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Tourism and Natural Hazards: River Landform Changes Due to Geohazards and Its Influence on the Economic Development of Ecotourism in Sabah, Malaysia

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Abstract: Geohazards are often portrayed as a calamity that has a detrimental effect on humans and the environment. It is usually uncommon to consider geohazards in the opposite context. Therefore, this study examines the positive effects of an earthquake event centered in Ranau, Sabah, especially from the aspect of ecotourism development. A total of 27 homestay entrepreneurs in Kampung Melangkap were interviewed in this study. The raw data collected during the interview were conceptually and descriptively analyzed using the ATLAS.ti 8 software. Observation techniques were used to supplement the interviews. This study found that the morphological changes of the Panataran Kedamaian River in Kampung Melangkap were a result of an earthquake centered in Ranau. This disaster has led to the development of more interesting physical attractions, attracting many tourists to Melangkap Village. The dramatic increase of tourists in Melangkap during the post-geohazard phase has become the starting point for the economic growth of ecotourism in the region. This is shown by the increase in the number of homestay entrepreneurs, the expansion in the size of their businesses, higher overall income of homestay entrepreneurs, and better job opportunities for the local population.

Keywords: hydrogeomorphology; river landscape; disaster; resilience; earthquakes; Melangkap homestay



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1. Introduction

Generally, humans are exposed to or experience various hazards which can be categorized into three types: natural hazards, environmental degradation, and technological dangers [1–3]. Natural hazards can be classified into three categories, namely hydrometeorological hazards, geophysical hazards, and biological hazards. Earthquakes are an example of geophysical hazards, while floods are an example of hydrometeorological hazards [4]. The connotative meaning of hazard is not similar to disaster, as many scholars poorly understand it [5]. Hazardous phenomena do not necessarily trigger a catastrophe since the disaster itself is the culmination of the hazard resulting from human vulnerability [6–8]. The risk or expected loss will not exist without the element of vulnerability in the area where the hazard occurs [9]. In other words, the risk of loss in the form of a disaster will only occur when there is human activity in the hazardous area.

It is undeniable that natural hazards often trigger disasters or even catastrophes that affect the environment as well as humans to an extent where people only view the phenomenon from a negative perspective [10]. Hazards are seldom regarded positively, although in reality, every hazardous occurrence has its own benefit or positive aspect. Several scenarios may be used to demonstrate this fact. For instance, natural forest fires can

lead to the loss of plant life, the death of wild animals, and the alteration of the physical and chemical properties of soil [11]. Simultaneously, however, forest fires can also positively impact the forest's ecosystem development [12]. In another example, the long-term positive effects of floods can be seen when it improves the ecological health of wetlands and soil fertility [13]. Floods are also important in the process of groundwater recharge, especially in the ecology of arid and semi-arid lands [14]. Likewise, volcanic activities, although seemingly destructive, have been found to be a tourism industry attraction and even a source of economic revenue for local communities [15,16].

This indicates that the lens used to see hazardous phenomena must be extended. Natural disasters should not just be negatively viewed, but positively as well [7,8]. According to the United States' Geological Survey [17], the Ranau earthquake in June 2015, with a magnitude of 6.1 on the Richter scale, or level VII (very strong), was one of the strongest earthquakes in Malaysia after the Lahad Datu earthquake in 1976 with a record of 6.2 on the Richter scale [18,19]. Mud floods also occurred after the 2015 earthquake in Panataran Kedamaian River, Kota Belud [20]. Thus, the issue arises as to whether the occurrence of geohazards (earthquakes, debris flow, and mud floods) also have a positive impact on the local population, particularly concerning the development of ecotourism. Based on that, this paper examines the positive effects of natural disasters (earthquakes and mud floods) on the rural community of the Kedamaian River Basin, Kota Belud, particularly from the aspect of economic development of ecotourism. In addition to being a key agent in the economic development of local communities [21], the tourism sector is also a major contributor of Malaysia's income source [22,23], particularly in Sabah [24]. This is a highly important topic to investigate, as the interaction between the environment and tourist activities should be studied from an integrated point of view [25].

2. Literature Review

2.1. Impact of Disasters on the Tourism Industry

Several studies have discussed the impact of disasters on the tourism sector, whether in the context of Malaysia or globally. Interestingly, the focus and outcomes of discussion suggested by previous research sometimes differ. Although previous research has generally been more focused on discussing the adverse effects of natural disasters on the tourism sector, some researchers have viewed it from the opposite perspective.

