International Journal of Education and Social Science Research

ISSN 2581-5148

Vol. 2, No. 02; 2019

EVALUATING THE EFFECTIVENESS OF WILDLIFE EDUCATIONAL PROGRAM ON KNOWLEDGE, ATTITUDE AND AWARENESS AMONG THREE SELECTED SECONDARY SCHOOL STUDENTS IN PERAK, MALAYSIA

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ABSTRACT

Habitat loss and wildlife encroachments have been the major factors diminishing the wildlife populations globally. Wildlife conservationists around the world are working hard to sustain wildlife populations through various possible ways, and one of themis through cultivating the awareness among young generation especially school children. In this study, we analysed the level of knowledge, awareness and attitude about wildlife among three selected secondary school students in Perak, Malaysia through a self-administered survey. The analysis was separated into two parts; pre-test and post-test, which was before and after mini education program called 'Care for Wild Animal' was conducted. Results from this study showed lower secondary school students (aged 13 years old) have lower level of knowledge and awareness on wildlife compared to upper secondary students (aged 16 years old). Male students had more knowledge and awareness towards wildlife and the conservations compared to female student who were culturally limited to external exposure. We believe that limited details of wildlife education in school syllabus could be the reason for the difference. Therefore, incorporating more information or a specific chapter on wildlife education and conservation starts from elementary school level will benefit the environment and the future of wildlife in our Malayan ecosystem and to produce nature loving generations.

KEYWORDS: wildlife education, awareness, attitude, knowledge, secondary school, self-administered survey

INTRODUCTION

Wildlife are earth's main asset and crucial for our ecosystem; nevertheless, many fail to realise their importance (Oldfield, 2003). Habitat loss has been the major factor for the diminishing wildlife population globally (Pereira et al., 2010; Barnosky et al., 2012). The main cause is due to human related activities such as deforestation, agriculture fragmentation apart from illegal hunting and trade (Hansen et al., 2013). Wild animals are being hunted to meet the demands for their fur, tusks, horn, antlers and other body parts (Arumugam&Annavi, 2018). Illegal hunting also happens when the wild animal damages human agricultural crop (Hedges et al., 2005).

To date, many wildlife conservationists around the world are working hard to sustain the wildlife population through various possible ways (Braverman, 2014).Wildlife conservation however, is highly depended on knowledge, attitude and awareness of public that needs serious attention to make the effort successful (Morgan &Gramann, 1989; Milfont&Duckitt, 2010; Tonin&Lucaroni, 2017).

ISSN 2581-5148

Vol. 2, No. 02; 2019

Many studies suggested that conservational education is essential and should be cultivated right from an early age (Morgan &Gramann, 1989; Dimopoulos et al., 2008). Environmental education (also compromised wildlife education and conservation) in many countries had shown positive increment in the children's knowledge, awareness and attitude using pre-test and post-test surveys (Vaughan et al., 2003; Dimopoulos et al., 2008; Erdogan, 2011; Borchers, et al., 2014).

In Malaysia, there is a lack of concern on whether our education system puts sufficient emphasis on environmental or wildlife education in primary or secondary schools to create a nature loving generation. Therefore, in this study we assessed the level of knowledge, awareness and attitude of secondary school students towards wildlife education as a pre-test survey. We later conducted a mini programme called 'Care for Wild Animal' to educate the school students on wildlife conservation and conducted a post-test survey to evaluate the effectiveness of our program.

Methodology

Study area

This study was conducted at three selected schools nearby one of the protected area in Malaysia; Batu Gajah Bird Reserve or also known as Kinta Nature Park (4°25'19. 68"N, 101° 3'32.38"E). The selected schools were SMK TohInderaWangsa Ahmad (4°27'43.93"N, 101° 2'35.14"E), SMK Sultan Yussuf (4°28'35.45"N, 101° 2'17.57"E) and SMK St. Bernadette Convent (4°29'6.73"N, 101° 2'5.85"E). The distance between SMK TohcInderaWangsa Ahmad, SMK Sultan Yussuf and SMK St. Bernadette Convent to Batu Gajah Bird Reserve were 5.7km, 7.2km and 8.3km respectively (Figure 1).

