only tend to use their traditions instead of vaccination. When they need to bring the dogs for guarding, their free-roaming dogs would be given some additional food such as coconut and brown sugar as they believe would energized the dogs while guarding. Association of free-roaming dogs with particular neighborhoods or individual households determines the extent to which these animals are deemed to be accessible to vaccination and sterilization programs (Morters *et al.* 2014). It is better that free-roaming dogs in Bawean island receive more attention related to their welfare because they can contribute to the spread of disease and high mortality among dogs and other wildlife including human as dogs are the main rabies vector. In recent years the dog owners were reported that there has been no record found on the rabies vector happening in Bawean Island.

### Factors Influencing Dog Management Practice

Two hundred dog owners in Bawean Island have completed the survey questionnaires. The result of KAP survey regarding the relationship of dog owners' demographic characters and dog ownership towards practices on the Table 5 shows that the majority of participants had poor practice towards dog management,

revealed the percentages of bad practice 198 (99.0%) and good practice 2 (1.0%). It comprises of males with bad practice (98.9%) and all females found to have bad practice (100%) on dogs' management. While only the remaining of (1.1%) of males had good practice. Higher percentages of bad practice found on the age ranged from  $\leq 45$  years (99.1%) with (0.9%) found to have good practice. Those with age ranged  $> 45$  years had bad practice (98.9%) and (1.1%) found to have good practice. Age describes experiences in a person in order to see the difference of practices based on their age (Halim 1992). Practice would vary in each person depends on their age. Generally, the more a person ages, the mental abilities and experience would increase and affecting their practice to the better (Halim 1992). All dog owners with higher percentages of poor practice were educated at the elementary school 97 (100%), high school 35 (100%), graduate/above 12 (90%), and illiterate 28 (100%). The good practice found on the dog owners educated at the secondary school 1 (3.7%) and graduate/above 1 (10.0%). Regarding their occupation, good practice only found on the farmers (0.8%) and on the government employee (7.1%). The remaining dog owners with different occupations had bad practice. Only (0.8%) of dog owners with the number of dogs 2-4 had good practice while others found to have bad practice. More details were shown in the Table 5 below.

Table 5 Result of the demographic characters of respondents towards dog-keeping practices in Bawean Island

Variable	Category	Practice		p-value	gamma
		Bad Frequency (%)	Good Frequency (%)		
<b>Gender</b>	Male	176 (98.9)	2(1.1)	0.617	-1.000
	Female	22 (100.0)	0(0.0)		
<b>Age</b>	$\leq 45$	112(99.1)	1(0.9)	0.852	0.131
	$> 45$	89(98.9)	1(1.1)		
<b>Education Level</b>	Illiterate	28(100.0)	0(0.0)	0.066	0.729
	Elementary school	97(100.0)	0(0.0)		
	Secondary school	26(96.3)	1(3.7)		
	High School	35(100.0)	0(0.0)		
	Graduate/above	12(90.0)	1(10.0)		
<b>Occupation</b>	Student	3(100.0)	0(0.0)	0.642	0.728
	Dependent/housewife	16(100.0)	0(0.0)		
	Labors	9(100.0)	0(0.0)		
	Fisherman	16(100.0)	0(0.0)		
	Farmer	118(99.2)	1(0.8)		
	Business	11(100.0)	0(0.0)		
	Teacher	12(100.0)	0(0.0)		
	Government Employee	13(92.9)	1(7.1)		
<b>Monthly Income</b>	$< 1.000.000$	130(99.2)	1(0.8)	<b>0.000*</b>	<b>0.479</b>
	$1.000.000 - 3.000.000$	63(100.0)	0(0.0)		
	$> 3.000.000$	5(83.3)	1(16.7)		
<b>The number of dogs owned</b>	1	115(99.1)	1(0.9)	0.776	0.041
	2-4	60(98.4)	1(1.6)		
	$>4$	23(99.0)	0(0.0)		
<b>Duration of dog ownership (years)</b>	$<3$	76(98.7)	1(1.3)	0.364	0.141
	3-5	86(100.0)	0(0.0)		
	$>5$	36(97.3)	1(2.7)		
<b>Information received related to dog ownership</b>	Yes	7(100.0)	0(0.0)	0.787	-1.000
	No	191(99.0)	2(1.0)		
<b>Knowledge</b>	Good	31(93.9)	2(1.0)	<b>0.001*</b>	<b>1.000</b>
	Bad	167(100.0)	0(0.0)		
<b>Attitude</b>	Positive	15(93.8)	1(6.3)	<b>0.028*</b>	<b>0.848</b>
	Negative	183(99)	1(0.5)		

Most of dog owners (99.0%) had poor level of practice due to lack of attention on educational training for dog keeping from any agencies or local government of Bawean Island and also the dog owners have never seen any information regarding keeping dogs in appropriate manner. The variables stated above have no significant relationship towards dog management practice, revealed no significant values  $p$ -value  $< 0.005$ .

The significant factors pertaining dog management practice in Bawean Island found a moderate positive association on the level of monthly income ( $r=0.479$ ;  $p<0.005$ ). Knowledge about keeping dog in appropriate manner had very strong positive association with ( $r=1.000$ ;  $p$ -value $<0.005$ ), and the other significant factor found a strong positive association on the attitude of dog owners ( $r=0.848$ ;  $p$ -value $<0.005$ ). Factors influencing dog management practice on the level of monthly income, based on the result comprised the majority of dog owners with a salary of 1 million per month as they worked on the agricultural crops of their own. These people were males with ages 18-45 (median 45) and had only attended the elementary school. For 3 years of dog ownership experience and having at least 1 dog at their house, these people have never received any educational training regarding dogs' keeping. The dog owners with poor knowledge pertaining practice comprised of male dog owners with ages 18-45 (median 45) and had only attended the elementary school. For the duration of 3 until 5 years of dog ownership experience and having at least 1 dog at their house, these people have never received any educational training regarding dogs' keeping. According to Notoatmodjo (2003) knowledge is the basic foundation to do something appropriately. A person's knowledge is not only influenced by the environment and level of education, but also by sources of information they received, experiences and counseling. Hence, the knowledge of dog owners needs to be raised through the provision of educational training of dogs' keeping, counseling and field practices to improve the quality of dog management practices in Bawean community.