The emphasis of discussion often highlights the economic aspect. The tourism industry is not only a critical economic catalyst of a country [26], but also plays a role in improving the living standards of the community [27]. Haque and Haque [28] conducted a study in Brunei Darussalam to measure the economic impact of the swine flu hazard. The number of tourist arrivals (tourism demand) was found to have decreased by 15 percent (30,000 people) in the first 12 months of swine flu. The economic loss incurred during that period was estimated at USD 15 million. Huang and Min [29] predicted the number of tourist arrivals in the aftermath of the worst earthquake in Taiwan in 1999. Based on the Seasonal Autoregressive Integrated Moving Average (SARIMA) model, it was found that the sharp decline in the number of international tourist arrivals to Taiwan could not be fully restored even after 11 months post-earthquake.

Yang et al. [30] found that the Wenchuan earthquake in Sichuan, China (from 12 May to 30 June in 2008) adversely affected the local tourism industry. At that time, there was a loss of RMB 21.99 billion in the total revenue. Interestingly, the earthquake also changed the landform of parts of the Wenchuan area, which eventually created new tourist destinations, such as quake lakes and the Wenchuan Earthquake Memorial. The total income of the tourism sector was able to increase with the availability of new tourist destinations. This situation is similar to that in Pompeii and Herculaneum, famous tourist areas in Italy. In the past, these areas experienced destruction due to the Vesuvius volcano eruption [31]. In just 1 day, the number of tourists visiting Pompeii reached up to 20,000 people in 2012 [32].

Table 1 shows the number of tourist arrivals in some countries during the pre- and post-disaster phases. Based on the table, most countries experienced a decline in the number

of tourist arrivals in the year of the disaster, excluding Thailand and the United States of America (USA). Although these two countries did not experience a decrease, the increase rate in the number of tourists the following year grew very slowly for both countries. This situation indicates that visitors were less interested in travelling in the early stages of the post-disaster phase. The number of tourist arrivals to the state of Sabah decreased in the year of the disaster (2015) and then dramatically increased in the following years (2016 and 2017). The trend of tourist arrivals from Nepal and Ecuador decreased in the year of the disaster and then increased dramatically in the following years.

Table 1. Tourist arrivals in several countries during the pre- and post-disaster phases.

No.	Disaster	Country/State/City	Year & Number of Tourists	Year & Number of Tourists	Year & Number of Tourists	Year & Number of Tourists
1	Tsunami 2004	Thailand	2003 10,082,000	2004 11,737,000	2005 11,567,000	2006 13,822,000
2	Tsunami 2011	Japan	2008 8,351,000	2010 8,611,000	2011 6,219,000	2012 8,368,100
3	Earthquake 1995	Japan, Kobe	1994 3,468,005	1995 3,345,274	1996 3,837,113	1997 4,218,208
4	Earthquake 2010	Haiti	2008 258,000	2009 387,000	2010 255,000	2011 349,000
5	Hurricane Katrina 2005	USA	2003 41,218,000	2004 46,086,000	2005 49,206,000	2006 50,977,000
6	Volcano eruption 2010	Iceland	2008 502,300	2009 493,940	2010 488,622	2011 565,611
7	Earthquake 2015	Sabah, Malaysia	2014 3,230,645	2015 3,176,226	2016 3,427,908	2017 3,690,224
8	Earthquake 2015	Nepal	2014 790,118	2015 538,970	2016 753,002	2017 940,218
9	Earthquake 2016	Ecuador	2015 167,600	2016 156,900	2017 180,600	2018 253,500

Source: [31,33–35].

In the context of natural disasters in Malaysia, the earthquake in 2015 centered in Ranau, Sabah is an important event that has caused anxiety and panic for many parties, especially the locals [36]. The earthquake affected tourism and economic activities of the local people in Kundasang [37] and Ranau [38]. The number of tourist arrivals to Kinabalu Park was also found to decline during the first three months after the earthquake [39]. Tongkul et al. [40] classified the effects of the earthquake into two types: primary and secondary. Immediate results include damage to public infrastructure, damage to nature, and the occurrence of subsequent disasters (such as landslides and mud floods). Disruption of tourism activities in the Ranau District has caused the number of tourist arrivals to decrease. The affected image of tourism was a secondary effect.