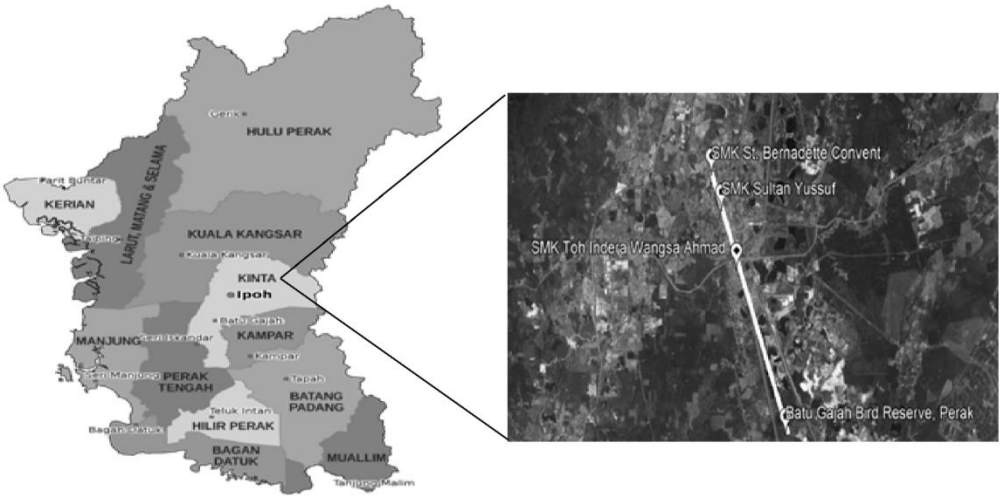

Figure 1: The location of the school from Batu Gajah Bird Reserve, Perak.

Sampling procedure

A total of 300 students from lower secondary (form one, age = 13) and upper secondary (form four, age = 16) levels comprised of 100 males and 200 females had filled in the questionnaires. All the students were placed in their respective school hall or computer laboratory. Before we introduced the mini program named 'Care for Wild Animal', the students were asked to write their answers in the questionnaires and return to the enumerator. Then we conducted the mini program, first by presenting information related to wild animals such as their distribution, ecological importance, the threats and conservation status through two-way interactive power point slide presentation and next by showing a short video aiming to increase their knowledge, awareness and attitude towards the wildlife. The students then were asked to answer the same questionnaires after the program. We spent an average of three hours to complete the survey in each school.

The questionnaires in the survey were designed in multiple-choice questions, fill in the blanks, yes/no, agree/not agree options prepared in bilingual (Malay and English). Students' background information such as age, gender, place of birth (within Perak state or other state), place of residence (rural or urban area) and parents background (education and occupation) were also obtained through this survey (Table 1). The questions on wildlife were developed to suit the age group of the students (Appendix) and were divided into three main sections to test the students' level of knowledge, awareness and attitude on wildlife. The knowledge section consists of questions pertaining to basic terms of wildlife, difference between domestic and wild animals; awareness section consists of students' awareness on the current status and threats faced by the wildlife; attitude section consists of students' opinions based on exploitation of natural resources and consequence to the wildlife and humans. The questionnaires were validated by using the responses from 30 randomly selected undergraduate students from Universiti Putra Malaysia who are taking Biology as their major course. Cronbach's alpha was found to be 0.70 for all three sections using IBM SPSS (Statistical Package for Social Science) software (version 23).

