Resilience in the face of flash floods, landslides and mudflows: the experience of tourist spots in cameron highlands

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Abstract. The flash floods, landslides and mudflow in Cameron Highlands are catastrophes which threaten local life and economic activities which depend on tourism activities. Several series of flash floods, landslides and mudflows which occurred in 2014, 2016 and 2018 in Cameron Highlands illustrate that they are the biggest threat to the highland tourism spot in the coming future. This tourist spot may face the risk of being unvisited for a while because of the untreated conditions after the flash floods, landslides and mudflows. This article aims to describe a brief historical summary of flash floods, landslides and mudflows in Cameron Highlands and how this disaster can threaten the readiness of activities in other highland tourism sites. The discussion focuses on the process of building resilience to flash floods in the Cameron Highlands over the last few years. This article ends with a discussion on the challenges to be undertaken in the process of enhancing Cameron Highlands as a highland tourism destination. The discussion suggests that the approach towards achieving sustainable tourism development goals especially in Cameron Highlands should return to the original goal of tourism development with its aim to minimize the environmental impact and protect the human habitat.

1. Introduction

Tourism is the largest and fastest-growing industry in most countries in the world [1, 2]. It is a source of employment opportunities, income growth and a growing source of wealth in most countries that develop the tourism sector as a major economic resource [1, 2]. However, its rapid development has had many environmental effects and threatened the lives of people living in the tourist destinations involved [3,4]. The occurrence of flash floods, landslides and mudflows is not only detrimental to the physical environment, but becomes more serious when it involves damage to the property and the loss of human life. The same thing has occurred in the Cameron Highlands tourist center. A series of flash floods, landslides and mudflows have not only caused significant damage to the property but have also resulted in the loss of life due to heavy currents and being buried under the mud that occurred in a short period of time. Therefore, it is important to know how this disaster caused the tourist spot to become paralyzed and the residents were unable to carry out activities for a period of time after the disaster. The discussion of the article aims to focus on a brief historical summary of flash flood, landslides and mudflows series in Cameron Highlands and how this disaster can threaten the readiness of activities in highland tourism sites. The challenges to be undertaken in the process of enhancing Cameron Highlands’ resistance as a highland tourism destination will be revealed at the end of the discussion.

Studies on urban resilience have been conducted by several scholars such as Meerow et al., 2016 and Ismael Aguilar-Barajas et al., 2019 from various perspectives and approaches. However, few have studied it from the perspective of resilience in highland tourism areas. Urban resilience as a concept is
amenable to different disciplinary perspectives and may be applied to a variety of distinct hazards or groups of hazards [5]. In its simplest form, urban resilience refers to the ability of an urban system to maintain or rapidly return to desired functions in the face of a disturbance. This involves short-term coping as well as long-term adaptation [5]. Urban resilience encompasses numerous and interrelated social, economic, institutional and political dimensions: enacting urban resilience is inevitably a contested process in which diverse stakeholders are involved and their motivation, power-dynamics, and tradeoffs play out across spatial and temporal scales” [5]. A study by Ismael Aguilar-Barajas et al., 2019 [6] focused on the aspect of urban resilience that discussed how catastrophic flash floods occurred in urban areas as a result of planning errors. Therefore, it is a bit difficult to present the concept of resilience in the highland tourism area which is suitable to be used as a working definition. This may have to do with the nature of the highland tourism center itself, which is highly vulnerable, sensitive to disasters and at risk of any man-made changes. These include the development of commercial agricultural areas, tourist spots and various highland related economic activities.

The development of the environmental element, which is a component of Sustainable Tourism, becomes a foundation in developing sustainable tourism in most of the developing countries [7]. A study of the application of environments physic is needed to keep the environment well maintained so that it provides the needs of the present while ensuring the options still being preserved for the future. In an effort to transform a tourism destination, it is essential to convert destination product into destination experience and destination marketing into destination management. To bring about accelerated tourism development. It is essential to turn to strategic management and to build a trademark and destination brand that has quality and meets the need of locals and tourists [9]. Therefore, the direction of the development of tourist spots in the highlands should also take into account this aspect of change.

2. Methods
This research uses direct observations, combining the elements of the environment and tourist spot and interviewing stakeholders in that particular area. The researchers had conducted site visits after the occurrence of flash floods, landslides and mudflows and repeated visits as soon as the tourist spots were reopened to see the changes that had taken place. A brief interview with the owner of the tourist spot was also held during the visit to find out how they dealt with the damage that occurred until it recovered as usual.