The dog owners with negative attitude comprised of male dog owners with ages 18-45 (median 45) and had only attended the elementary school. For the duration of 3 until 5 years of dog ownership experience and having at least 1 dog at their house, these people have never received any educational training regarding dogs' keeping as well. According to Notoatmodjo (2003) attitude is a reaction or response to a person that involves the opinion and emotions but have not shown practice or activity. The bad or negative attitudes are assumed that keeping dogs in appropriate manner is not necessary. This assumption is alerted and may become a threat due to free-roaming dogs are almost ubiquitous in a society particularly in Bawean island and managing their distribution is a challenge. It is important to note that, the free-roaming dogs can continue to have negative impacts to the Bawean deer. Factors influencing someone's attitude is the source of information from training and counseling, because if someone receive more information, they would likely gain more knowledge (Notoatmodjo 2003). Hence, the community approach program especially amongst dog owners in Bawean Island is seemed to be equitable and necessary that this knowledge is expected to improve attitudes about dog management practice in Bawean Island especially through inserting conservation messages to increase understanding and awareness about Bawean deer conservation.

## CONCLUSION AND RECOMMENDATION

### Conclusions

1. Camera traps for 1260 trap days (1440 hours) exposed a total of 1912 photographs. RAI was significantly lower, 0.15 (Bawean deer) and 0.24 (Free-roaming dogs) assumed to smaller Bawean deer population in the habitat than previous while higher population of free-roaming dogs recorded on direct-indirect presences. There was no significant relationship or interactions occurred in between both species during the record, however when the two species meet, the interactions of free-roaming dogs and Bawean deer emerged predation
2. The KAP survey revealed majority of dog owners had poor practice consisted of bad practice 198 (99.0%) and good practice 2 (1.0%). The significant factors of dog owners pertaining dog management practice in Bawean Island comprised of a moderate positive association on the level of monthly income, a very strong positive association on knowledge, and a strong positive association on the attitude. The poor practices described a lack responsible ownership and are leading to dogs ubiquitously roamed that may negatively affect Bawean deer and natural environments such as increasing rabies cases in human health.

### Recommendations

1. The East Java Natural Conservation Agency Regional Office plays a lead role in preventing human-wildlife conflict caused by wildlife pests such as Javan warty pigs and long-tailed macaque in order to minimize dog population in Bawean community
2. Monitoring and control of dog population through preventing the birth of unwanted litters of puppies and euthanasia are still important and effective tools in case dog population in Bawean Island is developed
3. Community approach program such as training about dog-keeping practice and responsible ownership in Bawean Island is necessary to explain the impacts of free-roaming dogs, ensuring animal welfare and prevention of zoonotic disease through regular vaccination on dogs
4. Implementation and enforce leash law are also perceived to emphasize the responsible dog ownership in order to reduce wildlife-free-roaming dog interactions
5. Future research is encouraged to review the changing in Knowledge, Attitude, and Practice of dog owner's post-implementation of program.

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# **APPENDICES**



## Appendix 1 KAP Survey Questionnaire

Questionnaire No. : .... / .... / .... / .... / .... / ....

Enumerator : .....

Date : .....



**DEPARTMENT OF FOREST RESOURCES  
CONSERVATION AND ECOTOURISM  
FACULTY OF FORESTRY  
BOGOR AGRICULTURAL UNIVERSITY**

**KAP SURVEY QUESTIONNAIRE FOR DOG OWNERS (KNOWLEDGE,  
ATTITUDE, PRACTICE) OF DOGS' MANAGEMENT IN BAWEAN ISLAND**

**Information for respondents:**

I am Annisa, a student from Department of Forest Resources Conservation and Ecotourism, Faculty of Forestry, Bogor Agricultural University. I wish to learn about your Knowledge, Attitudes, and Practices regarding dogs' management in Bawean Island, hence I request your kind attention and time to response to the questions below. The information you provide will be used to improve dog's management practice in Bawean Island. The participation is voluntary and I wish to bring the information you need.

**Statement for respondents:**

Do you want to be interviewed?

 Yes No

If No, please leave your message below. Thank you for your assistances.

.....

**A. LOCATION**

1. Address : .....

2. District :  Sangkapura Tambak**B. IDENTITY**

1. Name : .....

2. Age : ..... Years

3. Religion : .....

4. Gender :  Male  Female

5. Education level :  Illiterate  
 Elementary school  
 Junior High School  
 Senior High School  
 Graduated/above
6. Occupation :  Labors  Govt. Employee  
 Entrepreneur  Retired  
 Etc.
7. Monthly income :  <1 million/month  
 1-3 million/month  
 >3 million/month
8. Currently, how many dogs you owned?  
 2 – 4  >4
9. How old are your dogs?  
 1 – 3 years  3 – 5 years  >5 years
10. How did you get them?  
 Hereditary  
 Given by other people  
 Found in the wild
11. How many puppies were born per litter?  
 < 3  3 – 6  > 6
12. During the last year, how many of your dogs have died?  
 1  2  > 3
13. If any, what caused of death?  
 Killed  Disease  Conflict with wildlife
14. Duration of dogs' ownership:  
 <3 years  3-5 years  >5 years
15. Have you ever received any information regarding dog's keeping?  
 Yes  No
16. If Yes, where did you receive such information?  
 Counseling  
 Electronic media  
 Magazine  
 Flyer  
 Etc.
17. Whether you need educational training for dogs' keeping practice?  
 Yes  No

**C. KNOWLEDGE****CONSERVATION OF BAWEAN DEER**

No.	Statement	Yes	No	Don't know
1.	Dogs can expose aggressive behavior against human or wildlife			
2.	Dogs are supposed to be continuously free			
3.	Dogs can prey wildlife			
4.	Bawean Deers are one of its prey in the wild			
5.	Conflict prevention of wild animal and dogs is necessary			
6.	Provide foods for dogs			

**HUMAN HEALTH MANAGEMENT**

No.	Statement	Yes	No	Don't know
1.	Rabies is transmitted by dogs			
2.	Rabies is fatal and can cause death to human and wildlife			
3.	Rabies is transmitted to human by dogs' bite			
4.	Rabies become the negative impacts to local economic and social community			
5.	Dogs do not need rabies vaccine			

**D. ATTITUDE****CONSERVATION OF BAWEAN DEER**

No.	Statement	Agree	Disagree	Indecisive
1.	Believe the best way is to keep the dogs continuously free			
2.	Believe to prevent conflict with wild animals is to keep the dogs leashed			
3.	No efforts needed to prevent conflict of wild animals – dogs			
4.	Free-roaming dogs will not against wildlife			
5.	Dogs are good pet and will never against human and wildlife			

**HUMAN HEALTH MANAGEMENT**

No.	Statement	Agree	Disagree	Indecisive
1.	Free-roaming dogs are easier to get infected to Rabies rather than pet dogs			
2.	Believe that Rabies is not transmitted to human by dogs' bite			
3.	I believe Rabies become the negative impacts to local economic and social community			
4.	Believe that rabies can be prevented by vaccination of dog			
5.	Specific treatments for dogs (vaccination, vitamin, etc.) is only given when dogs are in bad conditions.			