2.2. The Concept of Ecotourism and Sustainable Tourism

The term ‘ecotourism’ has emerged from the late 1980s, following public awareness of the importance of environmental conservation [41,42]. There has also been numerous debates or discussions over the meaning of ecotourism [40]. In fact, from 2001 alone, a total of 85 different definitions of ecotourism had emerged [43]. Some scholars argue that the definition of ecotourism is different from nature-based tourism, as stated by Lindberg & Hawkins [44], Goodwin [45], Weaver [46], and Buckley [47]. Nevertheless, many opine that ecotourism and nature-based tourism have a similar definition [48,49].

For Ceballos-Lascurain [50], nature-based tourism is generally a tourism activity in a natural setting. Similarly, adventure tourism involves physically exerting activities in a natural setting. This view is in line with the statement of Goodwin [45] that nature-based tourism can belong in all forms such as low impact tourism, adventure tourism, mass tourism, and ecotourism. In brief, nature-based tourism can be defined as a more general form of tourism, namely: travelling to enjoy the undeveloped natural areas or wildlife.

On the other hand, ecotourism is more specifically defined as the responsible travel to natural areas for conserving the environment and improving the well-being of local people [51]. Fennell [52] defined it as a sustainable, non-invasive form of nature-based tourism that primarily focuses on learning about nature first-hand. It is ethically managed to be low impact, non-consumptive, and locally oriented (control, benefits, and scale). Both definitions are very much in line with the view of Nastase [53] who noted that ecotourism is essential as one of the means for promoting environmental conservation as well as a medium to generate income for local communities. From these definitions, it can be concluded that ecotourism is a form of sustainable tourism that generally emphasizes aspects of environmental conservation and the well-being of local communities.

Figure 1 presents a model of sustainable tourism. Based on this model, several essential components have been identified as the backbone of sustainable tourism. The first component is a competitive economy (economic efficiency). Sources of funds used to develop ecotourism areas should come from the local community itself. This matter is expected to eventually provide economic benefits to the local community by supporting employment opportunities, increasing total income, improving quality of life, etc. Secondly, the goal of ecotourism activities is not based on economic gain alone but is balanced with preserving the environment. This is important to ensure that the biodiversity of nature continues to be preserved for future generations.

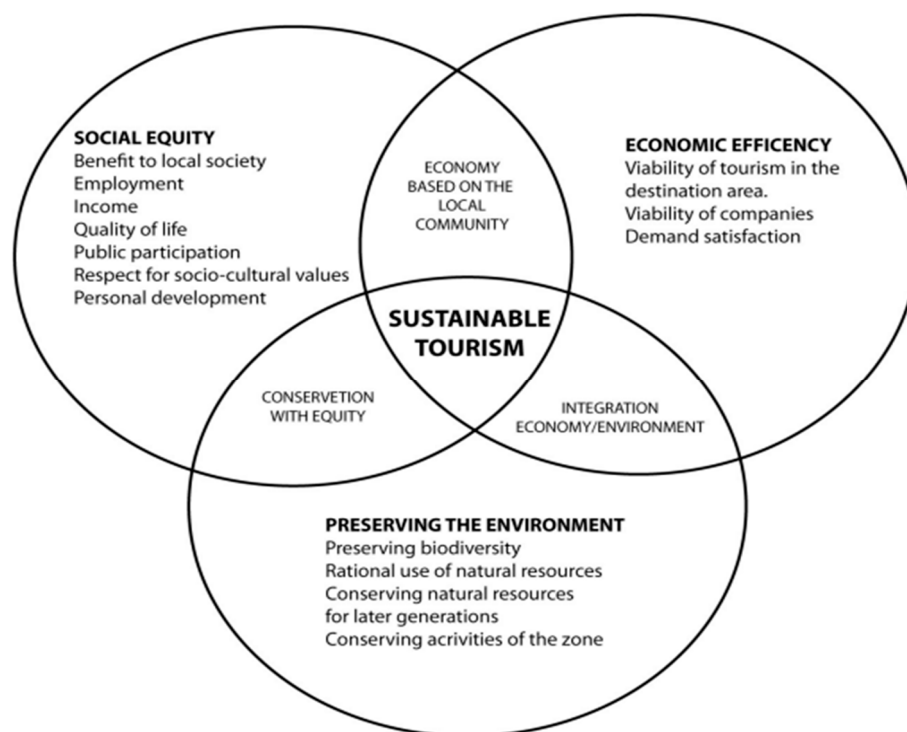


Figure 1. Sustainable Tourism Model. Source: [54–56].

