



The Effectiveness of Environmental Interpretation in Influencing Visitors' Knowledge in Kinabalu Park

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Abstract

Protected areas are established for the conservation of unique and pristine environment. Although protected, they are subjected to possible environmental and social impacts due to increasing tourism activities. This study aims to evaluate the effectiveness of Kinabalu Park's environmental interpretation in mitigating these impacts through the assessment of visitors' knowledge. Visitors' knowledge was compared between those who were exposed (post-visit) and not exposed to the interpretive programs (pre-visit). Overall, environmental interpretation in Kinabalu Park contributed to the visitors' knowledge related to general facts as post-visit samples indicated higher level of knowledge. However, there were no differences in their knowledge related to scientific aspect.

Keywords: environmental interpretation; knowledge; protected areas; repeat visitors

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1.0 Introduction

In most developing countries, the natural environment is one of the major resources for tourism (Nepal, 2000). Protected areas are the main setting for ecotourism practices especially for most developing countries (Weaver, 2008; Cobbinah, 2015). Malaysia currently houses 739 protected areas and 29 are national parks (UNEP-WCMC, 2017) in which some of the protected areas are promoted as ecotourism and nature-based tourism destinations including Kinabalu Park, Gunung Mulu National Park, Taman Negara Pahang, and more (Isa, Hasbullah, & Mohd Nasir, 2015). However, the increase in, tourism activities within protected areas had also increased the risks of possible environmental and social impacts due to overuse by visitors despite their protected status (Tubb, 2003). Mt. Everest National Park is facing serious tourism-induced problems due to the high number of tourists namely garbage, deforestation, soil erosion and cultural impacts (Nepal, 2000). A study at the Australian Alps protected area network revealed the negative impacts of winter tourism on the environment especially in the deteriorating water quality and impacts on wildlife and vegetation (Pickering, Harrington, & Worboys, 2003).

Educating visitors within the destinations through interpretation have become increasingly important as a mean to reduce the negative impact tourism activities have on the environment (Kimmel, 1999; Madin & Fenton, 2004; Powell & Ham, 2008). According to Lee & Balchin (1995), interpretation aims to achieve learning. It is assumed that a more knowledgeable visitor is more aware of their impacts on the environment and will tune their behaviour to suit the environment's needs (Hungerford & Volk, 1990, Ham & Weiler, 2006; Walker & Moscardo, 2014). Based on this, it is clear that knowledge is an important element in creating awareness among the visitors and influences their attitudes as well as behaviour (Walter, 2013; Cheng, Jin, & Wong, 2014). According to Phillips (as cited in Tubb, 2003), the knowledge visitors gained through interpretation influences how they intended to behave and has the potential to be transformed into actual behaviours.

Phillips (as cited in Tubb, 2003) believes that the effectiveness of environmental interpretation can be established by measuring whether or not the information has been relayed to the visitors. Interpretation is often labelled as an effective tool in managing visitors' impact on the environment (Bramwell & Lane, 1993; Munro, Morrison-Saunders & Hughes, 1998; Tubb, 2003) thus there is a need to evaluate the extent of interpretation's influence on the visitors. Hence, this study aimed at evaluating the influence of interpretation in Kinabalu Park, Sabah, Malaysia in terms of the visitors' knowledge before and after their visit to the park. This study also investigated the differences in the knowledge between first-time and repeat visitors in Kinabalu Park.

1.1 Study area

Established in 1964, Kinabalu Park covers an area of 75,370 ha and is located on the Crocker Range in the state of Sabah. Mount Kinabalu that stands at 4,095.2m height is the most prominent feature of Kinabalu Park. According to the IUCN protected area category system, Kinabalu Park is a type II protected area, a national park that caters for both environmental conservation and recreation. Kinabalu Park is the first national park in Malaysia to be

awarded the status of World Heritage Site by UNESCO in December 2000 due to its outstanding and unique values (UNESCO WHC, 2016). The status and uniqueness of the park make it an important asset to the country's natural resources as it represents some of the most distinctive ecological and biological diversity of universal value (Goh, 2008). There are seven substations in Kinabalu Park but only Park HQ and Poring substations were chosen as the primary focus of this study. Kinabalu Park receives approximately 600,000 to 700,000 visitors annually. Both Park HQ and Poring Hot Spring record the highest number of visitors' arrival compared to other substations. Kinabalu Park provides both personal and non-personal interpretation including interpretive centres, brochures, information panels, maps, video show, and guided walks. The interpretive programs in Kinabalu Park are managed by Sabah Parks, one of the managing agents in Kinabalu Park that is responsible for the management of tourism activities and conservation of the park as well as several other parks in Sabah.