**E. PRACTICE****Questions:**

1. The purpose of owning dogs:

- Pets                                       For sale  
 Guard house                               Protect livestock  
 Hunt

2. How do you manage your dogs?

- Leashed                                       Unleashed  
 Leashed and Unleashed                       Etc.

3. What is the main source of food of your dogs?

- Provide food for dogs  
 Dogs allow to find their own food  
 Etc.

4. Are there expenses related to dogs' treatment?

No	Health Management	Frequency	Given by
1.	<input type="checkbox"/> Vaccination, Mention...	<input type="checkbox"/> once a year <input type="checkbox"/> once a lifetime <input type="checkbox"/> Etc. mention...	<input type="checkbox"/> Health officer <input type="checkbox"/> Veterinary <input type="checkbox"/> Oneself <input type="checkbox"/> Etc. Mention....

2.	<input type="checkbox"/> Helminthic	<input type="checkbox"/> Once every 6 months <input type="checkbox"/> Once a year <input type="checkbox"/> Once a lifetime <input type="checkbox"/> Etc. Mention...	<input type="checkbox"/> Health officer <input type="checkbox"/> Veterinary <input type="checkbox"/> Oneself <input type="checkbox"/> Etc. Mention...
3.	<input type="checkbox"/> Vitamin	<input type="checkbox"/> Once every 6 months <input type="checkbox"/> Once a year <input type="checkbox"/> Once a lifetime <input type="checkbox"/> Etc. Mention....	<input type="checkbox"/> Health officer <input type="checkbox"/> Veterinary <input type="checkbox"/> Oneself <input type="checkbox"/> Etc. Mention....
4.	<input type="checkbox"/> Castration		<input type="checkbox"/> Health officer <input type="checkbox"/> Veterinary <input type="checkbox"/> Etc. Mention....

Etc. Mention....

5. Have you ever seen wildlife?

Yes  No

6. If Yes, what are they?

Bawean deer  Long-tailed macaque  
 Javan warty pigs  Etc. Mention...

7. When you see, how would you react?

Avoid them  Chase – Attack – Kill

8. What measures do you use to protect your animals against predators?

Border  Nothing  
 Supervised  Etc. Mention....

9. During the last year, have you observed your dog's exposing aggressive behavior against human or wildlife?

Yes, Mention ...  No

10. Have you ever observed your dogs with rabies symptoms? For example; nausea, vomiting, aggression or irritability

Yes  No

11. If Yes, how would you react?

Catch and Kill the dogs  
 Catch the dogs and leashed them and report the case to nearby officer  
 Abandon the dogs but report the case to nearby officer  
 Abandon the dogs without report the case to nearby office

## Appendix 3 The responses of whole sample regarding Knowledge

NO	KNOWLEDGE											Σ
	CONSERVATION OF BAWEAN DEER						HUMAN HEALTH MANAGEMENT					
	C1_1	C1_2	C1_3	C1_4	C1_5	C1_6	C2_1	C2_2	C2_3	C2_4	C2_5	
1	2	2	2	1	2	2	2	2	1	2	2	20
2	2	2	2	1	1	2	2	1	1	1	1	16
3	2	2	1	2	1	1	1	1	1	2	2	16
4	1	1	1	1	2	2	1	1	1	1	2	14
5	1	1	1	1	2	2	1	1	1	1	1	13
6	1	1	1	1	2	2	1	1	1	1	1	13
7	1	1	1	1	1	2	1	1	2	2	2	15
8	2	1	2	1	1	1	2	1	1	1	2	15
9	2	1	2	2	2	2	2	1	1	1	2	18
10	2	2	2	1	2	1	1	1	1	1	2	16
11	2	2	2	2	1	2	2	2	1	1	2	19
12	2	2	2	1	1	2	1	1	2	1	2	17
13	2	2	1	1	1	2	2	1	1	1	2	16
14	2	1	1	2	1	2	1	1	1	1	2	15
15	1	1	2	2	2	2	1	2	1	1	2	17
16	2	1	1	1	1	2	2	1	1	1	2	15
17	2	1	2	1	2	2	2	1	1	1	2	17
18	1	1	1	2	2	2	1	1	1	1	2	15
19	1	1	2	1	1	2	1	1	1	1	2	14
20	1	1	1	2	2	2	1	1	1	1	2	15
21	2	1	2	2	2	2	1	1	1	1	1	16
22	2	1	2	1	1	2	1	1	1	1	2	15
23	2	1	1	2	1	2	1	1	1	1	2	15
24	2	1	1	1	2	2	1	1	1	2	2	16
25	2	1	1	1	2	2	1	1	1	1	2	15
26	2	1	1	1	2	2	1	1	1	1	2	15
27	1	1	1	2	2	2	1	1	1	1	2	15
28	2	1	1	2	2	2	2	2	2	1	1	18
29	1	1	1	1	1	2	1	1	1	1	1	12
30	1	1	1	1	1	2	1	1	1	1	2	13
31	2	1	2	1	1	2	1	1	1	1	1	14
32	2	1	1	1	1	2	1	1	1	1	2	14
33	2	1	1	1	1	2	1	1	1	1	1	13
34	2	1	1	1	1	2	1	1	1	1	1	13
35	1	1	1	1	1	2	1	1	1	1	2	13
36	2	1	1	1	2	2	1	1	1	1	2	15
37	1	1	1	1	1	2	1	1	1	1	2	13
38	2	1	2	1	2	2	2	2	2	1	1	18
39	1	1	2	1	2	2	1	1	1	1	1	14
40	2	1	2	1	2	2	2	1	1	1	1	16
41	2	1	1	2	1	2	2	1	1	1	2	16
42	2	1	2	1	2	2	1	1	1	1	2	16
43	1	1	2	1	1	2	1	1	1	1	2	14
44	1	1	2	2	1	2	1	1	1	1	2	15
45	2	1	2	1	1	2	1	1	1	1	1	14
46	1	1	2	2	1	2	1	1	1	1	1	14
47	2	1	2	2	1	2	1	1	1	1	1	15
48	1	1	2	2	1	2	1	1	1	1	1	14
49	2	1	2	1	1	2	1	1	1	1	1	14
50	2	1	2	1	1	2	1	1	1	1	1	14
51	1	1	2	1	1	2	1	1	1	1	1	13
52	2	1	1	2	1	2	2	1	1	2	1	16
53	1	2	1	1	1	2	2	2	2	2	1	17
54	2	2	2	1	2	2	2	2	2	2	2	21
55	1	2	2	2	2	2	2	2	2	2	2	21
56	1	2	2	2	1	2	1	1	1	1	2	16



