THE MODIFICATION OF NATURAL RAFFLESIA TOURISM SITES IN RANAU, SABAH AND ITS INFLUENCE ON THE FUNCTIONAL SPECIES AT THOSE STEREOTYPED HABITAT.

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ABSTRACT

The implementation of nature-based tourism activities at naturally unique sites is expected to contribute to environmental needs while not foregoing socio-economic needs of the area. However, there is increasing evidence that nature-based tourism activities are also threatening natural forested areas. This threat normally comes from the modification of unique sites to suit the perceived market demands. In a case study at Sabah, the modification of natural Rafflesia sites in Ranau for tourism purposes is placing a new pressure at these sites. Three Rafflesia locations with different vegetation in Ranau that is being operated by indigenous communities for tourism, was chosen for a scientific study. The fauna population such as rodents, squirrels, and tree-shrews at these tourism sites were observed and described. The result of this study showed that the function of the species at the different vegetation remained unchanged. However, species abundance had changed in accordance to the kind of modification carried out at these nature–based tourisms sites. This study confirmed that both fauna and flora at the studied sites had changed due to tourism-related modification. Nevertheless, it is difficult to determine the impact of these changes on the survivability of Rafflesia or the sustainability of these tourism sites. Hence, while it is clear that local participation in tourism through Rafflesia-viewing related activities seem promising for the immediate future, long-termed tourism prospect which depends much on the survivability of these flowers, will continue to be uncertain if no effort is placed on the investigation of long-termed habitat stereotyping effect at Rafflesia tourism sites.

Keywords: Tourism Site Planning

1 BACKGROUND

The implementation of nature-based tourism activities at naturally unique sites are expected to contribute to both environmental and socio-economic needs of the said area. For this belief, many developing countries are seriously considering nature-based tourism activities as a development tools. But, Akama (1996) stated that in pursuance of profit margin major stakeholders will by the desired imaged of Kenya. He envision that the end result of the distorted tourist image. Because there is already a conflict of image, this will have trickling on the land-use. Thus, there is increasing evidence that nature-based tourism activities are doing the opposite and is threatening natural forested areas.

A nature-based tourism activity that harms the environment is not a phenomenon that is localized to a particular region. Even at a world-renounced ecotourism destination like Sabah, Malaysia, negative aspect of nature-based tourism is possible. It is possible to see the negative affects of nature-based tourism activity in Sabah through the modification of habitats. It will appear that all tourism sites in Sabah, there are changes in the microhabitat, to suit the general tourist. The reason for stereotyping to occur could be traced back to the unwillingness on the part of the land managers to incorporate localized culture for fear of resentment from its visitors based on the perception of what a tourist wilderness should be like. Hence, habitat stereotyping is another form of foreign culture incorporation into a tourist wilderness, which will continue all sites to receive only the general tourist.

Variation in habitat at tourism destination can be carried out using *Rafflesia*-blooming sites. Studies using *Rafflesia* are interesting because there are several sites with different condition for testing. *Rafflesia* has a non-seasonal blooms and the flower is normally pollinated by insects that is attracted by its rotting smell. As for its seed, it is dispersed by small mammals. A change at any one of this matter can be seen as a modification of unique sites to suit the perceived market demands, and to a certain extent, can be regarded as a threat to a specific habitat.

1.1 Introduction

Habitat stereotyping is a term describing the makeover of a tourist destination to suit the needs to the visitors. Habitat stereotyping occurrence at nature tourism destination relates to a nature-based tourism destination that seems to resemble another close by destination, in terms of its physical setup. This physical setup relates mainly by the biological setup and complemented by the man-made physical setup. The concept of habitat stereotyping is forwarded when a nature tourism destination is generically prepared to a point were the uniqueness of the destination is no longer visible or experienced. Habitat stereotyping occurs when standard materials are used in the provision of facilities and amenities which does not originate for the natural surrounding. Additionally, constant branch pruning and hill sloping will change the direction of water run-off and light intensity. These actions effectively will create a new microhabitat. Actions after actions will lead to habitat changes and if several places have the same situation, one can say that the habitat is being stereotyped. This situation will lead to the deletion of its aesthetic value which subsequently causes the economic value to be lowered. From such outcome, unhealthy competition will emerge to introduce disturbing factors to the sustainability of rural tourism. The action of habitat stereotyping is similar

to the action of increasing product similarity against successful ones. Of course, the action of habitat stereotyping relates mainly to the ecological attributes of a nature-based tourism product at on a micro-scale.