There had been very few interpretation studies carried out in Kinabalu Park (Jacobson, 2009; Bidder, Kibat, & Fatt, 2016). Goh (2008) highlighted in her study that there is a need to improve the visitors' education in Kinabalu Park considering visitors had asked for more information and educational experience. As one of the only two national parks in Malaysia with the status of World Heritage Site in the natural category and one of the most famous tourist destinations in the country, there is a vital need to evaluate the influence current interpretation in the park has especially in educating the visitors about Kinabalu Park and its importance.

2.0 Literature Review

2.1 Visitors' education and interpretation

The use of visitors' education, which is also one of the principles of ecotourism practice is on the rise as it is seen as an important tool in visitor impact management (Bramwell & Lane, 1993; Kimmel, 1999; Orams & Hill, 1998; Hughes & Morrison-Saunders, 2002; Madin & Fenton, 2004; Powell & Ham, 2008; Hill & Gale, 2012; Skanavis & Kounani, 2017). One of the most used approaches in visitors' education is interpretation and multiple definitions of interpretation have been put forward by different scholars but the most widely recognised definition is by Freeman Tilden (1957). Tilden defined interpretation as 'an educational activity that aims to reveal meanings and relationships through the use of original objects, by first-hand experience, and by illustrative media, rather than simply to communicate factual information' (Tilden, 2007, p. 33).

Interpretation seeks to raise awareness among visitors to natural area on the importance of conserving the environment by increasing visitors' knowledge and at the same time affect their attitude towards the place and prompt them to behave more responsibly in a sensitive environment (Hungerford & Volk, 1990; Orams, 1997; Orams & Hill, 1998, Hughes & Morrison-Saunders, 2005; Munro et al., 2008). Eventually, this will lead to the reduction of negative impacts on the environment (Kimmel, 1999; Madin & Fenton, 2004). However, achieving these goals depends on the appropriateness and effectiveness of the interpretation programs adopted. Several studies that documented the effectiveness of interpretation in

influencing visitors' environmental knowledge had produced mixed results.

2.2 Evaluation of interpretation

Several studies on the evaluation of interpretation had been carried out in the context of Malaysian natural environment (Mohd Hafizal Ismail, 2008; Jacobson, 2009; Roslina, Manohar, Ismail Adnan, Azlizam, & Mohd Aswad, 2013; Amin, Chan, & Mohd Shukri, 2014; Lim, Manohar, Azlizam, & Zakaria, 2016; Bidder et al., 2016). Majority of the studies yielded either partially positive or positive findings (Tubb, 2003; Madin & Fenton, 2004; Powell & Ham, 2008; Roslina et al., 2013) but there have also been studies that reported very little or no differences at all in the visitors' knowledge before and after they were exposed to interpretation (Papageorgiou, 2001; Hughes & Morrison-Saunders, 2002; Novey & Hall, 2006; Roberts, Mearns, & Edwards, 2014).

Tubb (2003) study at the High Moorland Visitor Centre in Dartmoor National Park, United Kingdom found that visitors' knowledge and awareness increased after they were exposed to the interpretation at the centre. Tubb (2003) also highlighted that visitors spent more time on exhibits that contained interactive materials within the interpretive centre. A study at the Galapagos National Park yielded positive outcome where visitors that were on a seven-day cruise demonstrated a higher level of knowledge after their voyage based on their self-reported and actual knowledge (Powell & Ham, 2008). In Malaysia, Roslina et al. (2013) had conducted a similar study at the Forest Research Institute of Malaysia where they had tested the Wetlands Environmental Interpretation Program (WEIP). School children exposed to the programs showed higher level of knowledge regarding the negative impacts of scratching on trees.

Several studies had yielded opposite results where interpretation had very little to no influence on the visitors' knowledge. At the Vikos-Aoos National Park in Greece, Papgeorgiou (2001) found that visitors' level of knowledge related to the park's issues and regulations were low based on the exit survey. Similarly, visitors' actual knowledge at the Walpole-Nornalup National Park, Australia also showed no differences before and after they were exposed to the newly installed interpretive signs in the park (Hughes & Morrison Saunders, 2002). Roberts et al. (2014) study at the Kruger National Park, South Africa also found no differences in the knowledge between visitors who took guided and non-guided interpretation. In Kinabalu Park, very few research related to interpretation were undertaken (Jacobson, 2009; Bidder et al. 2016). Jacobson (2009) had tested the impacts of guides, brochures, and signs at the Mountain Garden (now known as Botanical Garden) of Kinabalu Park while Bidder et al. (2016) research in the parks was related to the lack of cultural interpretation within Kinabalu Park. In Goh (2008) study at Kinabalu Park, visitors had given a low rating for the information and educational element within the park. The visitors had expected a more informative educational experience during their visit.

3.0 Methodology

This study adopted both quantitative and qualitative approaches but the primary focus is

placed on the quantitative method. Visitors' questionnaire survey involving pre- and post-visit surveys were designed to evaluate visitors' level of knowledge regarding Kinabalu Park before and after their visits. Furthermore, the pre- and post-visit respondents were independent of each other in order to avoid biased responses (Lee & Balchin, 1995; Tubb, 2003; Hughes & Morrison-Saunders, 2005; Lee & Moscardo, 2005). The respondents were selected using stratified convenient sampling where the samples were stratified according to local and international visitors based on the park's statistic on visitors arrival. Both pre- and post-visit surveys consisted of similar close-ended questions.