NO	KNOWLEDGE											Σ
	CONSERVATION OF BAWEAN DEER						HUMAN HEALTH MANAGEMENT					
	C1_1	C1_2	C1_3	C1_4	C1_5	C1_6	C2_1	C2_2	C2_3	C2_4	C2_5	
57	2	1	2	2	2	2	1	1	1	1	2	17
58	1	2	2	2	1	2	1	1	1	1	2	16
59	1	1	2	2	1	2	1	1	1	1	1	14
60	1	2	2	1	1	2	1	1	1	1	1	14
61	1	1	1	1	1	1	1	1	2	1	1	12
62	1	1	2	1	1	1	1	1	2	1	2	14
63	2	2	2	1	1	2	2	1	1	1	2	17
64	2	1	1	1	1	2	1	1	1	1	1	13
65	2	1	2	2	1	1	1	1	2	1	1	15
66	2	2	2	2	1	2	2	1	1	1	1	17
67	1	1	2	2	2	1	1	1	1	1	1	14
68	1	1	2	1	1	1	1	1	1	1	1	12
69	1	1	2	1	1	2	1	1	1	1	1	13
70	1	1	2	1	1	2	1	1	1	1	1	13
71	1	1	1	2	1	1	1	1	1	1	1	12
72	2	1	2	2	1	2	1	1	1	2	1	16
73	1	1	1	2	1	2	1	1	1	1	1	13
74	2	2	2	1	1	2	2	1	1	1	1	16
75	2	1	1	2	1	2	1	1	1	1	1	14
76	2	1	2	1	1	2	1	1	1	1	1	14
77	2	1	2	1	1	2	1	1	1	1	1	14
78	2	1	2	2	1	2	1	1	1	1	1	15
79	2	1	2	2	1	2	2	2	2	2	1	19
80	1	2	2	1	1	2	1	1	1	1	1	14
81	1	1	2	1	1	2	1	1	1	1	1	13
82	1	1	2	2	1	2	1	1	1	2	1	15
83	2	2	2	1	1	2	1	1	1	1	1	15
84	2	1	1	1	1	2	1	1	1	1	1	13
85	2	1	2	2	1	2	1	1	1	1	1	15
86	2	1	2	2	2	1	2	2	2	2	1	19
87	1	1	2	2	2	2	2	2	2	2	2	20
88	1	2	2	2	2	2	2	2	2	2	2	21
89	2	2	2	2	2	2	1	1	1	2	1	18
90	1	1	1	1	1	1	1	1	1	1	1	11
91	2	1	1	2	1	1	1	1	2	1	1	14
92	1	1	1	2	1	1	1	1	2	1	1	13
93	2	2	2	1	1	2	1	1	2	1	1	16
94	2	1	1	1	1	2	1	1	2	1	1	14
95	1	1	2	2	1	2	1	1	2	1	1	15
96	2	1	1	1	1	2	2	2	2	1	1	16
97	2	1	1	1	1	2	1	1	2	1	1	14
98	1	2	2	1	1	2	1	1	1	1	1	14
99	2	1	2	2	2	2	1	1	1	1	1	16
100	2	1	2	2	1	1	2	2	2	1	1	17
101	1	1	2	1	1	1	2	2	2	1	1	15
102	2	1	2	1	1	1	1	1	1	1	1	13
103	2	1	2	1	1	2	1	1	1	1	1	14
104	1	2	2	1	1	2	1	1	1	1	1	14
105	2	1	2	1	1	2	1	1	1	1	1	14
106	2	1	2	1	1	2	1	1	1	1	1	14
107	1	1	1	1	1	1	1	1	1	1	1	11
108	1	1	2	2	1	2	1	1	1	1	1	14
109	1	2	1	1	1	2	1	1	1	1	1	13
110	1	1	2	1	1	2	1	1	1	1	1	13
111	1	1	1	1	1	2	1	1	1	1	1	12
112	2	1	2	1	1	2	1	1	1	1	1	14
113	2	2	1	2	1	2	1	1	1	1	1	15
114	1	2	1	1	1	2	1	1	1	1	1	13



NO	KNOWLEDGE											Σ
	CONSERVATION OF BAWEAN DEER						HUMAN HEALTH MANAGEMENT					
	C1_1	C1_2	C1_3	C1_4	C1_5	C1_6	C2_1	C2_2	C2_3	C2_4	C2_5	
173	2	1	2	1	1	2	1	1	1	1	1	14
174	2	1	1	1	1	2	1	1	1	1	1	13
175	2	1	1	1	1	2	1	1	1	2	1	14
176	2	1	2	1	1	2	1	1	1	1	1	14
177	1	1	2	2	1	2	1	1	1	1	1	14
178	2	2	1	2	1	2	1	1	1	1	1	15
179	2	1	2	1	1	2	2	2	2	1	1	17
180	2	1	2	1	1	2	1	1	1	1	1	14
181	1	2	1	1	1	2	1	1	2	1	1	14
182	2	1	1	1	1	2	1	1	1	1	1	13
183	1	1	1	1	1	2	1	1	1	1	2	13
184	1	2	2	1	1	1	1	1	1	1	1	13
185	2	1	1	1	1	2	1	1	1	1	1	13
186	1	1	1	2	1	1	1	1	1	1	1	12
187	1	1	2	2	1	2	1	1	1	1	1	14
188	1	1	1	2	1	2	1	1	1	1	1	13
189	2	1	2	2	1	2	2	2	2	1	2	19
190	2	1	1	1	1	2	1	1	1	1	1	13
191	2	1	2	2	1	1	1	1	1	1	1	14
192	1	1	2	2	1	2	1	1	1	1	1	14
193	1	1	2	2	1	1	1	1	1	1	1	13
194	2	1	2	2	2	2	1	1	1	1	1	16
195	1	1	1	1	1	1	1	1	1	1	1	11
196	2	1	2	2	1	2	1	1	1	1	1	15
197	2	1	2	2	1	2	1	1	1	1	1	15
198	1	1	2	2	1	1	1	1	1	1	1	13
199	2	1	2	1	1	2	1	1	1	1	1	14
200	2	1	2	2	1	2	1	1	1	1	1	15