Duplication appears to be a prominent feature for a tourism industry that is still developing. In Sabah, although well-known as a place to see *Rafflesia*, it follows the *Old Tourism* phenomenon (Peters *et. al.*, 2005). This means that duplication among destination will exist. Many *Rafflesia*-blooming sites exhibit this situation. The conditions presented at the *Rafflesia* Information Center and Kg. Kokob Baru *Rafflesia* Conservation Garden can be classified as tourist wilderness. This is due to duplication of information-like centre as a facility of tourism. Of course, the quality of publicly run facility is much higher that of those run by small indigenous community. In this sort of environment, habitat stereotyping does occur. However, more studies on the tourist wilderness environment are needed to fulfill understand development that leads to habitat stereotyping.

The modification of natural sites for tourism is known to pressure the pristine condition of these sites. However, specific conditions are always disregarded when evaluating the impact of tourism on an environment. Most researchers are motivated to apply less complex observation because of management constrain. This approach is normally used when determining the carrying capacity of an area using *Limits of Acceptable Changes* model. While many are comfortable with LAC, in truth, it is a quick solution to the assessment of negative tourism issues on environment. Thus, to fully appreciate the pressure of tourism on pristine environment, one must go-back-to-basics.

1.1.1 Changes in Ecosystem

Modification of natural sites for tourism purposes could change specific environmental conditions which will eventually alter the existing ecosystem, particularly when the modification is linked to ephemeral resources. Ephemeral fragmented resources are known to support large number of species and offer opportunities for studying factors maintaining species diversity. While observing the patterns of *Trollius* sp. resource exploitation in four different globeflower fly species (*Chiastocheta* sp.), Pompanon *et. al.*, (2006) found that specific foraging patterns due contrasting resource exploitation strategies; do occur when there are interspecific competition. They believe that community structuring of these fly species and ultimately species co-existence can be explained by resource partitioning within resource patches during the exploitation of these ephemeral discrete resources. “build and they will come…” is a common saying that many new participants of tourism hold fast to. In Old Tourism (Auliana Poon, 1993), this concept has hold truth because the consumer are not matured and motivated by the movement of the crowd and price. And although Sabah boost of being an ecotourism playground, in truth, its industry still follows the Old Tourism pattern (Peters, 2005) which was brought about by price ware and workforce emphasis. Hence, for Sabah’s tourism scenario, building facilities and preparing amenities, will attract the tourist dollars. And it is this community structuring that give rise to ecosystem changes. Because of such changes, it comes as no surprise for ecotourist to demand access in more pristine environment. Weaver (1998) argued this as another approach to pressure natural environment. This pressure is derived when there is a concomitant loss of wildlife attractiveness rather that the habitat destruction. If such situation is not understood, tourism and environment can never mix.

2 METHODS AND MATERIALS

Three *Rafflesia* locations with different vegetation in Ranau that is being operated by indigenous communities for tourism were chosen in this study. While casual interviews were carried out to obtain initial understanding of the areas, at these sites, vegetation cover was assessed. The small mammal population were sampled and described in terms of its frequency and abundance. The collected data will be tabulated and analyzed for similarity.

3 DATA ANALYSIS AND DISCUSSION

Although *Rafflesia* blooming can be found in several locations throughout the district of Ranau, Sabah, there are three sites that are highly preferred by local tour operators. These sites are located at kg. Kokob, kg. Marakau dan kg. Poring. The tourism site at kg. Kokob has been receiving tourists since the mid-1990s while at kg. Poring, it has been in the past ten years and kg. Marakau only recently. At each of the study site, there appear to major variables in the understanding of habitat stereotyping, namely, the physical and tourism environment while the blooming opportunities can be seen as a constant in this study.

3.1 Environmental Conditions in the *Rafflesia* Blooming Sites at Ranau

The condition at a *Rafflesia* blooming site varies. All sites that were studied are active *Rafflesia* blooming sites under different environmental conditions. The variation is mainly linked to its land-use and general conditions. **Table 1** shows the different environmental features at each study site. These features are the general land use, its landscape, as well as the conditions in those forests.