Based on the literature review, several methods had been used in assessing visitors' knowledge namely measuring actual knowledge gain, perceived or self-report knowledge, and visitors' conceptual understanding. Acquisition of facts or actual knowledge gain is the most used method in interpretation' evaluation in order to measure the visitors' ability to recall the information (Lee & Balchin, 1995; Tubb, 2003; Novey & Hall, 2006; Sander, 2012). In this study, visitors' actual knowledge was assessed using a series of 12 statements based on the information available in Kinabalu Park in a quiz-type format with multiple-choice answers that were "true", "false", and "not sure". The knowledge statements used in the survey were information that can be found in the interpretation throughout Kinabalu Park namely involving general park information and scientific information.

A total of 443 sets of questionnaire surveys were collected at a 98% response rate but, only 390 sets were deemed usable for analysis, as the rest were incomplete or damaged. 200 sets were pre-visit surveys and another 190 sets were post-visit surveys. The survey data was analysed using statistical analysis where frequency, crosstabulation, and Pearson Chi-square were performed with the aid of the Statistical Package for Social Science (SPSS) software. Observation was also carried out in this study in which the researcher had participated in the interpretive programs in both Park HQ and Poring substations of Kinabalu Park in order to determine the type of interpretation and interpretive materials used in the programs.

4.0 Results

4.1 Interpretation in Kinabalu Park

Based on the observation carried out, Park HQ and Poring substations adopted both personal and non-personal interpretation in which some activities adopted both types of interpretation while others employed only one type of interpretation. There were also activities that do not employ any interpretive materials. Introductory signs and information panels were the most used interpretive materials at both substations for non-personal interpretation and personal interpretation was given in the form of guided walks by Sabah Parks' staff.

4.2 Respondents' demographic background and visitation profile

According to the analysis findings, the majority of the respondents were between 16 to 25 years old (36.2%) and 26 to 35 years old (37.7%). 47.2% of the respondents were male visitors and the rest were female visitors (52.8%). In terms of nationality, 72.8% of the

respondents were Malaysians and 27.2% were international visitors. Majority of the respondents had a diploma education (31.5%) and bachelor's degree (28.7%). 28.5% of the respondents were students followed by 17.4% with professional occupation and 15.6% general workers.

Out of all the respondents, slightly more than half of them were first-time visitors (59.7%) and 40.3% were repeat visitors. Majority of the visitors gained information about the park from the Internet (61.3%), friends (56.2%) and family/relatives (44.4%). Visitors that came to the park were mostly motivated by the recreational opportunities provided (67.4%) and its landscape/scenery (63.6%) while 32.3% came for knowledge purpose. Chi-square tests conducted revealed significant differences between the pre- and post-visit samples in terms of age, education, occupation, nationality, types of visitors, source of information and motivation ($p < 0.05$). Thus, these differences might have had an influence on the visitors' responses to the knowledge statements as well.

4.3 Impact of interpretation on knowledge

Visitors' knowledge was evaluated by determining the number of correct responses to the 12 quiz-like knowledge statements in both the pre- and post-visit survey. Overall, post-visit samples showed a higher number of correct responses compared to the pre-visit samples. Table 1 shows the number of correct responses among the visitors in both pre- and post-visit samples.

Table 1: Percentage of visitors responding correctly to the knowledge statements and chi-square results.

No.	Item	Percent (%)		Significance (p-value)
		Pre-visit	Post-visit	
1	Kinabalu Park is a World Heritage Site in the natural category declared by the UNESCO World Heritage Committee.	83.5	77.9	0.362
2	Mount Kinabalu is the highest mountain between the Himalayas and New Guinea.	44.5	35.8	0.162
3	Kinabalu Park is a hotspot for plant biodiversity containing over 5,000 to 6,000 vascular plants.	61.0	59.8	0.819
4	There are five stations in Kinabalu Park.	15.5	17.9	0.043*
5	Climbing Mount Kinabalu requires two days and one night.	60.3	63.2	0.207
6	Low's Peak is the highest peak on top of Mount Kinabalu.	45.7	58.3	0.001*
7	Mount Kinabalu is considered sacred by the local Dusun-Kadazan people.	65.0	77.4	0.007*
8	Mount Kinabalu is still growing at the rate of 5mm annually.	34.2	31.1	0.51
9	Kinabalu Park also acts as the Centre for Plant Biodiversity for Southeast Asia.	50.0	41.3	0.000*
10	Many of the animals inside Kinabalu Park are threatened and vulnerable to extinction.	52.5	54.2	0.831