## Appendix 4 The responses of whole sample regarding Attitude

NO	ATTITUDE										$\Sigma$
	CONSERVATION OF BAWEAN DEER					HUMAN HEALTH MANAGEMENT					
	D1_1	D1_2	D1_3	D1_4	D1_5	D2_1	D2_2	D2_3	D2_4	D2_5	
1	1	3	3	1	2	2	3	3	3	3	24
2	1	2	2	2	3	3	1	1	3	2	20
3	1	1	1	1	2	3	1	1	1	3	15
4	1	1	3	1	3	2	2	2	2	3	20
5	1	1	1	1	1	2	2	2	2	3	16
6	1	1	1	1	2	2	3	2	2	2	17
7	1	1	1	1	2	2	2	2	3	3	18
8	1	2	2	1	1	3	2	2	2	3	19
9	1	1	1	1	1	3	2	1	3	3	17
10	1	1	1	1	2	2	2	2	3	3	18
11	1	1	1	1	1	2	2	2	3	3	17
12	1	2	1	3	2	2	2	2	3	3	21
13	1	1	1	1	3	2	2	2	2	2	17
14	1	1	2	2	3	2	2	2	2	3	20
15	1	3	3	3	1	3	2	2	3	3	24
16	1	2	2	1	1	3	2	1	3	3	19
17	1	3	3	1	1	3	2	2	3	2	21
18	1	1	1	1	1	2	1	2	3	3	16
19	3	3	1	1	1	2	1	2	3	3	20
20	2	1	1	1	2	2	2	2	3	3	19
21	1	3	3	1	1	1	2	2	3	1	18
22	2	1	1	1	1	2	2	2	3	3	18
23	2	1	1	1	1	1	2	2	3	3	17
24	2	1	3	1	1	2	2	2	2	1	17
25	1	1	1	1	1	2	2	2	3	3	17
26	1	1	1	1	1	2	2	2	3	3	17
27	1	1	1	1	1	2	2	2	3	3	17
28	1	3	1	1	1	2	1	2	3	1	16
29	1	1	1	1	1	2	2	2	3	3	17
30	1	2	1	1	1	2	2	2	3	3	18
31	1	1	1	1	1	2	2	2	2	2	15
32	1	2	2	2	1	2	2	2	3	1	18
33	1	1	1	1	2	2	2	2	2	1	15
34	1	1	3	1	1	2	2	2	3	2	18
35	1	1	1	1	1	2	2	2	3	3	17
36	1	1	1	2	2	1	2	2	3	3	18
37	1	1	1	1	1	2	2	2	3	3	17
38	2	1	3	1	1	3	2	2	3	3	21
39	1	3	3	1	1	2	2	2	3	3	21
40	1	3	1	1	1	2	2	2	3	1	17
41	1	1	1	1	1	2	2	2	3	3	17
42	1	1	1	1	1	2	2	2	3	1	15
43	1	1	1	1	3	2	2	2	3	3	19
44	1	1	1	1	1	2	2	2	3	2	16
45	1	1	1	1	1	2	2	2	3	2	16
46	1	1	1	1	1	2	2	2	2	1	14
47	1	1	1	1	1	2	2	2	3	1	15
48	1	1	1	1	1	2	2	2	2	1	14
49	1	1	1	1	1	2	2	2	3	2	16
50	1	3	1	1	1	1	1	1	3	2	15
51	1	1	1	1	1	2	2	2	2	1	14
52	1	3	1	3	1	2	1	1	3	3	19
53	3	3	1	3	1	3	1	3	2	1	21
54	3	3	3	1	1	1	1	3	3	3	22
55	3	3	3	1	1	2	1	3	3	3	23
56	2	3	2	3	1	3	3	3	2	1	23

NO	ATTITUDE										$\Sigma$
	CONSERVATION OF BAWEAN DEER					HUMAN HEALTH MANAGEMENT					
	D1_1	D1_2	D1_3	D1_4	D1_5	D2_1	D2_2	D2_3	D2_4	D2_5	
57	3	3	3	1	1	2	1	2	3	1	20
58	3	3	3	3	1	2	2	2	2	3	24
59	1	2	1	1	1	2	2	2	2	1	15
60	1	3	3	1	1	2	2	2	2	1	18
61	1	2	1	1	1	2	2	2	2	3	17
62	1	3	3	1	1	2	3	1	3	1	19
63	3	3	3	3	1	2	2	1	3	1	22
64	1	2	1	1	1	2	1	1	3	3	16
65	1	2	1	1	1	2	1	1	3	2	15
66	1	2	1	1	1	3	1	1	2	2	15
67	1	2	1	2	3	2	2	2	3	2	20
68	1	2	1	3	1	2	2	2	3	1	18
69	1	2	1	1	1	2	2	2	3	1	16
70	1	1	1	1	1	2	2	2	3	1	15
71	1	1	1	1	1	2	2	2	2	1	14
72	1	1	3	3	1	2	2	2	3	1	19
73	1	1	1	1	1	2	2	2	3	1	15
74	3	3	3	1	1	2	2	2	3	1	21
75	1	3	3	1	1	2	2	2	3	1	19
76	3	3	1	1	1	2	2	2	3	1	19
77	1	1	3	1	1	2	2	2	3	1	17
78	1	2	1	2	2	2	2	2	3	1	18
79	3	3	3	1	1	2	2	2	3	1	21
80	3	3	1	1	1	2	2	2	3	1	19
81	1	1	1	1	1	2	2	2	2	1	14
82	3	1	1	1	3	2	2	2	2	3	20
83	1	3	3	3	1	2	2	2	3	1	21
84	1	1	1	1	1	2	2	2	3	1	15
85	2	1	3	1	1	2	2	2	2	3	19
86	3	3	3	3	3	3	3	3	3	1	28
87	1	1	3	3	3	3	3	3	3	3	26
88	3	3	3	1	1	3	3	3	3	2	25
89	3	3	3	3	1	3	2	3	3	3	27
90	1	1	1	1	1	3	1	2	2	1	14
91	1	1	1	1	1	2	3	2	3	1	16
92	1	1	1	1	1	3	3	2	3	1	17
93	3	3	3	1	1	2	2	2	3	1	21
94	1	1	1	1	1	2	2	3	3	3	18
95	1	1	1	1	1	2	2	2	3	3	17
96	1	3	3	3	1	3	1	3	3	3	24
97	1	1	1	1	1	2	1	2	3	1	14
98	1	1	1	1	3	2	2	2	1	1	15
99	3	3	3	3	1	3	2	2	2	1	23
100	1	2	1	1	1	2	2	2	3	1	16
101	1	1	1	1	1	2	2	2	3	1	15
102	2	2	3	2	3	2	2	2	2	2	22
103	1	1	1	1	1	2	2	2	2	2	15
104	1	1	1	1	1	2	2	2	2	1	14
105	1	2	2	2	1	2	2	2	2	2	18
106	1	3	3	1	1	2	2	2	2	2	19
107	1	1	1	1	1	2	2	2	2	2	15
108	1	3	3	1	1	2	2	1	3	1	18
109	1	3	3	1	1	2	2	2	2	2	19
110	1	1	1	1	1	2	2	2	2	1	14
111	1	3	1	1	1	2	2	2	2	2	17
112	1	2	1	1	1	2	2	2	2	1	15
113	1	3	3	1	1	2	2	2	2	1	18
114	1	1	1	3	1	2	2	2	3	1	17