Data analysis

All statistical analyses were run in R Statistical Package Version 3.3.2. For the first part, we fitted generalised linear mixed-effects models using the glmer function in lme4 package (Bates et al., 2016) and model averaging based on information criteria, AICc (Akaike's Information Criterion; (Burnham & Anderson, 2002) in MuMIn package (Barto´n, 2016). As parental educational and occupation are also important predictors of children's educational and behavioral outcomes during their adult phase(Kalff et al., 2001; Dubow et al., 2009), we also included the role of parents as one of our variables in this study. The fixed effects were the students' background information (school, academic level, gender, place of birth, grown up place, father's education and occupation, and mother's education and occupation) while the Y- axis represents the scores (1 for correct or positive answer otherwise 0) from the survey. Student's identity was included as random effects in all models to control individual-specific variation. By using an information-theoretic (IT) approach to select sets of plausible models we were able to estimate the overall importance of each fixed effect (Burnham

&Anderson, 2011). Then the models were ranked by their AICc value and we considered the top model to be the only plausible model if model rank (ΔAICc) was ≤ 7. 'Average method' (averaged over all plausible models to estimate model-averaged parameters) was used (Burnham & Anderson, 2002). Followed by the calculation of 95% confidence interval for model-averaged parameter estimates using the model.avg function in R. The relative importance of each fixed effects were calculated as the total ω of all plausible models that included the fixed effects of interest. For the second part, we compared the result of the survey before and after (pre and post-test) our program to identify whether our program had successfully brought a positive impact in students' knowledge, awareness and attitude towards wildlife by using ANOVA test. We considered the program was successful if p-value <0.05.

Table 1: Student's background information used in the study retrieved from questionnaire forms

Background information		**SMK TohInderaWangsa Ahmad**	**SMK St. Bernadette Convent**	**SMK SULTAN YUSSUF**
Gender	Male	51	0	57
	Female	49	100	43
Academic level	Lower Secondary	50	50	50
	Upper Secondary	50	50	50
Place of birth	Perak	84	86	83
	Other than Perak	16	14	17
Grown up place	Urban	42	100	72
	Rural	58	0	28
Mother's education level	Primary/Secondary	81	90	64
	Tertiary	19	10	36
Father's education level	Primary/Secondary	75	87	55
	Tertiary	25	13	45
Mother's occupation	Professional	18	25	39
	Non-professional	82	75	61
Father's occupation	Professional	23	23	46
	Non-professional	77	77	54

RESULTS

Pre-test on knowledge, awareness and attitude towards wildlife

Based on the model average table, different academic level had the highest relative variable importance with 1.00 and it did not overlap zero (Table 2A). Thus, showing upper secondary students had more knowledge towards the wildlife compared to lower secondary students (Figure 2a). Similarly, result showed the level of awareness for the survey was higher in upper secondary

students compared to lower secondary student with second highest relative variable importance of 0.80 and it did not overlap zero (Table 2B, figure 2b). Gender was also found to be a significant factor on wildlife knowledge and awareness with highest relative importance of 0.74 and 0.92, respectively and did not overlap zero (Table 2A and 2B). It showed that male students had more knowledge and awareness towards wildlife compared to female students (Figure 3). Attitude towards wildlife did not affect by any tested parameters (Table 2C). Neither student's school, place of birth, place of residence nor parents' occupation and education had been contributing factors on students' knowledge, awareness and attitude towards wildlife.

Table 2: Model-averaged parameter estimates over all submodels with Delta Akaike's Information Criterion (ΔAICc) < 7 testing the relationship between variables and knowledge, awareness and attitude of students towards wildlife. ß (CI) = Estimated value (95% Confidence Interval) and RI = Relative Importance. Bold estimates had a confidence interval that did not overlap zero.