11	Entrance fee to Kinabalu Park is also called Conservation fee.	59.5	53.7	0.407
12	Sabah Parks is responsible for the management and conservation of Kinabalu Park.	62.5	66.8	0.298

Note: * indicates significant differences between pre- and post-visit samples at $p < 0.05$

Further chi-square test was used in this study to identify any significant differences between pre- and post-visit samples in terms of their knowledge. The test indicated significant differences between both samples in four out of 12 knowledge statements used in the survey. Firstly, knowledge statement (4) *there are five stations in Kinabalu Park* was a wrong statement and there are seven stations in Kinabalu Park. Although very few managed to respond correctly, there was however a significant difference between both samples ($X^2=6.285$, $df=2$, $p < 0.05$). 17.9% of the visitors in the post-visit samples responded correctly compared to 15.5% pre-visit samples. Secondly, a significant difference was also observed in the number of correct response to knowledge statement (6) *Low's Peak is the highest peak on top of Mount Kinabalu* ($X^2=13.511$, $df=2$, $p < 0.05$). 58.3% of the post-visit samples provided the correct response whereas the number was lower among the pre-visit samples (45.7%). Moreover, post-visit samples also demonstrated lower number of visitors that responded incorrectly to the statement (24.6%) compared to the 42.2% in the pre-visit samples.

Thirdly, both samples also indicated statistically significant differences in the number of correct responses to knowledge statement (7) *Mount Kinabalu is considered sacred by the local Dusun-Kadazan people* ($X^2=10.037$, $df=2$, $p < 0.05$). 65.0% of the pre-visit responded correctly but the number of correct responses was higher in the post-visit samples (77.4%). The number of visitors that were unsure of the statement was also significantly lower in the post-visit samples (16.8%) compared to 30.5% in the pre-visit samples. Lastly, knowledge statement (9) *Kinabalu Park also acts as the Centre for Plant Biodiversity for Southeast Asia* ($X^2=18.558$, $df=2$, $p < 0.05$) also showed significant differences between pre- and post-visit samples. However, unlike the other statements, the analysis revealed that slightly lower number of visitors in the post-visit samples manage to respond correctly to the statement (41.3%) while 50.0% of the pre-visit samples responded correctly. The pre-visit samples indicated only 3.5% incorrect responses to the statement but the number was significantly higher in the post-visit samples (16.4%).

4.4 Impact of repeat visitation on knowledge

Further analysis of the impacts of repeat visitation on visitors' knowledge was carried out among the post-visit samples in the study. Out of all 190 post-visit respondents, 58.4% ($n=111$) were repeat visitors while the rest of them, 41.6% ($n=79$) were in Kinabalu Park for the first time. Overall, the analysis revealed that visitors with prior experience in Kinabalu Park had a higher level of knowledge compared to those that were visiting for the first time as observed in the post-visit samples. Table 2 shows that the level of knowledge was higher among the repeat visitors in the post-visit samples across all knowledge statements except for statement (5) *climbing Mount Kinabalu requires two days and one night*.

Table 2: Percentage of first-time and repeat visitors responding correctly to the knowledge statements and chi-square results.

No.	Item	Percent (%)		Significance (p-value)
		First-time visitor	Repeat visitor	
1	Kinabalu Park is a World Heritage Site in the natural category declared by the UNESCO World Heritage Committee.	75.9	79.3	0.356
2	Mount Kinabalu is the highest mountain between the Himalayas and New Guinea.	29.1	40.5	0.010*
3	Kinabalu Park is a hotspot for plant biodiversities containing over 5,000 to 6,000 vascular plants.	59.5	60	0.986
4	There are five stations in Kinabalu Park.	11.4	22.5	0.073
5	Climbing Mount Kinabalu requires two days and one night.	72.2	56.8	0.048*
6	Low's Peak is the highest peak on top of Mount Kinabalu.	40.3	70.9	0.000*
7	Mount Kinabalu is considered sacred by the local Dusun-Kadazan people.	68.4	83.8	0.040*
8	Mount Kinabalu is still growing at the rate of 5mm annually.	30.4	31.5	0.414
9	Kinabalu Park also acts as the Centre for Plant Biodiversity for Southeast Asia.	39.7	42.3	0.039*
10	Many of the animals inside Kinabalu Park are threatened and vulnerable to extinction.	53.2	55	0.955
11	Entrance fee to Kinabalu Park is also called Conservation fee.	41.8	62.2	0.021*
12	Sabah Parks is responsible for the management and conservation of Kinabalu Park.	51.9	77.5	0.001*

Note: * indicates significant differences between first-time and repeat visitors at $p < 0.05$

Further chi-square test showed that seven of the statements indicated significant differences between first-time and repeat visitors. Firstly, there was a significant difference in the statement (2) *Mount Kinabalu is the highest mountain between the Himalayas and New Guinea* ($X^2=9.236$, $df=2$, $p < 0.05$) in which the result showed that 40.5% of the repeat visitors provided a correct response compared to only 29.1% among the first time visitors. Secondly, there was also a significant difference in the statement (5) *climbing Mount Kinabalu requires two days and one night* ($X^2=6.074$, $df=2$, $p < 0.05$). However, the crosstabulation analysis showed that more first-time visitors answered correctly (72.2%) compared to 56.8% repeat visitors. Thirdly, statement (6) *Low's Peak is the highest peak on top of Mount Kinabalu* was also statistically significant ($X^2=21.229$, $df=2$, $p < 0.05$) and it was found that more than half of the repeat visitors in the post-visit samples gave a correct response (70.9%) while less than half of the first time visitors answered correctly (40.3%).