NO	ATTITUDE										$\Sigma$
	CONSERVATION OF BAWEAN DEER					HUMAN HEALTH MANAGEMENT					
	D1_1	D1_2	D1_3	D1_4	D1_5	D2_1	D2_2	D2_3	D2_4	D2_5	
115	3	3	3	3	1	2	2	2	2	1	22
116	1	1	1	1	1	2	2	2	3	1	15
117	1	3	3	2	1	3	3	3	3	1	23
118	1	2	1	1	1	2	2	2	3	1	16
119	1	2	1	1	1	2	2	2	3	1	16
120	1	2	1	1	1	2	2	2	3	1	16
121	1	2	1	1	1	2	2	2	3	1	16
122	1	2	1	1	1	2	2	2	3	1	16
123	1	2	1	1	1	2	3	2	3	1	17
124	1	1	1	1	1	2	2	2	3	1	15
125	1	1	1	1	1	2	2	2	3	1	15
126	1	1	1	1	1	2	2	2	3	1	15
127	1	2	1	1	1	2	2	2	2	1	15
128	1	1	1	1	1	2	2	2	3	1	15
129	1	3	3	1	1	3	1	1	3	1	18
130	3	3	3	3	3	2	1	3	3	3	27
131	1	1	1	1	1	2	2	2	3	1	15
132	1	3	3	1	1	2	2	2	3	1	19
133	1	2	2	1	1	2	2	2	3	1	17
134	1	1	1	1	1	2	2	2	3	1	15
135	1	3	1	1	1	2	2	2	3	1	17
136	1	3	1	3	1	2	2	2	3	1	19
137	1	1	1	1	1	3	2	1	3	1	15
138	1	1	1	1	1	2	2	2	2	1	14
139	1	1	1	1	1	2	2	2	3	1	15
140	1	1	1	1	1	2	2	2	3	1	15
141	1	3	3	3	1	3	3	3	3	1	24
142	1	2	2	1	1	2	2	2	2	2	17
143	1	2	2	1	1	3	1	2	3	3	19
144	1	1	1	1	1	3	2	2	3	1	16
145	1	1	1	1	1	2	2	2	3	3	17
146	3	3	3	3	1	3	1	2	3	1	23
147	1	1	1	1	1	2	3	1	1	1	13
148	3	3	3	3	1	2	2	2	2	1	22
149	1	1	1	1	1	2	2	2	3	2	16
150	1	1	1	1	1	2	2	2	2	1	14
151	3	3	3	1	1	2	2	2	2	1	20
152	3	3	1	1	1	2	2	2	2	2	19
153	3	3	3	1	1	2	2	2	2	1	20
154	1	3	1	1	1	2	2	2	1	2	16
155	3	3	1	1	1	2	2	2	1	1	17
156	3	3	3	1	1	2	2	2	2	1	20
157	1	1	1	1	1	2	2	2	2	1	14
158	3	3	3	3	1	3	3	3	3	2	27
159	3	1	1	1	1	2	1	1	3	1	15
160	3	3	1	1	1	3	1	1	3	3	20
161	3	3	1	1	1	3	1	3	3	1	20
162	3	3	3	1	1	2	2	2	2	2	21
163	3	3	1	1	1	3	1	1	2	2	18
164	1	1	1	1	1	2	2	2	2	1	14
165	1	2	1	1	1	2	2	1	1	1	13
166	1	1	1	1	1	2	2	2	2	2	15
167	1	1	1	1	1	2	3	2	2	1	15
168	1	1	1	1	1	1	3	2	1	1	13
169	1	1	1	1	1	2	2	2	3	2	16
170	1	1	1	1	1	2	2	2	3	1	15
171	1	1	1	1	1	2	2	2	2	1	14
172	1	1	1	1	1	2	2	2	3	1	15

NO	ATTITUDE										$\Sigma$
	CONSERVATION OF BAWEAN DEER					HUMAN HEALTH MANAGEMENT					
	D1_1	D1_2	D1_3	D1_4	D1_5	D2_1	D2_2	D2_3	D2_4	D2_5	
173	1	3	3	1	1	2	2	2	3	1	19
174	1	1	1	1	1	2	1	2	3	1	14
177	1	1	1	1	1	2	2	2	2	1	14
178	1	1	1	1	1	2	3	1	1	3	15
179	1	1	1	1	1	2	2	1	2	1	13
180	1	1	1	1	1	1	1	2	2	1	12
181	1	1	1	1	1	1	1	2	2	2	13
182	1	1	1	1	1	2	3	1	3	1	15
183	1	1	1	1	1	2	1	2	3	3	16
184	1	1	1	1	1	2	2	2	2	2	15
185	1	1	1	1	1	2	2	2	2	2	15
186	1	1	1	1	1	2	2	2	2	2	15
187	1	1	1	1	1	2	2	2	2	2	15
188	1	1	1	1	1	2	2	2	2	1	14
189	1	3	1	1	1	3	3	1	3	1	18
190	1	1	1	1	1	2	2	1	1	1	12
191	1	1	1	1	1	2	2	2	2	2	15
192	1	1	1	1	1	2	2	2	2	2	15
193	1	3	1	1	1	2	2	2	2	2	17
194	3	1	3	1	1	2	2	2	2	2	19
195	1	1	1	1	1	2	2	2	2	2	15
196	1	1	1	1	1	2	2	2	2	2	15
197	1	1	1	1	1	2	2	2	2	2	15
198	1	1	1	1	1	3	1	2	3	2	16
199	1	3	2	3	1	2	2	2	2	2	20
200	1	3	2	2	1	2	2	2	2	1	18