3. Methods

3.1. Research Area

Sabah is located in East Malaysia [57–59] (Figure 2b). This study was conducted in Melangkap Village, located in the highlands near the foot of Mount Kinabalu in Sabah.

Mount Kinabalu is the earthquake's epicenter located about 7 km from Kundasang Town and 13 km from Ranau Town. Melangkap Village is in the Kota Belud District (Figure 2c), only 31 km away from Kota Belud Town. The Melangkap Village consists of five small villages, namely, Melangkap Tomis, Melangkap Tiong, Melangkap Kapa, Melangkap Nariou, and Melangkap Baru (Figure 2a). Dusun is the main ethnic group that dominates this village. The total population of Melangkap Village is approximately 3000 people who are mostly Christians. Apart from the tourism industry, the main economic activity in Melangkap Village is agriculture. The Melangkap community, similar to most indigenous communities in Sabah, is aware of the importance of their natural environment. They have adopted the 'Bombon' method to conserve and protect the Panataran Kedamaian River's ecology for future generations. The 'bombon' technique is a means of maintaining the environment for freshwater fish. This technique has been used by the Kadazandusun since the time of their forefathers. The practice of this tradition is vital to ensure the sustainability of nature for future generations [60].

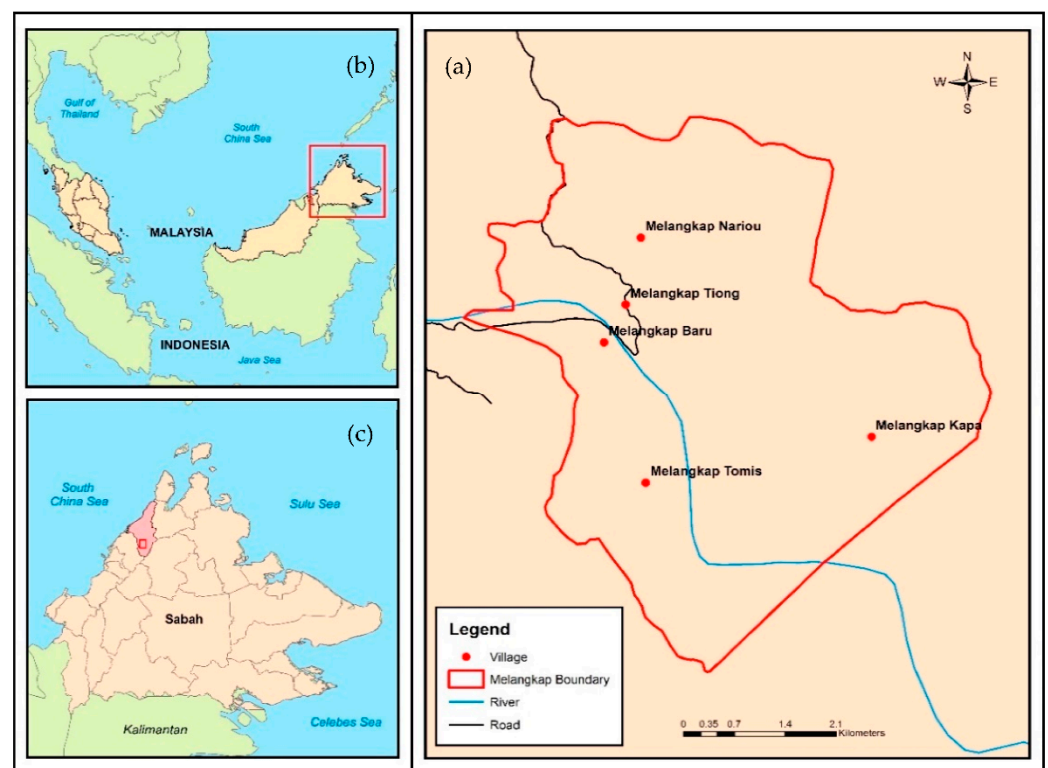


Figure 2. Location of Melangkap Village situated in Kota Belud District. (a) The Melangkap Village consists of five small villages, namely, Melangkap Tomis, Melangkap Tiong, Melangkap Kapa, Melangkap Nariou, and Melangkap Baru; (b) Sabah is located in East Malaysia; (c) Melangkap Village is in the Kota Belud District. Source: [60].