Cameron Highlands as a highland tourism destination consists of several tourist spots which are always an attraction among local and international tourists as a well-known ecotourism and agro tourism destination in Malaysia. The attractions in Cameron Highlands are located in Ringlet, Tanah Rata, Brinchang, Kea Farm, Kg Raja and Lojing. Ringlet is the gateway to Cameron Highlands from Tapah, Perak, while Lojing is the gateway to Cameron Highlands from Kelantan and Raub is the gateway from Pahang. Figure 1 indicates specific tourist spots in Cameron Highlands by location.

The purpose of this article aimed to explain how this disaster can threaten the readiness of activities in the highland tourism sites and how the tourist spot reacts to resilience by focusing on resilience during flash floods, landslides and mudflows. This research is important in order to develop an environment-based sustainable tourism specially to increase the number of tourists to visit but at the same time to maintain sustainability in Cameron Highlands as a highland tourist spot in Malaysia.
Figure 1. Tourist spots in Cameron Highlands

Data Analysis
Cameron Highlands is an eco-tourism and agro-tourism highland tourism destination that often becomes the focus of tourists in Malaysia compared to other highland tourism destinations [2]. However, this tourism location has often experienced landslides, flash floods and mudflows. A series of mudflows such as the Kuala Terla incident in November 2014 and May 2016 left nearly 1,000 residents in four villages in Ringlet to lose connection with the main road. The flash floods, landslides and mudflows incidences were linked to land development factors in Cameron Highlands for
agricultural purposes and tourism spot development and various commercial activities to meet the demand of tourists, causing the land to be explored to the maximum; to the extent that it violates the limits of its ability to accommodate. What is worse is the greed of some parties which have carried out illegal land exploration for agricultural activities around Ringlet related to flash floods, landslides and mudflows. The following section will present some of the serious landslides, flash floods and mudflows series in Cameron Highlands that have been recorded according to time series.

3. Result and Discussion

3.1 Major flooding, landslides and mudflows events: a brief historical summary in Cameron Highlands

3.1.1 Flash Flood and Mudflows (2014). The mudflow and landslide incidents in Ringlet and Lembah Bertam in November 2014 are worth remembering. The tragedy must not be forgotten because both disasters have cost lives and terrible destruction. The post-tragedy events had uncovered various deficiencies; however, the most worrying one was the illegal exploration of land that had been indirectly recognized as the cause which had exposed the resort to the risks of natural disasters such as mudflows and landslides. Different initiatives had been taken, and even the Sultan of Pahang, Sultan Ahmad Shah himself, had directed the illegal land exploration for agricultural activities throughout the Cameron Highlands to be stalled. The then government also proposed the relocation of high-risk residential and industrial areas around Cameron Highlands in an effort to control encroachment and landslides, but it is difficult to determine the extent of its implementation.

Mudflows also occurred in Ringlet in 2014 when heavy rainfall continued and the rise in water levels of Sungai Ringlet (Ringlet River) caused mudflows that affected more than 20 resident homes as well as damaging several resident vehicles (refer to Figure 2-5). Residential settlements located in that area were prone to be exposed to landslides and mudflows. The incident also resulted in over 20 houses and several vehicles being swept away by mudflows in Pekan Ringlet (Ringlet Town), Kampung Baru Ringlet and Kampung Ulu Merah. Among the areas affected by the knee-high mudflows were Pekan Ringlet, Kampung Baru Ringlet, Kampung Ulu Merah. The affected area was located only four kilometers from the mudflow location in Lembah Bertam that killed four people on 23 October 2014. In a 2014 incident, four people were killed; a stream of rubbish, trees and sand was also released that caused 80 homes on the river bank and dozens of vehicles, shops and Surau An Nur of Lembah Bertam to be destroyed. The flood was caused by the overflowing water from the Sultan Abu Bakar (SAB) Dam following a sharp rise in water levels up to 0.6 meters per hour and endangering the dam's structure.

![Figure 2. Post-flood impact: one reported dead and another missing in a mudflow that hit Cameron Highlands, Pahang.](Image)
Figure 3. The mud floods caused the houses and vehicles to be swept away by heavy currents

Figure 4. It was reported that some children were swept away by heavy currents

Figure 5. About 150 residents were transferred to the relief center

In the same incident, it was reported that about 150 people had been evacuated to a relief center as a result of the flash flood. It was also reported that a vegetable farm worker died as a result of a landslide in the highlands.
The mudflows that occurred at Pos Brooke is considered to be the worst flood ever occurred in Cameron Highlands by the Orang Asli (indigenous people) who have been living in the area for a long time. Residents of Pos Brooke have always been anxious during the monsoon season because of the frequent occurrence of mudflows caused by the erosion of the hills mainly due to agricultural exploration activities near their homes. Some hills have been cleared for vegetable farms; as such, mudflows occur when the heavy rains flow down these areas. The hill is located only 100 meters from the resident homes. The mud also flows into the road surface, affecting the movement of the Gua Musang-Lojing route users. For the people of Pos Brooke, the mudflows caused by the cleared hills by vegetable farmers are not something new to the Orang Asli in the village. This is because during the year, mudflows occur more than five times, especially during heavy rains. Most roads in Pos Brooke are flooded with mudflows and obstructing the Orang Asli from using motorcycles to get to the nearest town for various purposes. Despite the various objections submitted to the state government and farmers, no action was taken.