Table 1: *Observed environmental condition at studied site*

Particular	Site		
	Kg.Kokob	Kg.Marakau	Kg. Poring
Generalized Land use	**Recreational**	**Idle**	**Agriculture**
General Landscape	Hilly	Hilly	Flat
Canopy Cover	**Medium**	**Medium**	**Low**
Leaf Litter	High	Medium	Medium
Soil Moisture	High	Medium	Medium

In general, all three study sites are found on undulating land. Based on **Table 1**, the site at kg. Kokob appears to be prepared for tourist more than any other sites. For kg. Poring, it would seem that there are a new comer in Tourism while, kg. Marakau have not been exploited its tourism potential. Of course, the preparation of these studied sites for tourist are referring to the physical aspects only. The following figures show the condition at these study sites. The photographs that appear in **Figure 1** were all take on site where *Rafflesia* had already bloomed and were visited by tourists.

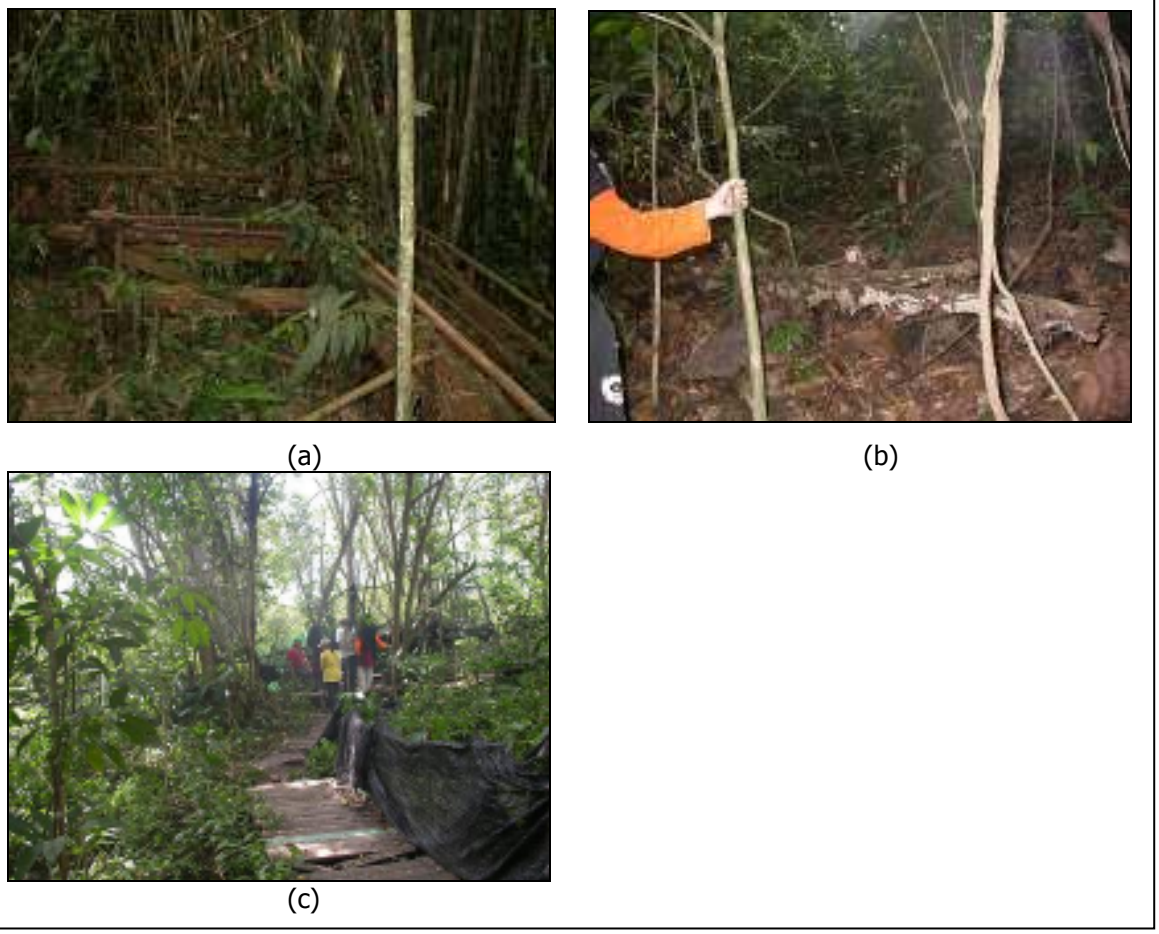

Figure 1: *study sites at (a) kg. Kokob, (b) kg. Marakau, and (c) kg. Poring*

Figure 1(a) shows the typical situation in the *Rafflesia* tourism site at kg. Kokob. Kg. Kokob is situated around hilly areas. The conditions of the *Rafflesia* tourism site at kg. Kokob is on undulating land. It is surrounded by thick bamboo covering as it is in a small valley with streams. **Figure 1(b)** shows the exact location where *Rafflesia* had bloomed at kg. Marakau. Only a barked-wire fence exist, which appear more for territorial marking rather than tourism-related. Hence, although the site at kg. Marakau is pristine, it lacks basic tourism facilities when compared to kg. Kokob. As for **Figure 1(c)**, it shows the situation in the *Rafflesia* tourism site at kg. Poring. In general, *Rafflesia* at Kg. Poring is found on typical agriculture land. This noted through its flat landscape and its low canopy covering which is ideal for crops. The *Rafflesia* site was formally an idle rice paddy plot. From all the three studied sites, *Rafflesia* blooming can be seen under numerous conditions.