3.2. Data Collection

This research applied a case study design [61] to gain an extensive understanding of the impact of river landform changes due to geohazards (earthquakes, debris flow, and floods) on the socio-economic development of residents, especially homestay and chalet entrepreneurs in Melangkap Village. Therefore, a total of 27 homestay and chalet entrepreneurs were asked to participate as informants in this study. The informant selection process was based on the purposive sampling technique [62]. Only residents with the status of homestay or chalet entrepreneurs were eligible to be informants. Entrepreneurs were chosen as the study sample because they are the only ones who know the purpose of their involvement in the homestay and chalet business after the occurrence of the earthquake. The same goes for other matters such as business orientation, level of business

development, and business profit, which only the entrepreneurs themselves can answer. Structured face-to-face interviews were used to obtain information from homestay and chalet entrepreneurs. In the interview, the researcher posed the same series of standard questions to all entrepreneurs. Each informant's response was recorded in transcript form. A period of approximately 15–20 minutes was required to interview an operator. All respondents provided their informed consent for inclusion before participating in this research. This study abides with the ethical guidelines of Universiti Malaysia Sabah.

Apart from the interview method, this study also applied observation techniques in the process of recording data in the field. The aim was to support and reinforce the existing data obtained from the interview process. Among the observed phenomenon was the shape of the Panataran Kedamaian River landform after the disaster, as well as the type of services offered to tourists by the entrepreneurs. The information or data obtained through the observation process was subsequently translated in the form of pictures. The interview and observation data collection process was conducted in September 2019.

3.3. Data Analysis

This study applied two types of analyses: thematic and descriptive. Thematic analysis was used to answer questions regarding the main attractions of Melangkap Village which tourists visit and the factors that motivated respondents to participate in the ecotourism industry as homestay entrepreneurs (refer to Section 4.2). Descriptive analysis was applied to compare the number of participants, business size, total income, and type of paid services offered by entrepreneurs in the pre- and post-disaster periods (refer to Sections 4.3 and 4.4).

According to Braun and Clarke [63], six main steps must be accomplished during the thematic analysis: familiarization with the data, coding, searching for themes, reviewing, defining, and documenting. However, it was not necessary to conduct the six steps linearly. In this study, the researcher's first process (1) was to collect all interview transcripts and then review them, as recommended by Creswell and Poth [64]. The purpose was to record any initial analytical observations. The next step (2) was to perform the coding process. The coding process in this study was conducted with the help of ATLAS.ti software 8. The open coding technique was used to build code categories. Once the entire transcript text was coded, the next step (3) was to identify the themes and sub-themes based on the code categories obtained. In the fourth phase (4), the themes that have been produced were reviewed. This was to ensure that the phrases in each sentence were timed correctly. In the next phase (5), the validity of the theme was re-examined in the context of the entire dataset by repeating the data and theme extraction processes. Finally (6), the analysis results based on the themes were reported by directly referring to the dataset.

4. Results

4.1. Demographic Information of Local Entrepreneurs

In this study, ecotourism entrepreneurs can be classified into two main groups. The first group of entrepreneurs began business operations before the earthquake (Entrepreneur A). The second group began business operations only after the earthquake (Entrepreneur B). The research analysis found that the total percentage of Entrepreneur B (74.1%)-type entrepreneurs was more than Entrepreneur A (25.9%)-type entrepreneurs. In addition, more than half (59.3%) of the total ecotourism entrepreneurs interviewed in this study were female. The majority (81.5%) were found to be over 40 years old. The study also found that all entrepreneurs were married. In terms of education level, more than half of the total number of entrepreneurs had the highest educational background, up to the university level (59.3%). The results revealed that most entrepreneurs were Dusun (96.3%) and Christian (88.9%). More than half (55.6%) of all interviewed entrepreneurs had settled in Melangkap Village before 1976. Only one entrepreneur settled in the village after 2015 (refer to Table 2).

Table 2. Demographic information of local entrepreneurs.