Fourthly, a statistically significant difference was also observed in the statement (7) *Mount Kinabalu is considered sacred by the local Dusun-Kadazan people* ($X^2=6.459$, $df=2$, $p < 0.05$). Among the repeat visitors in the post-samples, more than one-third responded

correctly (83.8%) but less than one-third of the first time visitors did (68.4%). Fifthly, the chi-square test also indicated that statement (9) *Kinabalu Park also acts as the Centre for Plant Biodiversity for Southeast Asia* was statistically significant ($X^2=6.499$, $df=2$, $p<0.05$) in which among the repeat visitors in the post-visit samples, 42.3% gave a correct response while only 39.7% of the first time visitors also gave the same answer. Sixthly, statement (11) *entrance fee to Kinabalu Park is also called Conservation fee* also showed significant differences ($X^2=7.762$, $df=2$, $p<0.05$) with 62.2% out of all the repeat visitors in the post-visit samples responded correctly but only 41.8% of the first time visitors did. Lastly, there was also a significant difference in the statement (12) *Sabah Parks is responsible for the management and conservation of Kinabalu Park* ($X^2=14.569$, $df=2$, $p<0.05$). 77.5% of those with prior experience in Kinabalu Park was aware of Sabah Parks' role in managing the park but only 51.9% of the first time visitors provided the correct response to the statement.

5.0 Discussion

5.1 Impact of interpretation on visitors' knowledge

The results of this study show that visitors' knowledge was indeed higher among the visitors that were exposed to interpretation during their visit to Kinabalu Park as observed in the post-visit samples. However, it was also observed in the post-visit samples that the visitors demonstrated higher level of knowledge in regards to certain themes in Kinabalu Park namely general facts and values about Kinabalu Park while knowledge related to the scientific aspect of the park did not show any differences between both samples. General information about Kinabalu Park was available in the form of information panels upon entering the park that was located right after the entrance to the park. Based on observation, almost all of the visitors that came to the park would head to these panels first or after they visited the visitor centre located adjacent to the panels. Moreover, the same information was repeated in a few more of the panels installed at different points along the park's main road, galleries, and exhibition halls. Similar information was also made available to the visitors in the form of interpretive centres, brochures, and exhibition halls. The availability of the information panels helped intensified the visitors' memories regarding this particular information.

Moreover, the location of the information about the park's general facts and scientific aspects especially within the interpretive centres might have influenced the visitors' level of knowledge. Majority of the panels with information about the park's facts are displayed in the earlier sections of the interpretive centres while panels related to scientific information about Kinabalu Park are located in the following sections. According to Tubb (2003) study at the Dartmoor National Park, it was found that visitors' attention towards the interpretive panels shortened as they progress through the interpretive centre. Similarly, visitors' in Kinabalu Park might have given more attention to the earlier sections and began to lose interest as the progress thus explaining the higher level of knowledge related to general facts and lower level of knowledge related to scientific aspect.

Ham (2013) had highlighted in his TORE model of thematic communication that enjoyable is one of the most important qualities in effective interpretation. Sources of an enjoyable

educational experience for visitors can derive from interactive materials, 3D exhibits, games, quizzes, puzzles, and many more (Ham, 1992). However, Kinabalu Park adopted mostly text-based interpretation in conveying information to the visitors throughout the park and it lacked interactive materials. Unlike general facts, scientific information is a lot more complex and difficult to understand when described only using text-based interpretation because of its technical terms. Visitors to an outdoor setting are often labelled as non-captive audiences and they are not obligated to pay attention to the educational materials within the setting (Ham, 2013). Interactive materials have the potential to attract and sustain the visitors' attention during their visit. The use of different interactive materials in conveying information to visitors also can provide them with a variety of interpretive experiences and giving them control over the information itself (Moscardo, 1998). Tubb (2003) also found in her study that visitors tend to spend more time reading through interpretive panels that contained interactive exhibits. 90% of people can recall information that they have manipulated instead of information they read or listen to (Wearing & Neil, 1999). The lack of interactive materials used in Kinabalu Park might have resulted in the lack of interests in the scientific aspect of the park thus affecting their learning process.