3.1.1 Climate within Environment

The existence of *Rafflesia* is not affected by environmental conditions mainly because it parasites on a host that can exist in many places. Its bloom on the other hand, will depend on several environmental conditions. From other researchers work (Nais, 2000), the blooming of *Rafflesia* depends much on the moisture content at the site. Because Moisture is influence by factors such as temperature, hence the understanding of daily temperature will give an insight on the blooming potentials of these sites.

Figure 2 shows that daily temperature at the three study sight. This recording was taken simultaneously for five days. The figure generally shows that each study site have different temperature range but all falling within 23ºC and 27ºC.

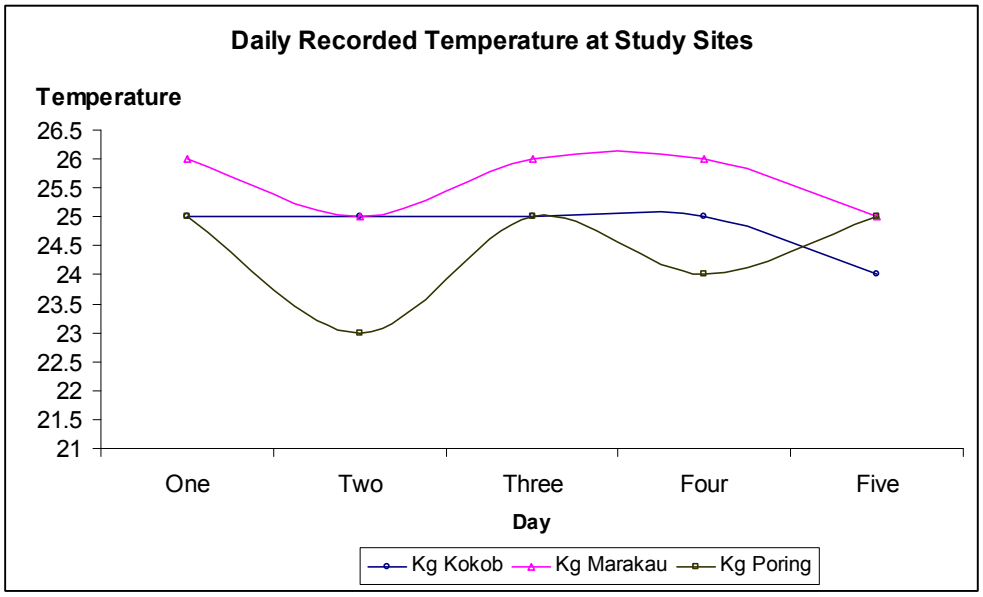

Figure 2: *Daily recorded temperature at study sites between 18th Dec 07 to 22nd Dec 07*

Temperature at Kg. Marakau is the highest among the entire three study site, while the lowest will come from Kg. Poring. Although Kg. Poring is an agriculture land, it has low temperature mainly because it is surrounded by a thick forest. Kg Kokob temperature is less higher then Kg Marakau because the area is maintained will greenery while at Kg. Marakau, nothing has been done. Hence, it can be deducted that the soil moisture at Kg. Poring is high compared to the other two study sites, while the lowest is at Kg. Marakau. As such, there will be more opportunities of observing *Rafflesia* blooming at kg. Poring, while the least likely to see is at kg. Marakau. This assumption has been confirmed through the casual interview with the property owners of the studied site.