## Appendix 5 The responses of whole sample regarding Practices

NO	PRACTICE								$\Sigma$
	E2	E3	E4	E5	E7	E8	E9	E10	
1	3	2	2	2	1	3	1	1	15
2	1	2	1	2	1	1	1	2	11
3	1	1	1	2	1	1	2	2	11
4	1	1	1	1	2	1	2	2	11
5	1	1	1	1	2	1	2	2	11
6	1	2	1	2	1	1	2	2	12
7	1	1	1	2	1	1	1	2	10
8	2	2	1	2	2	2	2	2	15
9	2	2	2	2	1	1	2	2	14
10	2	2	1	2	1	2	2	2	14
11	2	2	2	2	2	1	2	2	15
12	2	2	1	2	2	1	2	2	14
13	1	2	1	2	2	1	2	2	13
14	1	2	2	2	2	1	1	2	13
15	1	2	1	2	1	1	1	2	11
16	1	2	1	2	2	1	1	2	12
17	1	2	1	2	2	1	2	2	13
18	1	2	1	2	2	1	2	2	13
19	1	2	1	2	2	1	2	2	13
20	1	2	1	2	2	1	2	2	13
21	1	2	1	2	1	2	2	2	13
22	1	2	1	2	2	1	2	2	13
23	2	2	1	2	1	1	2	2	13
24	2	2	1	2	1	1	2	2	13
25	2	2	1	2	2	1	2	2	14
26	2	2	1	2	1	1	2	2	13
27	2	2	1	2	1	1	1	2	12
28	2	2	1	2	2	1	1	2	13
29	2	2	1	2	2	1	2	2	14
30	2	2	1	2	2	1	2	2	14
31	1	2	1	2	2	1	2	2	13
32	1	2	1	2	2	1	2	2	13
33	1	2	1	2	2	1	2	2	13
34	1	2	1	2	2	1	1	2	12
35	1	2	1	2	2	1	2	2	13
36	1	2	1	2	2	1	2	2	13
37	1	2	1	2	2	1	2	2	13
38	1	2	1	2	2	1	1	2	12
39	1	2	1	2	2	1	1	2	12
40	1	2	1	2	2	3	1	2	14
41	1	2	1	2	2	1	1	2	12
42	1	2	1	2	2	2	1	2	13
43	1	2	1	2	2	1	1	2	12
44	1	2	1	2	2	1	1	2	12
45	1	2	1	2	2	1	1	2	12
46	1	2	1	2	2	1	1	2	12
47	1	2	1	2	2	1	1	2	12
48	1	2	1	2	2	1	2	2	13
49	1	2	1	2	2	1	1	2	12
50	1	2	1	2	1	1	1	2	11
51	2	2	1	2	2	1	1	2	13
52	1	1	1	2	2	1	2	2	12
53	2	2	1	2	2	2	1	2	14
54	2	2	1	2	2	3	1	2	15
55	2	2	1	2	2	3	1	2	15
56	2	2	1	2	2	1	2	2	14
57	2	2	1	2	2	2	1	2	14



NO	PRACTICE								$\Sigma$
	E2	E3	E4	E5	E7	E8	E9	E10	
58	2	2	1	2	2	2	2	2	15
60	2	2	1	2	2	1	2	2	14
61	2	1	1	2	2	1	1	2	12
62	2	2	1	2	2	1	1	2	13
63	2	2	1	2	2	2	1	2	14
64	1	1	1	2	2	1	1	2	11
65	1	1	1	2	1	1	1	2	10
66	1	2	1	2	2	3	1	2	14
67	1	1	1	2	1	1	2	2	11
68	1	1	1	2	2	1	2	2	12
69	1	2	1	2	2	1	1	2	12
70	1	2	1	2	2	1	1	2	12
71	1	1	1	2	2	1	2	2	12
72	2	2	1	2	2	1	1	2	13
73	1	2	1	2	2	1	1	2	12
74	1	2	1	2	2	1	1	2	12
75	2	2	1	2	2	1	1	2	13
76	1	2	1	2	2	1	1	2	12
77	2	1	1	2	2	1	2	2	13
78	1	2	1	2	2	1	1	2	12
79	1	2	1	2	2	1	1	2	12
80	1	2	1	2	2	1	1	2	12
81	1	2	1	2	2	1	2	2	13
82	1	2	1	2	2	1	1	2	12
83	2	2	1	2	2	1	1	2	13
84	1	2	1	2	2	1	2	2	13
85	1	2	1	2	2	1	1	2	12
86	2	1	1	2	2	3	1	2	14
87	2	2	2	2	2	3	1	2	16
88	2	2	1	2	2	2	1	2	14
89	1	2	1	2	1	1	1	2	11
90	1	1	1	2	2	1	1	2	11
91	1	1	1	2	2	1	1	2	11
92	1	1	1	2	2	1	1	2	11
93	2	2	1	2	1	1	1	2	12
94	1	2	1	2	1	1	1	2	11
95	1	2	1	2	2	1	1	2	12
96	2	2	1	2	2	1	1	2	13
97	2	1	1	2	2	1	1	2	12
98	1	2	1	2	2	1	1	2	12
99	2	2	1	2	2	1	1	2	13
100	2	2	1	2	2	1	1	2	13
101	1	2	1	2	2	1	2	2	13
102	2	2	1	2	2	1	2	2	14
103	2	2	1	2	2	1	2	2	14
104	2	2	1	2	2	1	1	2	13
105	2	2	1	2	2	1	1	2	13
106	2	2	1	2	2	1	1	2	13
107	1	2	1	2	2	1	1	2	12
108	2	2	1	2	2	1	1	2	13
109	2	2	1	2	2	1	1	2	13
110	2	2	1	2	2	1	1	2	13
111	2	2	1	2	2	1	1	2	13
112	2	2	1	2	2	1	1	2	13
113	2	2	1	2	2	1	1	2	13
114	2	2	1	2	2	1	1	2	13
115	2	2	1	2	2	1	1	2	13
116	2	2	1	2	2	1	1	2	13
117	2	2	1	2	2	2	2	2	15