Explanatory variables	**A. Knowledge**		**B. Awareness**		**C. Attitude**	
	ß (CI)	RI	ß (CI)	RI	ß (CI)	RI
Intercept	2.02 (1.89, 2.16)	-	1.68 (1.49, 1.86)	-	2.11 (2.01, 2.20)	-
School	0.01 (-0.05, 0.07)	0.27	0.02 (-0.06, 0.09)	0.26	0.00 (-0.05, 0.05)	0.21
Academic Level	**0.05 (0.03, 0.08)**	**1.00**	**0.04 (2.71e-03, 0.07)**	**0.82**	0.00 (-0.03, 0.03)	0.21
Gender	**-0.09 (-0.17, -2.72e-04)**	**0.74**	**-0.13 (-0.24, -0.02)**	**0.91**	0.01 (-0.09, 0.08)	2.21
Place of Birth	-0.05 (-0.16, 0.06)	0.33	-0.07 (-0.21, 0.06)	0.36	-0.01 (-0.12, 0.10)	0.21
Grown up Place	0.04 (-0.06, 0.13)	0.31	0.06 (-0.06, 0.18)	0.34	-0.02 (-0.12, 0.07)	0.23
Father's Occupation	0.04 (-0.09, 0.12)	0.34	0.05 (-0.07, 0.17)	0.30	0.01 (-0.12, 0.19)	0.21
Mother's Occupation	0.02 (-0.09, 0.17)	0.27	0.05 (-0.07, 0.17)	0.31	0.02 (-0.11, 0.14)	0.22
Father's Education	0.05 (-0.05, 0.15)	0.38	-0.02 (-0.15, 0.11)	0.23	-0.02 (-0.10, 0.10)	0.22
Mother's Education	0.07 (-0.05, 0.18)	0.43	0.03 (-0.10, 0.18)	0.26	0.00 (-0.11, 0.10)	0.21

Comparison of pre and post-test on knowledge, awareness and attitude before and after 'Care for Wild Animal' Program

We found that all three attributes had shown a positive turnover whereby the mean from post-test is higher compared to pre-test (Table 3). As these tested attributes given p-value <0.05, this program had successfully increased the knowledge, awareness and attitude among students.

Table 3: Pre-test and post-test result on knowledge, awareness and attitude of all the students in the study. SE: Standard error.

Attributes	**Mean ± SE (Pre-Test)**	**Mean ± SE (Post-Test)**	**P-value**
Knowledge	8.48 ± 0.13	11.98 ± 0.13	**0.000215**
Awareness	5.40 ± 0.10	12.45 ± 0.09	**0.00109**
Attitude	8.19 ± 0.08	8.87 ± 0.06	**4.61e-06**

ISSN 2581-5148

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DISCUSSION

Wildlife conservation programs had been vastly carried out targeting younger generation in many countries with the aim to reduce any type of wildlife encroachment in upcoming generations so that wildlife could have a sustainable population (Dimopoulos et al., 2008; Erdogan, 2011). Aiming the same value, we conducted a program with self-administered survey among secondary school students and we found that our program gave a great impact towards increasing knowledge, awareness and attitude on wildlife.

The level of knowledge and awareness was low among lower secondary students compared to upper secondary students, possibly due to the difference in syllabus taught in school. Ministry of Education of Malaysia had set the syllabus for science topic at lower secondary level as such they learn about general intra and inter-specific factors about organism in nature whereas, biodiversity and endangered species were only taught during upper secondary (form 4 onwards).This also could be the reason for having different levels of awareness among students based on their learning experience and maturity level.