3.2 Relationship of Fauna and Study Site Land Use

The dispersal of the parasitic plants on the other hand, depends on certain functional fauna. According to Nais (2000), *Rafflesia* is dispersed by rodents and squirrels. The result of this study showed that the function of the species at the different vegetation remained unchanged. Both rodents and squirrels act as distribution agents of *Rafflesia*. However, the role of these animals has not been fully investigated. Moreover, Nais (2001) believe that other pathways of seed dispersal may occur since ants and termites are commonly seen around the plants. But the use of these fauna for land use study is an exciting field. McIntyre *et. al.*, (2001) found that different land use will have different fauna community structure. While observing different land use, i.e. industrial, residential, agricultural and desert, they encounter different groups of arthropods such as insects and mites. They concluded that the ground arthropod community composition varied with land use. Predators, herbivores, omnivores, and detritivores among arthropods. They concluded that fauna abundance cannot necessary be used as good indicators to certain effects. They suggest further studies on the different in

ecosystem functions with land use. And certainly, studies on the possibility of using functional fauna as indicators, is a possibility. Hence, the functional fauna could be used as indicators for the condition of a tourism environment.

3.2.1 Small Fauna at Rafflesia *Site*

Generally, Rafflesia depends on small mammals as dispersal agent for its fruit body. Nais (2001) stated that wild pigs, squirrels and elephants have been proposed as Rafflesia dispersal agents. However, squirrel (*Callosciurus notatus*) and tree shrew (*Tupaia tana*) were recorded as actually dispersing the seeds of Rafflesia. An interesting aspect that Nais (2001) pointed out was that the distribution data of these two animals suggest that some degree of co-occurrence with *Rafflesia*. This study shows interesting aspect of this co-occurrence. **Table 2** shows the abundance of small mammals caught using the common spring trap at the Rafflesia sites.

Table 2: *Observed Fauna at studied sites*

Spesis	Tangkapan		
	Kg Kokob	Kg Marakau	Kg Poring
Order Rodentia			
Famili Sciuridae			
Callosciurus sp.	0	0	1
Famili Muridae			
Sundamys sp.	1	0	0
Rattus sp.	1	0	2
Order Scandentia			
Famili Tupaiidae			
Tupaia sp.	0	2	**8**

From **Table 2**, squirrels, rats or mice, and tree shrews have been caught at the study sites. At, kg. Poring, it is evident from **Table 2** that tree shrews dominate the tourism site. At kg. Marakau, tree shrews were caught while rats were caught at kg Kokob. This table indicates that *Rafflesia* tourism sites need not necessarily have the same diversity of species. Ecologically, tree shrews seem to favor agricultural landscape while rats prefer vegetation closer to human settlements. Rizkalla and Swihart (2007) explain this phenomenon through their Full Model over Connectivity Model. In the Connectivity Model, landscape features is stated to influence the mobility of an animal. This model does not consider climatic conditions. Rizkalla and Swihart (2007) found that abiotic factors such as temperature do also have influence on the motivation of a small animal species in finding a forest for shelter and accordingly, the mobility of squirrels are high compared to other species like rodents. Hence, the small mammals' diversity varies at the tourism study sites.

No two tourism sites are the same. At, kg. Poring's *Rafflesia* tourism site, with its average temperature low compared to other places, tree shrew is the dependent dispersal agent of *Rafflesia* fruit body. On the other hand, rodents seem to be the dependent dispersal agent of *Rafflesia* fruit body at kg. Kokob. As such, it will come as a no surprise for a tourist to comment that the *Rafflesia* tourism site at kg Poring appears more natural than of those at kg Kokob, simply because of the potential dispersal agents to be encountered. But, at all the three study sites, the tourist can

tolerate the pristine condition of the *Rafflesia* tourism site simply for the small chargeable fee, the tourist have a willingness to pay. However, species abundance had changed in accordance to the kind of modification carried out at these nature–based tourisms sites.

3.3 Quality and Value of *Rafflesia* Blooming Tourism Site at Ranau

In nature-based tourism, the quality and value of a tourism site depends on the environment of the tourism site. A study was carried out by Murphy *et. al.*, (2000) on the perception of a tourist about a tourism product. Based on their study, two component were identified, namely the environment component and the infrastructure component. This study revealed that the environment component is the center piece of a tourism destination. This component can have an influence of tourist perception on the quality and value of a tourism product. On the other hand, although infrastructure component has influence on the tourist perception of both quality and value of that tourism product, its influence is lower that the environment component. This finding explains the popularity of locally operated *Rafflesia* Tourism site even though the conditions at these are not pristine.