NO	PRACTICE								$\Sigma$
	E2	E3	E4	E5	E7	E8	E9	E10	
118	1	2	1	2	2	2	2	2	14
119	1	2	1	2	2	1	1	2	12
120	1	2	1	2	2	1	1	2	12
121	2	2	1	2	2	1	1	2	13
122	1	2	1	2	2	1	1	2	12
123	1	2	1	2	2	1	1	2	12
124	1	2	1	2	2	1	1	2	12
125	1	2	1	2	2	1	1	2	12
126	1	2	1	2	2	1	1	2	12
127	1	2	1	2	2	1	1	2	12
128	1	2	1	2	2	2	1	2	13
129	1	2	1	2	2	2	1	2	13
130	1	1	1	2	2	3	1	2	13
131	1	2	1	2	2	1	1	2	12
132	2	2	1	2	1	3	1	2	14
133	1	2	1	2	1	3	1	2	13
134	1	2	1	2	2	1	2	2	13
135	1	2	1	2	2	1	2	2	13
136	1	2	1	2	2	1	1	2	12
137	1	2	1	2	2	1	1	2	12
138	1	2	1	2	2	1	2	2	13
139	1	2	1	2	2	1	2	2	13
140	1	2	1	2	2	1	1	2	12
141	2	2	1	2	2	2	1	2	14
142	1	2	1	2	2	1	1	2	12
143	1	2	1	2	2	3	1	2	14
144	2	2	1	2	2	3	1	2	15
145	1	2	1	2	2	1	1	2	12
146	2	2	1	2	2	1	1	2	13
147	1	2	1	2	2	1	1	2	12
148	2	2	1	2	2	2	1	2	14
149	1	2	1	2	2	1	1	2	12
150	2	2	1	2	2	1	1	2	13
151	2	2	1	2	2	2	1	2	14
152	2	2	1	2	2	1	1	2	13
153	2	2	1	2	1	2	1	2	13
154	1	2	1	2	2	1	1	2	12
155	2	2	1	2	2	1	1	2	13
156	2	2	1	2	2	1	2	2	14
157	1	2	1	2	1	1	1	2	11
158	2	2	1	2	2	1	2	1	13
159	2	2	1	2	2	1	1	2	13
160	2	2	1	2	2	1	1	2	13
161	2	2	1	2	2	2	1	2	14
162	1	2	1	2	2	1	2	2	13
163	1	2	1	2	2	1	2	2	13
164	1	2	1	2	1	1	1	2	11
165	1	2	1	2	2	1	2	2	13
166	1	2	1	2	1	1	1	2	11
167	1	2	1	2	1	1	2	2	12
168	1	2	1	2	2	1	2	2	13
169	1	2	1	2	2	1	2	2	13
170	1	2	1	2	1	1	2	2	12
171	1	2	1	2	1	1	2	2	12
172	1	2	1	2	2	1	2	2	13
173	1	2	1	2	1	1	2	2	12
174	1	2	1	2	2	1	2	2	13
175	1	1	1	2	2	1	2	2	12
176	1	2	1	2	2	1	1	2	12

NO	PRACTICE								$\Sigma$
	E2	E3	E4	E5	E7	E8	E9	E10	
177	1	1	1	2	2	1	1	2	11
178	1	2	1	2	2	1	1	2	12
179	1	2	1	2	2	1	1	2	12
180	1	1	1	2	2	1	1	2	11
181	1	2	1	2	2	1	1	2	12
182	1	2	1	2	2	1	2	2	13
183	1	2	1	2	2	1	1	2	12
184	1	2	1	2	2	1	1	2	12
185	1	2	1	2	2	1	2	2	13
186	1	1	1	2	2	1	1	2	11
187	1	2	1	2	2	1	1	2	12
188	1	2	1	2	2	1	1	2	12
189	1	2	1	2	2	1	1	2	12
190	1	2	1	2	2	1	1	2	12
191	1	1	1	2	2	1	2	2	12
192	2	1	1	2	2	1	1	2	12
193	2	2	1	2	2	1	1	2	13
194	2	2	1	2	1	1	1	2	12
195	1	1	1	2	2	1	1	2	11
196	1	2	1	2	2	1	1	2	12
197	2	2	1	2	2	1	1	2	13
198	1	1	1	2	2	1	1	2	11
199	2	2	1	2	2	1	1	2	13
200	2	2	1	2	2	2	1	2	14

Appendix 6 Documentation



Figure 1 Bawean deer (*Axis kuhlii*)



Figure 4 Bawean deer on camera trap



Figure 2 Free-roaming dogs (*Canis lupus familiaris*)



Figure 5 Free-roaming dogs on camera trap



Figure 3 Camera trap installation



Figure 6 KAP survey

## **AUTHOR BIOGRAPHY**

The author was born in Pekanbaru, Riau on June 19, 1996 as the only daughter of three children to Haldi Akmal and Syofniar. In the year of 2014, the author had graduated from SMA Negeri 6 Pekanbaru. During the time in Senior High School, the author had chance to travel abroad and experienced the Australian education system at the Castlemaine High School Victoria. She had been nominated as Outstanding Culture for Youth of Indonesian Zapien Melayu. Through the SNMPTN system in 2014, the author had been accepted into Department of Forest Resources Conservation and Ecotourism, Bogor Agricultural University (IPB). During her time at IPB, the author had been actively participated as member of Dormitory Linguistic Club and Head Commission of Public Relation 2016/2017 of IFSA Local Committee IPB (International Forestry Students' Association). Throughout her time as a student and member of organizations, the author had been represented IPB abroad as one of the delegates to participate in Summer Course on Tropical Agriculture 2017 in Thailand. She learned the basic knowledge of agriculture and management of natural resources including fishery, soil, water, forestry and environment. In the late 2017, the author was also selected and represented IFSA LC IPB for the 27<sup>th</sup> session of Asia-Pacific Forestry Commission in Colombo, Sri Lanka. The technical forum for countries to discuss and address forest issues on a regional basis, which was established by Food and Agriculture Organization (FAO) of the United Nations. After that, the author had been represented IFSA to Bonn Germany as one of the Youth in Landscape Initiatives (YIL); The initiative of young people who have committed to living the landscapes philosophy in collaboration with Young Professionals for Agriculture Development (YPARD) and the Global Agroecology Alliance (GAEA) together participated in the Global Landscape Forum 2017. Moreover, she had also been participated to several meetings as Youth Rapporteur at the Global Landscape Forum: Peatlands Matter in Jakarta and the 3<sup>rd</sup> Asia-Pacific Rainforest Summit in Yogyakarta, Indonesia. All through her time at Bogor Agricultural University, the author was filled with challenges – personally and professionally but she would never stop to stretch herself to the limit as she always does. She begins all journeys with love and light. Praying that the resolutions transform reality.