3.1.2 Flash Flood 1 (2016). Ringlet faced the most impact by flash flood and mudflows compared to other tourist spots in Cameron Highlands. Ringlet was hit by a flash flood when the water in the nearby river rose above the cliff level due to the heavy rain. The flash flood that occurred in 2016 was considered as the worst flash flood ever in Pekan Ringlet compared to the previous incidents. The flash flood was linked to the discharge of water from the Sultan Abu Bakar Dam in Lembah Bertam. The flood incident was so bad because the water rose up to the waist-high level with a strong current of river water entering the residents’ homes and drowning most houses in an instant. Residents failed to save important documents because the houses were flooded quickly. In the incident, there were also flood victims who were reported dead due to the flash floods and landslides in Lembah Bertam. There were also victims injured in the incident. The Cameron Highlands tourism sector was also affected by flash floods, landslides and mudflows. Damage to the infrastructure, buildings and tourism sites made it difficult for local economic activities to be carried out by the locals. They also had problems with the supply of clean water because the water plant was damaged and debris and mud flowing into the river also affected the tourism sector.

For the purpose of slowing down the effects of flash floods, the residents of Pekan Ringlet expressed their hope that the authorities could expand and deepen Sungai Ringlet as soon as possible. This is because the water level of Sungai Ringlet has risen sharply due to the narrow stream of Sungai Ringlet and is unable to cope with the overflowing water of Sungai Bertam, especially during heavy rainfall. Therefore, it can be concluded that the catastrophe that occurred in Ringlet was not only resulted from land exploration for commercial activities, but was also influenced by the natural factor that the river could not function fully because it was shallow and could not cope with the sudden overflow of water. For that reason, efforts to deepen and widen Sungai Ringlet should be undertaken immediately to avoid the same occurrence.

3.1.3 Landslides (Oktober 2018). Cameron Highlands was hit by an extraordinary landslide in October 2018 that involved the death of three non-Malaysian citizens. The landslide occurred when their rumah kongsi was buried in the tragedy. Although the three victims were not Malaysian citizens, it is still heartbreaking to think about the fate of the married couple and another individual who died in the catastrophic crash that hit them while they were sleeping. Disasters are hard to predict, especially when it involves natural disasters, but they can at least be prevented, including the Cameron Highlands case. According to information, the cottage occupied by the Myanmar farmer at the landslide location at Batu 49, Kampung Tiga, Kuala Terla, was built in an illegal area, which was below a steep slope. Despite its status as a tourist destination, issues such as illegal land exploration, the presence of illegal immigrants and weak enforcement are actually synonymous with Cameron Highlands, not a year or two, but are said to have been rooted for a long time. The latest landslide incident in 2018 should be carefully studied, especially to answer the questions of the general public on how it was possible for the victim to build a home in an illegal location in a sloppy area. The question is, is there only one house or are there any other such premises, including illegal farms in a risky location? Not only do we worry about the lives of settlers, but we also worry about the risks that the local residents face.
3.2 Resilience in the face of landslides, flash flood and mudflows

A series of landslides, flash floods and mudflows provide a wealth of experience, especially on the way the tourist spot recovers after the devastating catastrophe. The effects of landslides, flash floods and mudflows have caused many of the tourist spots to be severely damaged, and needed to be restored within a short period of time with the majority of the expense being individually incurred by the homeowners, agricultural landlords, tourism centers and commercial centers involved. However, the state government has always been the first to come to help the victims of landslides, flash floods and mudflows in Cameron Highlands, providing assistance such as flood relief centers and various basic assistance such as sending rescue teams, food supplies and clothing as well as other forms of assistance. However, based on the experience of a series of landslides, flash floods and mudflows, the owners of tourist spots need to recover and repair the damage the soonest possible. This is because, tourists arrive in Cameron Highlands all the time and the tourist spot needs to be restored as soon as possible to meet the demands of the incoming tourists to Cameron Highlands.

3.2.1 Respondent 1 (owner of a vegetables farm). Ringlet is a small town that is the gateway to Cameron Highlands from Perak. The town is located on a sloping site and is relatively narrow compared to other tourist spots in Cameron Highlands. However, Ringlet became well-known after the flash floods, landslides and mudslides that occurred in 2014, 2016 and 2018. Therefore, it is important to study how far tourist spots have their resilience in this area after a few series of flash floods, landslides and mudslides.