The popularity of *Rafflesia* as a tourism attraction indeed has prompted local entrepreneurs to venture into tourism services through the provision of certain facilities. Basic facilities will include utility, transport, accommodation, rest, scenic, and sewerage. Because of the condition at kg. Kokob, the facilities that are placed here will include cemented steps, wooden bridge-like boardwalks, wooden railing throughout the site. At kg. Marakau, the tourism activity is not active all year round. As such, there are no longer lasting tourism facilities. As for kg. Poring, it is clear that this site had been landscaped with shady trees to reduce the surrounding temperature. Besides this, because it has a flat area, the physical facilities that are erected will include wooden boardwalks and simple wire fences at certain key positions. The following table summarizes the tourism facilities that are at the *Rafflesia* tourism sites.

Table 3: *Tourism Facilities at study sites*

Facilities	Site		
	Kg.Kokob	Kg.Marakau	Kg. Poring
Utility*			
Electricity	√	X	√
Water	√	X	√
Transport*			
Boardwalk	√	X	√
Raised Boardwalk	√	X	X
Cemented Pathway	√	X	X
Accommodation			
Basic	√	X	√
Rest			
Bench	√	X	√
Scenic			
Viewing Area	X	X	X
Sewerage			
Toilet	√	X	√

Table 3 shows the existing facilities at the study sites. It shows that the *Rafflesia* tourism site at kg. Kokob is more equipped to handle tourist needs as compared to the

site in kg. Poring, or kg. Marakau. Each of the study sites have not been fitted with costly infrastructure. By comparison, the facilities at kg. Kokob emphasizes on heighten security as compared to the facilities at kg. Poring. The facilities that seem to have more impact on the general environment is the transport-related facility, namely boardwalks and pathways since it impact the *Tetrastigma* sp. the grape-like vine host plant of *Rafflesia*. Because at kg. Kokob there are more variety, tourism impact can be managed and at the same time, the tourism atmosphere can be diversified. Based on *ad hoc* discussion with the tourism site operators, it would appear that the site at kg. Kokob is still pristine and needs more conservation security. But the so-called "pristine" condition can be complex and subjective, as one would note when considering the situation at kg. Marakau. But critically, there is a need to determine if the tourism atmosphere has any relationship with the forested atmosphere.

The situation at these sites demonstrates serious competition where a specific type of organism will thrive. It will appear that in a tourism site close to human shelters, there will be more rodents at those tourism sites. These rodents are able to habituate these environments better mainly because the vegetation at these has been changed by the local operators to suit the perceived needs of the tourists. This study confirmed that both fauna and flora at the studied sites had changed due to tourism-related modification. Interestingly, Saairnen (2005) argued that tourist wilderness perception can effect management decision. Hence, the changes were influenced greatly by socio-economic needs. The provision of tourism facilities and amenities in Sabah, particularly at RCIS sites area largely influenced by the demands of the visitors rather that the need to support environmental awareness activities.

3.4 Current Issues

But, at kg. Kokob, rodents may well be the distributing agents of *Rafflesia* seeds. And because tourist may not appreciate rodents, it would come to no surprise to have tourist demanding more pristine environment. Indeed, this will pressure existing environment as described in Weaver (1998) concept. This is illustrated in the following figure.