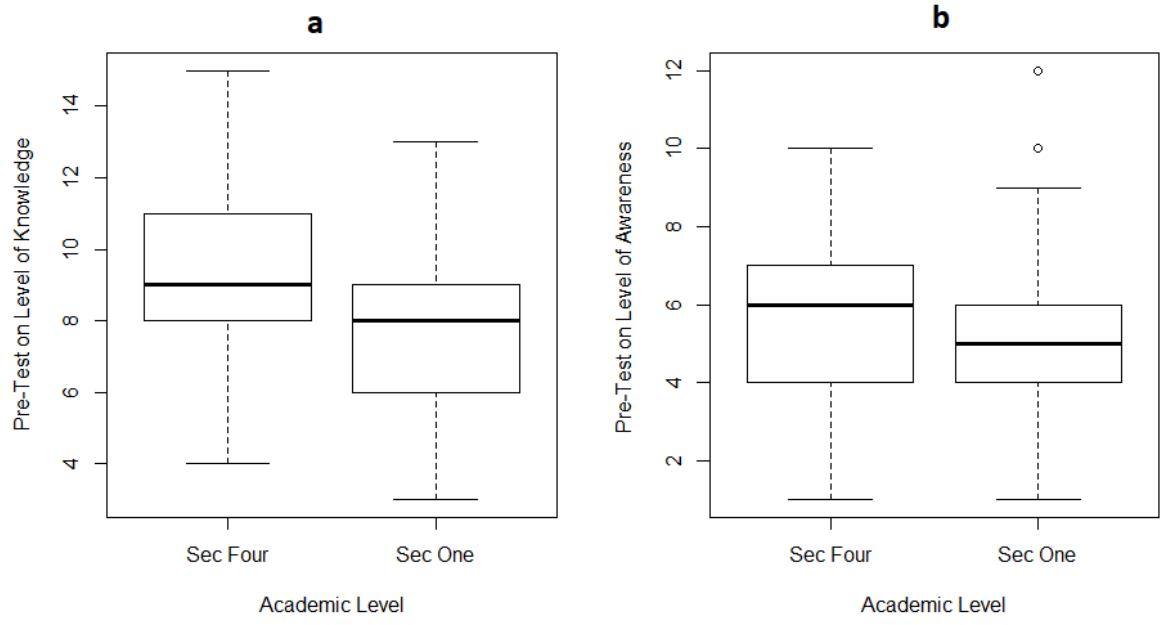

Figure 2: (a) Secondary four (form 4) students had more knowledge on wildlife compared to secondary one (form 1) students, similarly, **(b)** the level of awareness were higher in secondary four(form 4) students than secondary one(form 1) students.

Apart from that, female students shown to have less awareness on wildlife compared to male students. Contrastingly with previous study, those female students showed more responsibility toward the environment and wildlife compared to male students (Tikka et al., 2000).Nevertheless, the results from previous study in Malaysia showed that men have more interest, mutualism value

ISSN 2581-5148

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and being environmentalist compared to women (Jafarpour& Manohar, 2014).Hence, we predicted the possibility of male students having higher level of awareness towards the wildlife in this study was because they more likely to be social, outgoing and exposed themselves to the surrounding environments compared female students who were by culturally limited to external exposure. Therefore, male studentshave the opportunity to gain more knowledge and change in their attitudes towards environmental related issues more than females (Borchers et al., 2014).