Overall, the mixed results yielded in this study is similar to several other studies (Tubb, 2003; Madin & Fenton, 2004; Hughes & Morrison-Saunders, 2005; Hill, Woodland, & Gough, 2007; Mohd Hafiz Ismail, 2008; Powell & Ham, 2008; Roslina et al., 2013) in which visitors' knowledge in the post-visit samples were higher only in relation to certain aspects namely general facts and values about the park. Tubb (2003) study revealed that visitors' knowledge increased only in terms of their knowledge about farming. The study at the Great Barrier Reef Marine Park also reported that visitors' knowledge only increased in terms of reef knowledge while other knowledge aspects showed no changes (Madin & Fenton, 2004). Similarly, the study at Forest Research Institute Malaysia (FRIM) also found The Wetlands Environmental Interpretation Program (WEIP) helped increase the school children's knowledge related to the negative impacts of scratching on trees (Roslina et al., 2013).

The findings also revealed knowledge statements with lower level of correct responses among the post-visit samples compared to the pre-visit samples namely statements related to Mount Kinabalu being the highest mountain, its growth and entrance fee to the park. The differences could have been due to the significant differences in the respondents' background and visitation profile between the pre- and post-visit samples which influenced their ability to recall the information they encountered in the park as well as their responses to the knowledge statements in the survey. However, the influence of visitors' demographic background and visitation profile on their level of knowledge were not explored in this study.

5.2 Impact of repeat visitation on visitors' knowledge

Repeat visitors in Kinabalu Park also demonstrated higher level of knowledge across 11 of the knowledge statements compared to first-time visitors as observed in the post-visit samples. The differences between first time and repeat visitors were especially significant in terms of several of the knowledge statements including Mount Kinabalu being *the highest mountain between the Himalayas and New Guinea, the highest peak of the mountain, the sacredness of the mountain to the local people*, Kinabalu Park's status as a *centre for plant*

diversity, entrance fee, and the management authority. The significant differences between the two types of visitors regarding this knowledge indicate that repeat visitors to Kinabalu Park seemed to be more knowledgeable in certain aspects compared to those that visited for the first time. Several other past studies had found similar differences between first-time and repeat visitors (Young, 1999; Hughes & Morrison-Saunders, 2002; Madin & Fenton, 2004). Young (1999) observed that repeat visitors had higher level of spatial knowledge compared to first time visitors at the Daintree and Cape Tribulation area, Queensland, Australia while similar study at the Great Barrier Reef Marine Park also found that repeat visitors possessed higher level of reef knowledge as opposed to first time visitors (Madin & Fenton, 2004).

6.0 Conclusion

Interpretation does not only seek to inform visitors about an area but it aims to increase their knowledge, change their attitude and modify their behaviour that best suits the environment (Hungerford & Volk, 1990; Orams, 1997; Hughes & Morrison-Saunders, 2005; Munro et al., 2008). There is a need to evaluate interpretation's influence in order to determine whether or not the goals of interpretation are achieved (Littlefair, 2003) and it also helps analysed if the interpretive programs should be continued or stopped (Madin & Fenton, 2004). This study attempted to evaluate the overall influence of interpretation in Kinabalu Park on the visitors' knowledge. Overall, this study reveals that the interpretation programs in Kinabalu Park contributed to the visitors' general knowledge about Kinabalu Park but not their knowledge related to the scientific aspect of Kinabalu Park (as observed in the post-visit samples). The park's reliance on text-based interpretation and lack of interactive materials especially for scientific-related information could have resulted in the loss of interests among the visitors thus affecting their learning process. Hence, this evidence indicates a need for Sabah Parks to incorporate interactive materials in the park's future interpretive design such as hands-on objects visitors can manipulate, quizzes, puzzles, sound, and more especially for scientific-related information in order to facilitate the visitors' learning process.

Despite the findings in the survey conducted, this study provides limited support to the current interpretive programs adopted in Kinabalu Park. This study had no control over the respondents' demographic characteristics and visitation profile due to the different samples used in the pre- and post-visit surveys. The significant differences between both samples could have influenced the visitors' knowledge apart from interpretation within Kinabalu Park. The visitors could have had access to other interpretive materials aside from the ones provided in the park and their purposes for visiting could have influenced their receptiveness towards the interpretation. Further to that, the study does not take into account the impact of different activities and types of interpretation provided. Future research could be carried out with the use of control and experiment groups in order to control the visitors' demographic traits and to further expand the indicators including attitude, behaviour, and satisfaction as well in measuring the effectiveness of environmental interpretation in Kinabalu Park. Apart from that, further analysis can also be done to determine the impact of the visitors' characteristics and visitation profiles on their knowledge. The influence of other factors was not investigated due to the limited scope of this study. A more detailed investigation on

interpretation's influence on the visitors in Kinabalu Park is required as potential future research.