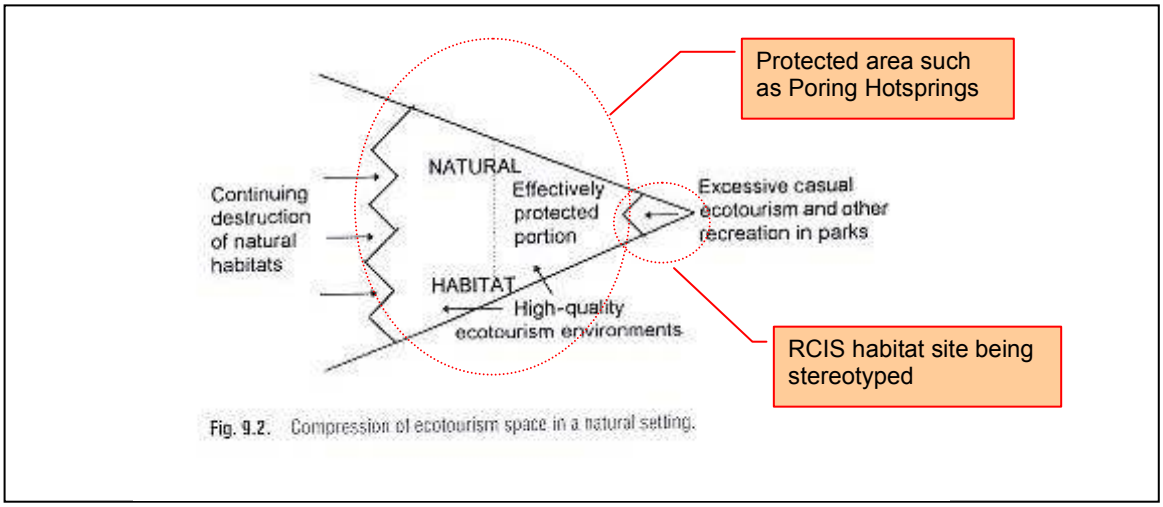

Figure 3: *Habitat Stereotyping in RCIS, Sabah*

In **Figure 3**, The nearest adjacent protected natural forest is at Poring Hotsprings National Park. As for the *Rafflesia* blooming sites that are on private lands, it is referred as RCIS. Based on the above figure, RCIS is indirectly pressuring the demand for ecotourist to venture into protected areas. This situation is the opposite of the primary intention of RCIS.

Such perception was described by Saairnen (2005) appropriately to suggest that tourism industry impact is more damaging when it construct people's idea of wilderness rather that the direct use of that wilderness environment. This is because tourism is challenging the traditional idea of the term wilderness. Thus, to rid the site of rodents to suit the needs of the tourist may be damaging if these rodents are the only dispersal agent. Nevertheless, it is difficult to determine the impact of these changes on the survivability of *Rafflesia* or the sustainability of these tourism sites.

4 CONCLUSION

There is increasing evidence that nature-based tourism activities are doing the opposite and is threatening natural forested areas. Habitat stereotyping explains how nature-based tourism activities can be negative to the natural forested areas. A change on this matter can be seen as a modification of unique sites to suit the perceived market demands because habitat stereotyping relates mainly to the ecological attributes of a nature-based tourism product at on a micro-scale. The preparation of a site for *Rafflesia* tourist visitation and viewing can be done in several approaches once considering the range in which the plant or its host is able to tolerate. But, more studies on the tourist wilderness environment are needed to fulfill understand development that leads to habitat stereotyping. Slight variation in landscape, design and others, will not lower the opportunity of sighting or the tourism experience. One should go-back-to-basics to understand the situation, otherwise, tourism and environment can never mix. While it is clear that local participation in tourism through *Rafflesia*-viewing related activities seem promising for the immediate future, long-termed tourism prospect which depends much on the survivability of these flowers, will continue to be uncertain if no effort is placed on the investigation of long-termed habitat stereotyping effect at *Rafflesia* tourism sites. Critically, there is a need to determine if the tourism atmosphere has any relationship with the forested atmosphere. In this study, it is clear that there are three different tourism experiences at the three *Rafflesia* tourism sites. These sites vary due to both tourism preparedness and the condition of the environment. Although small mammals' diversity varies at the tourism study sites, species abundance changed in accordance to the kind of modification carried out at these nature–based tourisms sites. Sites that are within human settlement have more fauna that can be regarded as "pest". Although these "pests" have a functional purpose in a *Rafflesia* blooming site, the tourist perception may be generated through negative imaging. If tourists are not well-informed, they are most likely to demand for more a pristine environment, which will place pressure existing environment. In a rich culture environment like Malaysia, stereotyping should not occur. There have been many facilities and amenities that were built without reducing any uniqueness of a particular environment. Thus, the concept of stereotyping occurrence in nature tourism destinations appears provocative simply because it is novel, let alone habitat stereotyping. But, while this is an exploratory study on the effects of structural changes at tourism sites and how it will change its environmental situation, it is clear that more studies are needed. Of course, the more interesting question is the impact of these changes on the survivability of *Rafflesia* or the sustainability of these tourism sites.

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