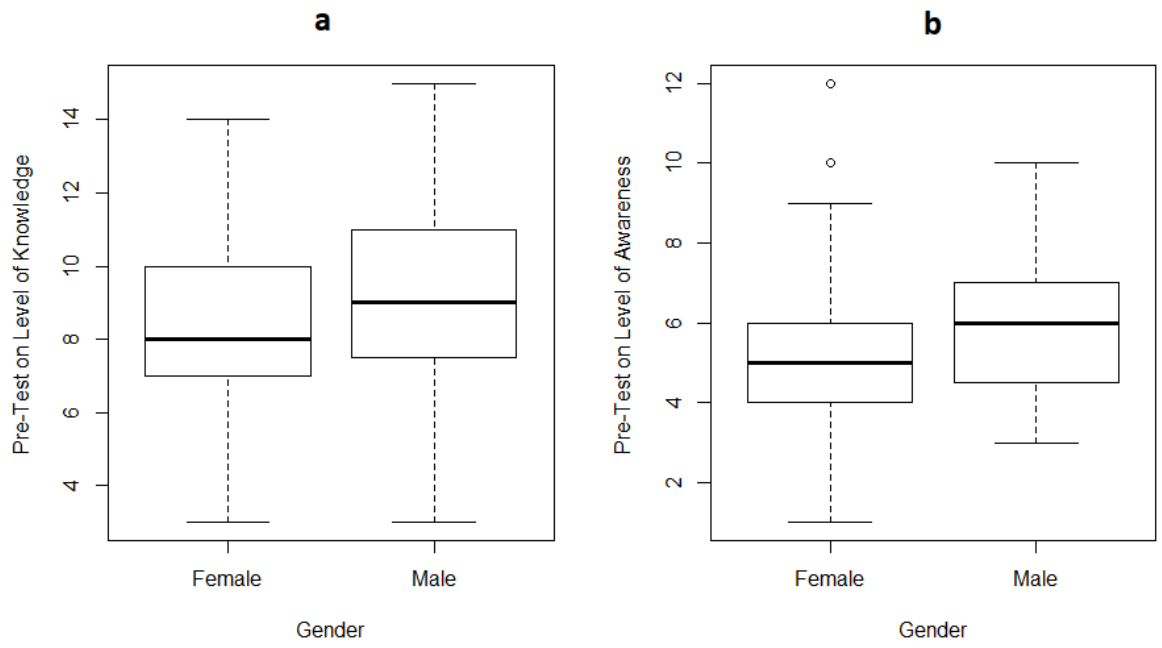

Figure 3: (a) Male students had more knowledge about wildlife compared to female students, and **(b)** level of awareness was also higher in male students than female students.

Reflecting to our result, we believe that adding more information on wildlife and the conservations into current science syllabus right from elementary or lower secondary could enhance the knowledge, awareness and attitude in younger generation. Such effort could bring empathy, responsibility and appreciation towards our Malaysian ecosystem and resources. Studies from other countries had also proved a positive outcome towards conservation. For example a study by Bradley et al. (1999) showed that students from elementary school had increased level of knowledge by 22% after exposing them to an environmental science course. In another study, students had improved significantly by 71% between pre-test and post-test after receiving environmental related course (Vaughan et al., 2003).

Apart from programs that focused on internal survey; external conservation program such as visiting zoo, breeding centers and nature reserves should also be incorporated to allow both male and female students to have larger exposure towards wildlife conservation. It is because wildlife tours can

provide a range of education and conservation benefits for the participants including affective emotional responses and cognitive ability towards wildlife conservations (Zeppel, 2008). An experience ecologist or wildlife biologist would able to deliver such programs effectively.

Creating new ways to gauge the gaps on the wildlife educations is highly recommended to begin from elementary school levels as it is not only as along-term investment to create a nature loving generation but also children are known to directly affect the behaviors of their parents (Ballantyne et al., 2001). Therefore, it will also help to improve the current generation's knowledge, awareness and attitude on wildlife conservation.

CONCLUSION

From this study, we were able to find out that students were not familiar with most wildlife related knowledge and have lack of awareness and attitude towards wildlife conservation after a pre-test was conducted among the lower and upper secondary school students. After we carried out a program called 'Care for Wild Animal' by giving related information on wildlife education and conservation, we found a significant increase in student knowledge, awareness and attitude on these issues. Through the pre-test study, we were also able to find out that most students from form one could not able to answer the question compared to form four students. It was mainly due to the syllabus in their current education system that did not have much concernon wildlife related issues and their conservation efforts. Therefore, incorporating more information or a specific chapter on wildlife education and conservation right from elementary school will benefit the environment and the future of wildlife in our Malayan ecosystem. A solid foundation in knowledge, awareness and attitude towards wildlife will reduce human made threat and healthy growing wildlife population in current and upcoming generations.

ACKNOWLEDGEMENTS

We acknowledge the contributions of those students who were participated in this survey and mini program.

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Appendix

Questionnaires used in the survey

BAHAGIAN A: SOSIO-DEMOGRAFI
SECTION A: SOCIO-DEMOGRAPHY

Latarbelakang / *Background*

Tandakan (✓) atautulisdalamruang yang disediakan.
Tick (✓) or write in the space provided.