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References

- Amin, V. L., Chan, M. K. Y., & Omar, M. S. (2014). Enhancing Visitor Experiences Using Thematic Interpretation in Park Guiding Service in Sarawak National Parks. In *SHS Web of Conferences* (Vol. 12, p. 01025). EDP Sciences.
- Bidder, C., Kibat, S. A., & Fatt, B. S. (2016). Cultural Interpretation toward Sustainability: A Case of Mount Kinabalu. *Procedia - Social and Behavioral Sciences*, 224, 632–639.
- Bramwell, B., & Lane, B. (1993). Interpretation and sustainable tourism: The potential and the pitfalls. *Journal of Sustainable Tourism*, 1(2), 71–9.
- Cheng, M., Jin, X., & Wong, I. A. (2014). Ecotourism site in relation to tourist attitude and further behavioural changes. *Current Issues in Tourism*, 17(4), 303-311. doi: 10.1080/13683500.2013.8000301.
- Cobbinah, P. B. (2015). Contextualising the meaning of ecotourism. *Tourism Management Perspectives*, 16, 179–189. <https://doi.org/10.1016/j.tmp.2015.07.015>
- Goh, H. C. (2008). *Sustainable tourism and the influence of privatization in protected area management. A case of Kinabalu Park, Malaysia*. (Doctoral dissertation), Zentrum für Entwicklungsforschung, University of Bonn, Bonn, Germany (57).
- Ham, S. H. (1992). *Environmental interpretation: A practical guide for people with big ideas and small budgets*. Golden, CO: North American Press.
- Ham, S. H., & Weiler, B. (2006). *Development of a research-based tool for evaluating interpretation*. CRC for Sustainable Tourism Gold Coast. Retrieved from http://sustain.pata.org/wp-content/uploads/2015/02/Ham_ToolEvalInterp.pdf
- Ham, S. H. (2013). *Interpretation: making a difference on purpose*. Golden, Colorado: Fulcrum Publishing.
- Hill, J., & Gale, T. (2012). *Ecotourism and environmental sustainability: Principles and practices*. (J. Hill & T. Gale, Eds). Ashgate Publishing Ltd.
- Hill, J., Woodland, W., & Gough, G. (2007). Can Visitor Satisfaction and Knowledge About Tropical Rainforests be Enhanced Through Biodiversity Interpretation, and Does this Promote a Positive Attitude Towards Ecosystem Conservation? *Journal of Ecotourism*, 6(1), 75–85. <http://dx.doi.org/10.2167/joe166.0>
- Hughes, M., & Morrison-Saunders, A. (2002). Impact of trail-side interpretive signs on visitor knowledge. *Journal of*

Ecotourism, 1(2-3), 122–132.

Hughes, M., & Saunders, A. M. (2005). Interpretation, Activity Participation, and Environmental Attitudes of Visitors to Penguin Island, Western Australia. *Society & Natural Resources*, 18(7), 611–624. <http://doi.org/10.1080/08941920590959587>

Hungerford, H. R., & Volk, T. L. (1990). Changing learner behavior through environmental education. *Journal of Environmental Education*, 21(3), 8–21.

Jacobson, S. K. (2009). *Communication skills for conservation professionals* (2nd ed.). Washington, DC: Island Press.

Kimmel, J. R. (1999). Ecotourism as Environmental Learning. *The Journal of Environmental Education*, 30(2), 40–44. <http://doi.org/10.1080/00958969909601869>

Lee, T., & Balchin, N. (1995). Learning and attitude change at British nuclear fuel's Sellafield visitors centre. *Journal of Environmental Psychology*, 15(4), 283–298.

Lee, W. H., & Moscardo, G. (2005). Understanding the Impact of Ecotourism Resort Experiences on Tourists' Environmental Attitudes and Behavioural Intentions. *Journal of Sustainable Tourism*, 13(6), 546–565. <http://doi.org/10.1080/09669580508668581>

Lim, E. A., Manohar, M., Azlizam Aziz, & Zakaria, M. (2016). Influencing secondary school students' conservation behavior intention through an interpretive education program on the Malayan tapir. *Evaluation and Program Planning*, 58, 60-69. <https://doi.org/10.1016/j.evalprogplan.2016.05.008>

Littlefair, C. J. (2003). *The effectiveness of interpretation in reducing the impacts of visitors in national parks*. (Doctoral dissertation), Griffith University, Australia. Retrieved from <https://www120.secure.griffith.edu.au/rch/file/8d1ce8bd-a543-04b2-516c-be5466f9b86f/1/02Whole.pdf>

Madin, E. M. P., & Fenton, D. M. (2004). Environmental interpretation in the Great Barrier Reef Marine Park: An assessment of programme effectiveness. *Journal of Sustainable Tourism*, 12(2), 121–137.

Mohd Hafizal Ismail (2008). *The role of interpretive signages in enhancing conservation knowledge, awareness and behavior among visitors at Penang National Park, Malaysia*. (Master's thesis), Universiti Putra Malaysia, Malaysia.