Demography	Frequency (n)	Percent (%)
Types of Entrepreneurs		
Entrepreneur A	7	25.9
Entrepreneur B	20	74.1
Gender		
Male	11	40.7
Female	16	59.3
Age		
21–40 years old	5	18.5
40 years old and above	22	81.5
Marital Status		
Married	27	100
Single	0	0
Religion		
Muslim	3	11.1
Christian	24	88.9
Education Level		
No Education	1	3.7
Primary School	1	3.7
Secondary School	9	33.3
College/University	16	59.3
Ethnicity		
Dusun	26	96.3
Others	1	3.7
Year of Settling		
After 2015	1	3.7
1996–2015	3	11.1
1986–1995	2	7.4
1976–1985	6	22.2
Before 1976	15	55.6

4.2. Landform Changes of Panataran Kedamaian River Due to Geohazard Have Triggered Tourist Attraction

Based on the interview of homestay entrepreneurs, it was found that there are two main factors why Melangkap Village was visited after the disaster, namely the physical attraction and the cultural attraction (Table 3). The average visitor cited physical attraction as the main factor for traveling to Melangkap Village after the disaster. Physical attractions include the beauty of the river, mountain view, fresh air, and night atmosphere (Figure 3). Ironically, among the four physical aspects, the beauty of the river is an essential element that influences the decision of tourists to visit Melangkap Village. Tourists are very interested in the clear water of the Panataran Kedamaian River, the flat and wide landforms of Panataran Kedamaian riverbanks, the unique rock formations, the size of the river, and the cool water temperature. Apart from the beauty of the Panataran Kedamaian River, the breathtaking view of Mount Kinabalu (which can be seen from Melangkap Village) is

also an important tourist attraction (Figure 3a). Two other physical attractions, the fresh air and night atmosphere, were seen to be additional benefits that influenced tourists to visit Melangkap Village (Figure 3b). Their decision is, to some extent, also influenced by cultural attractions. The cultural attraction is seen as a supporting factor that complements the physical attraction. This is because the available facilities provided to tourists make it easier for them to enjoy the physical attractions found in the area (Figure 3c).

Table 3. Main Tourist Attractions in Melangkap Village.

Theme	Sub-Theme	Frequency	Example
Physical attraction	Beautiful river	63.4%	The rocks washed away by the floods from Mount Kinabalu caused the river water to become clearer and more bluish. (Entrepreneur 7)
			The natural environment has become more beautiful due to the riverbank landform that is now wider due to flood sediments. (Entrepreneur 1)
	Mountain view	22%	The view of Mount Kinabalu is more beautiful and clearer since the number of trees on the riverbank has decreased due to floods. (Entrepreneur 11)
	Fresh air	2.4%	Fresh and cool air is abundant, especially in the early morning and at night. (Entrepreneur 18)
Cultural attraction	Night atmosphere	2.4%	Soothing night atmosphere. (Entrepreneur 15)
	Good facilities	7.4%	Many facilities are provided for visitors to use. (Entrepreneur 21)
	Beautiful village	2.4%	Very beautiful and peaceful village atmosphere. (Entrepreneur 9)

Figure 4 shows the landform of the Panataran Kedamaian River after the flood disaster. It has now become a tourist hotspot for various activities, such as picnics and bathing. The morphological formation of the island in the middle of the Panataran Kedamaian River is the main tourist attraction. The sloping and wide land surface makes the island area suitable for picnic and chalet sites. Based on the observations made in the field, it was found that about a dozen chalets have been built on the island (Figure 4a). The island and the formation of a wide, sloping, and airy riverbank area (point bar) in the upstream part of the island further enhances the aesthetic value of the region (Figure 4b).

Since an enormous number of tourists arrive to view the landform of the Panataran Kedamaian River, which is now more attractive after the earthquake, the locals began providing homestay options. According to several local entrepreneurs, the demand for an ecotourism sector in Sabah, which was quite strong at the time, influenced their choice in becoming actively engaged in the homestay business. Other reasons also affected their decision to be directly involved in the homestay business, such as the high demand for accommodation services, the ability to generate a lucrative income source, and the ability to provide employment opportunities to local residents. All three reasons are economic profit-oriented. If observed from a non-economic orientation, the desire to share the beauty of nature with others and continue its preservation is a factor that triggered entrepreneurs to become directly involved in this industry (Table 4).



Figure 3. Physical and cultural attractions in Melangkap Village. (a) View of the Mount Kinabalu from Melangkap Village; (b) The night scene at Melangkap village; (c) accommodation facilities available in Melangkap Village.



Figure 4. Landform changes of the Panataran Kedamaian River after the disaster. (a) A row of chalets built on an island; (b) The formation of a wide, sloping, and airy riverbank area (point bar) in the upstream part of the island further enhances the aesthetic value of the region.

Table 4. Motivating factors that prompted entrepreneurs' involvement in the homestay business.