1. Berapakahumuranda?
   How old are you?
   _____

2. Jantina
   Gender
   ☐ Lelaki
   Male
   ☐ Wanita
   Female

3. Dimanakahnegerikelahirananda?
   Where is the state of your birth?
   _____

6. LatarBelakangKeluarga
   Family Background
   A. PekerjaanBapa / *Father Occupation*
   _____

   B. PekerjaanIbu / *Mother Occupation*
   _____

   C. TarafPendidikanBapa / *Father education*

☐ SekolahRendah / *Primary School*

☐ SekolahMenengah / *Secondary school*

☐ Kolej/ Universiti / *University/College*

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4. Dimanakahkawasanandadibesarkan?
Where did you grow up?

☐ Luar Bandar / *Rural*

☐ Bandar / *Urban*

5. Tingkatan / *Secondary*
   - ☐ Satu
     One
   - ☐ Dua
     Two
   - ☐ Empat
     Four
   - ☐ Lain-lain: _____
     Others: _____

D. TarafPendidikanIbu
Mother Occupation

☐ SekolahRendah / *Primary School*

☐ SekolahMenengah / *Secondary School*

☐ Kolej / Universiti
College/ University

BAHAGIAN B: PENGETAHUAN
SECTION B: KNOWLEDGE

1. Adakahandatahuapaituhidupan liar?
Do you know what wildlife is? Ya/Yes ☐ Tidak ☐

2. Silanyatakantahappersetujuanatautidakbersetujudengansetiapkenyataanberikutdenganmeletakkantanda(/) padakotak yang sesuai.
Please indicate the level of your agreement or disagreement with each of the following statement by placing a check (/) in the appropriate box.

Bil/No	Kenyataan / Statement	Setuju Agree	Tidaksetuju Disagree	Tidakpasti Not sure
A	Istilah "hidupan liar" termasuklahhaiwan domestic sepertihaiwanpemeliharaanatauhaiwanternakan. *The term "wildlife" includes domesticated animals such as household pets or livestock animal.*			
B	Haiwan domestic sepertianjing, kucing, ataubabi yang telahmenjadi liar atauditinggalkandianggapsebagaihidupan liar. *Feral animals, like dogs, cats, or pigs that have been turned loose or abandoned are considered wildlife.*			
C	Istilah "interaksihidupan liar denganmanusia"			

	sentiasamerujukdengankeadaan yang negatif yang bolehmembawakemudaratan *The term "human wildlife interaction" always refer to a negative situation that can bring negative impact.*			
D	Aktivitimanusiasepertipemangsaan, penebanganhutandanpemburuanmenyebabkanhidupan liar terusberkurangan *Human activities such as predation, cutting down trees in the forest and illegal hunting are the main causes for wildlife to decrease continuously.*			
E	Mamaliaadalahkumpulan vertebrata terdirinombortertinggispesiesterancam *Mammalia is a group of vertebrates comprises the highest numbers of endangered species.*			

3. Silanyatakansamaadasetiapkumpulanhaiwanberikuttermasukdalamistilah "hidupan liar"
Please indicate whether each of the following groups of animals is included in the term "wildlife".

Bil / *No*	**Haiwan / *Animals***	**Ya / *Yes***	**Tidak / *No***	**Tidakpasti / *Not sure***
A	Mamalia / Mammals			
B	Burung / Birds			
C	Reptilia / Reptiles			
D	Amfibia / Amphibians			
E	Ikan / Fish			
F	Serangga / Insects			
G	Molluska / Mollusks			

4. Adakahandatahuapa yang dimaksudkandengan "kepupusan"?
Do you know what is meant of "extinction"?

_____

Silatandakanjawapan yang betul
Please tick the correct answer

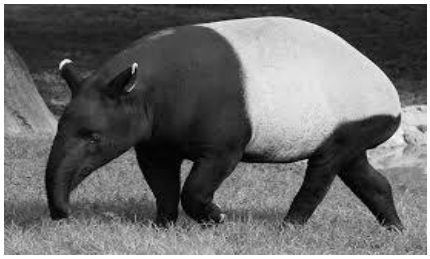
5. Adakahandatahubahagian mana daripadabadaksumbudibawakeluaruntukperdagangan haram?
Do you know which part of Rhinoceros is taken out for illegal trade?