An interview with the owner of the vegetable garden in Ringlet described the several times his garden had been damaged by flash floods and landslides. However, the events of 2014 and 2018 were so bad that they destroyed almost all of the crops that he had been working on for so long. After the landslide, he received assistance from local authorities such as police, firefighters, Red Crescent associations and various other community groups during their rescue operation followed by early cleaning at the affected orchards. Afterwards, the efforts of cleaning and restoring the garden were entirely in their hands. The vegetable gardening effort did not take long time as farmers took action to dispose of all the crops that were not saved because of floods and landslides. This cleaning process needed to be done immediately with the budget from the farmer.

3.2.2 Respondent 2 (Owner of the flower gardeners. Flower gardeners are also severely affected by flash floods, landslides and mudslides. Although the size of the farm at Ringlet is not as great as the flower farms at Tanah Rata and Kea Farm, farmers were severely affected by the 2016 and 2018 disasters. Crops were badly damaged due to flash floods and mud floods and could not be saved. Entrepreneurs suffered huge losses. After the catastrophe, entrepreneurs had to put aside their own capital for the process of cleaning and replanting.

3.2.3 Respondent 3 (A souvenir seller. Tourists also will get a variety of souvenirs in Cameron Highlands as a souvenir and gift for their friends. However, the sale of souvenirs is adversely affected in the event of a major disaster. There were cases of souvenir shops being swept away by storms during a flash flood in Ringlet.

The result shows that there is a lack of public awareness of environmental hygiene that can affect the quality of tourist attractions, as well as a lack of facilities to maintain the cleanliness of the environment after the disaster happened. Therefore, it is necessary to educate the surrounding community about the importance of quality in a tourist attraction, the provision of adequate facilities, and the need of support from stakeholders in maintaining environmental sustainability in Cameron Highlands especially after the disaster. There are many other potential tourist spots in Cameron Highlands has the potential to increase the number of tourists traveling to the place.

In an effort to address the issue of flash floods, landslides and mudflows in Cameron Highlands, the Pahang state government has taken joint action with related agencies (Department of Environment, Royal Malaysian Police) in addressing the issue of illegal land intrusion in Cameron Highlands. This measure was found to be effective in the efforts of the state government to hunt down those involved in the issue of illegal land intrusion more effectively. Even though many proposals have been recommended to be implemented as a development guide platform in the highlands, they still stay as a plan. Implementation is still vague and unclear while disasters keep on happening whether on a small
or large scale. Action should be taken immediately as the fate of the people living and actively involved in the tourism economy in the highlands needs to be given due rights and protection.

3.4. The challenges to be undertaken in the process of enhancing the Cameron Highlands spot resistance as a highland tourism destination

Rapid development in the highland tourism center area requires a comprehensive planning and management strategy that is capable of predicting future development and growth impacts. Management expertise is required in managing the tourist spot in the highland tourism center as it is at risk of being exposed to various threats of environmental quality degradation such as pollution (water, air and domestic waste), flash floods, landslides, mudflows and micro climate change. The power of management in identifying financial products and resources is very important in the management of a tourist area, including in the highland tourism area. This management expertise is able to create a new paradigm in the management of the competitive tourism industry while at the same time retaining the needs of future generations.

Efforts to conduct research in high-risk areas need to involve a combination of expertise in various fields with the local and overseas stakeholders. Among the programs that can be implemented are community action plans in reducing the risk of community-based disaster. In line with this, a 2015-2030 Disaster Risk Reduction plan was introduced in Malaysia to understand local disaster risk. The involvement of all stakeholders including the local community is very important in developing a risk reduction action plan for community-based disaster that often occurs in Cameron Highlands.

There is a need for a business vitality plan and a comprehensive geospatial data management to maintain future disaster risk information as well as development and investment of the Cameron Highlands area as a tourist attraction spot. Future land use planning should take into account local disaster risk information. The efforts to expand the concept of green tourism development and sustainable Cameron Highlands forest management should be encouraged, the information on disaster risk in this area needs to be evaluated scientifically and widely spread to promote future development and investment based on disaster risk. The role of science and technology has been proven to be successful in assisting any policy-making process based on risk information. Malaysia has also expanded the concept of Sustainable Development Goal (SDG) by issuing development planning guidelines to make cities more resilient to disaster.

4. Conclusion

New approaches to sustainable tourism development, especially in developing countries like Malaysia, should return to the concept of tourism development aimed at minimizing the impact of damage to the human and local environment. This is because, if this goal is not met, then the tourism development will end in an extraordinary phenomenon of the similar natural disaster. If all parties are aware of protecting and safeguarding the rights of others, such things can be avoided.

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