Moscardo, G. (1998). Interpretation and sustainable tourism: functions, examples and principles. *Journal of Tourism Studies*, 9(1), 2.

Munro, J. K., Morrison-Saunders, A., & Hughes, M. (2008). Environmental interpretation-evaluation in natural areas. *Journal of Ecotourism*, 7(1), 1–14.

Nepal, S. K. (2000). Tourism in protected areas: The Nepalese Himalaya. *Annals of Tourism Research*, 27(3), 662–682.

Novey, L. T., & Hall, T. E. (2006). The effect of audio tours on learning and social interaction: An evaluation at Carlsbad Cavern National Park. *Science Education*, 91(2), 201–221.

Orams, M. B. (1997). The effectiveness of environmental education: Can we turn tourist into "greenies"? *Progress in Tourism and Hospitality Research*, 3, 295–306.

Orams, M. B., & Hill, G. J. E. (1998). Controlling the ecotourist in a wild dolphin feeding program: Is education the answer? *The Journal of Environmental Education*, 29(3), 33–38.

- Papageorgiou, K. (2001). A combined park management framework based on regulatory and behavioral strategies: Use of visitors' knowledge to assess effectiveness. *Environmental Management*, 28(1), 61–73.
- Pickering, C. M., Harrington, J., & Worboys, G. (2003). Environmental Impacts of Tourism on the Australian Alps Protected Areas: Judgments of Protected Area Managers. *Mountain Research and Development*, 23(3), 247–254. [https://doi.org/10.1659/0276-4741\(2003\)023\[0247:EIOTOT\]2.0.CO;2](https://doi.org/10.1659/0276-4741(2003)023[0247:EIOTOT]2.0.CO;2)
- Powell, R. B., & Ham, S. H. (2008). Can Ecotourism Interpretation Really Lead to Pro-Conservation Knowledge, Attitudes and Behaviour? Evidence from the Galapagos Islands. *Journal of Sustainable Tourism*, 16(4), 467–489. <http://doi.org/10.1080/09669580802154223>
- Roberts, M., Mearns, K., & Edwards, V. (2014). Evaluating the effectiveness of guided versus non-guided interpretation in the Kruger National Park, South Africa. *Koedoe*, 56(2), 1–08.
- Roslina, M., Manohar, M., Ismail Adnan, A. M., Azlizam, A., & Mohd Aswad, R. (2013). Effectiveness of wetland interpretation in affecting school children's attitude towards scratching of trees. *Pertanika Journal of Tropical Agricultural Science*, 36(S), 195–204.
- Sander, B. (2012). The importance of education in ecotourism ventures: lessons from Rara Avis ec lodge, Costa Rica. *International Journal of Sustainable Society*, 4(4), 389–404. <https://doi.org/10.1504/IJSSOC.2012.049408>
- Siti Suriawati Isa, Rashidi Hasbullah, & Mohd Nizam Mohd Nasir (2015). Adventure and ecotourism. In Manohar Mariapan, Siti Suriawati Isa, Nor Akmar Abdul Aziz, Evelyn Lim Ai Lin & Khalid Rehman Hakeem (Eds.), *Adventure and ecotourism in Malaysia* (pp. 1-25). Selangor, Malaysia: UPM
- Skanavis, L. C., & Kounani, A. (2017). *Ecotourism as an educating tool for encouraging sustainable development: the case of Skyros island*. In *Health and Environment Conference* (p. 188).
- Tilden, F. (2007). *Interpreting our heritage* (4th ed.). USA: The University of North Carolina Press.
- Tubb, K. N. (2003). An evaluation of the effectiveness of enterpretation within Datmoor National Park in reaching the goals of sustainable tourism development. *Journal of Sustainable Tourism*, 11(6), 476–498.
- UNEP-WCMC (2017). *Protected area country profile for Malaysia from the World Database of Protected Areas*. Retrieved 10 April 2017 from <http://www.protectedplanet.net>
- UNESCO WHC (2016). *Kinabalu Park*. Retrieved 12 May 2016 from <http://whc.unesco.org/en/list/1012>
- Walker, K., & Moscardo, G. (2014). Encouraging sustainability beyond the tourist experience: ecotourism, interpretation and values. *Journal of Sustainable Tourism*, 22(8), 1175–1196. <http://dx.doi.org/10.1080/09669582.2014.918134>
- Walter, P. G. (2013). Theorising visitor learning in ecotourism. *Journal of Ecotourism*, 12(1), 15–32. <https://doi.org/10.1080/14724049.2012.742093>
- Wearing, S., & Neil, J. (1999). *Ecotourism: Impacts, potentials and possibilities*. Burlington, MA: Elsevier Science Ltd.
- Weaver, D. (2008). *Ecotourism* (2nd ed.). Milton, QLD: John Wiley & Sons Australia, Ltd.
- Young, M. (1999). Cognitive maps of nature-based tourists. *Annals of Tourism Research*, 26(4), 817-839.