(a) Tulang / Bone
(b) Daging / Meat
(c) BuahPinggang / Kidney
(d) Tanduk / Horn

6. Yang mana satuprimat yang berikutbukanberuk?
Which of the following primate is not an ape?

(a) Hanuman langur / *Hanuman langur*
(b) Chimpanzee / *Chimpanzee*
(c) Orangutan / *Orangutan*
(d) Hoolockungka / *Hoolock gibbon*

BAHAGIAN C: AWARENESS
BAHAGIAN C: KESEDARAN



1. Iniadalahsalahsatujenishaiwanhidupan liar. Adakahandatahuapakah Namahaiwanini*?*

This is one type of wildlife animal. Do you know what its name?

Ya / *Yes* Tidak / *No* ☐ ☐

2. JikalauYa, silatulisnamatempatanatausaintifik di bawah.
   If yes, please write down its local / scientific name below.

   _____

3. Iniadalah Malayan Tiger. Adakahandatahuhaiwanitutelahdiiktirafsebagaispesiesterancam?

8. Berdasarkanpengalamananda, apa yang andatahutentangkempenkesedaran? Danadakahandapernahterlibatdalamsebarangkempenkesedaran?
   Based on your experience, what you know about awareness campaign?and have you involved in any of the awareness campaign before?

_____
_____
_____

9. Iniadalah*Sumatran Rhinoceros*. Adakahandatahuhaiwaninitelahdiiktirafsebagaispesiesterancam?
   This is the Sumatran Rhinoceros. Do you know the animal has been recognised as a critically endangered species?

Ya / *Yes* Tidak / *No* ☐ ☐

10. Adakahandatahuberapabanyak*Sumatran Rhinoceros* yang tinggal di Malaysia?
    Do you know how many of Sumatran Rhinoceros are left in Malaysia?

Ya / *Yes*Tidak / *No* ☐ ☐

11. Jikaya, silanyatakan.

ISSN 2581-5148

Vol. 2, No. 02; 2019

This is the Malayan Tiger. Did you know the animal has been recognised as critically endangered species?

Ya / *Yes* Tidak / *No* ☐ ☐

4. Adakahandatahuberapabanyak Malayan tiger tinggalsekarang?

Do you know how many of the animals were left?)

Ya/*Yes* Tidak / *No* ☐ ☐

5. JikaYa, silanyatakan.
   If Yes, please state.
   _____

6. Adakahandatahuapakahisusemasa di Malaysia mengenaikonflikmanusiadenganhaiwanhidupan liar?

Do you know what are the current issues in Malaysia about conflict between human and wildlife animals?

Ya / *Yes* Tidak / *N* ☐ ☐

7. Jika YA, silanyatakan di bawahdanapapendapatandamengenaiisu-isutersebut?

If yes, please state below and what is your opinion about the issues?

_____
_____
_____
_____
_____
____

If yes, please state.

_____

12. Silanyatakan Taman Negara yang bolehdidapati di Malaysia.

Please state a National Park that can be found in Malaysia.

_____

Soalan di bawahadalahberkaitandenganpengetahuan Bandar Batu Gajah.

The questions below are related to the knowledge about Batu Gajah City.

13. Adakahandatahubahawa di Batu Gajah terdapatsatutempat yang dinamakansebagai Kinta Nature Park yang diiktirafsebagaitempatpersinggahanburungterbesar di Malaysia?

. *Do you know a place named as Kinta Nature Park in Batu Gajah that has been recognised as the largest bird stopper place in Malaysia?*

Ya / *Yes* Tidak / No ☐ ☐

14. Adakahandatahubahawakawasankonservasiburunginisedangdiancamolehaktivitisepertipembalakandan juga perlombonganpasir?
    Do you know that this bird conservation area is threatened by activities such as logging and sand mining.

Ya / *Yes* Tidak / No ☐ ☐