Theme	Sub-Theme	Frequency	Example
Economic orientation	Increase in tourists arrivals	17.2%	More visitors come for recreational activities. (Entrepreneur 7 & Entrepreneur 20)
	High camping/ accommodation demand	10.4%	Demand for accommodation and campsites is very high at the moment. (Entrepreneur 16)
	Employment opportunities	6.9%	The youth of this village do not have to go elsewhere to look for a job. (Entrepreneur 5)
	source of income	10.4%	The homestay business is profitable and can generate additional income. (Entrepreneur 11)
Non-economic orientation	Beautiful view	17.2%	The landform of the river area has changed to become more beautiful and has the potential to be developed. (Entrepreneur 24)
	Sharing nature	10.4%	To share the beauty of nature with others. (Entrepreneur 8)
	Industrial needs	17.2%	Responding to the government's call to increase the tourism industry in Sabah. (Entrepreneur 1)
	Environmental conservation	6.9%	Continue the preservation of the beauty of nature for future generations. (Entrepreneur 4)
	Good accessibility	3.4%	The road network improved. (Entrepreneur 18)

4.3. Increase of Business Size and Total Revenue after Disaster

The study found that the number of homestay and chalets dramatically increased after the earthquake. Such increase was almost threefold, starting from 7 companies before the disaster to 27 companies after the disaster. After the earthquake, the number of entrepreneurs, business sizes, and income amounts all grew. For instance, an entrepreneur from Group A increased the size of his home from less than 1001 square feet before the catastrophe to about 4000 square feet after the disaster. For entrepreneurs in the Group B category, several expanded the size of their house areas from less than 1001 square feet before the disaster to 2001–3000 square feet after the disaster.

This study also found that after the earthquake, most entrepreneurs expanded the number of rooms in their homes to rent to visitors. Prior to the disaster, both groups (Entrepreneurs A & B) only had several rooms, not exceeding 12 units. After the disaster, several entrepreneurs increased their number of rooms by up to 20 rooms. Aside from the size of the house and the number of homestay rooms, the staff number also increased following the disaster. Group A, for example, conducted business operations with the help of one or two staff members before the disaster. However, after the disaster, the minimum number of staff available for business operations was three to four people. As for Group B, 15% had a total staff number between 7 and 15 people.

The results of this study also found that the increase in business size (house size, number of rooms, and number of staff) improved the total average income of entrepreneurs. Before the disaster, the total monthly income of entrepreneurs in Group A did not exceed RM 2001. After the disaster, the total income of most entrepreneurs in Group A (71.4%) increased from RM 2001 to RM 30,000. A similar situation can be seen for the entrepreneurs in Group B. A small portion (10%) can generate an average monthly income of RM 10,000 to RM 30,000 (Table 5).

Table 5. Comparison of business size and total income of homestay and chalet entrepreneurs before and after the disaster.

Type of Entrepreneurs Type of Asset		Entrepreneur A (n = 7)		Entrepreneur B (n = 20)	
		Pre Disaster	Post Disaster	Pre Disaster	Post Disaster
House Size	<1001 sq ft	2 (28.6%)	1 (14.3%)	10 (50%)	4 (20%)
	1001–2000 sq ft	4 (57.1%)	4 (57.1%)	7 (35%)	4 (20%)
	2001–3000 sq ft	1 (14.3%)	1 (14.3%)	1 (5%)	10 (50%)
	3001–4000 sq ft	0	0	2 (10%)	2 (10%)
	>4000 sq ft	0	1 (14.3%)	0	0
Number of Rooms	1–4 units	3 (42.9%)	1 (14.3%)	11 (55%)	4 (20%)
	5–8 units	2 (28.6%)	4 (57.1%)	8 (40%)	4 (20%)
	9–12 units	2 (28.6%)	0	1 (5%)	3 (15%)
	13–16 units	0	0	0	8 (40%)
	17–20 units	0	2 (28.6%)	0	1 (5%)
Number of workers	<3 persons	3 (42.9%)	0	0	7 (35%)
	3–4 persons	2 (28.6%)	3 (42.9%)	0	7 (35%)
	5–6 persons	2 (28.6%)	4 (57.1%)	0	3 (15%)
	7–8 persons	0	0	0	2 (10%)
	9–15 persons	0	0	0	1 (5%)
Average monthly income	<RM2001	7 (100%)	2 (28.6%)	0	12 (60%)
	MYR2001-MYR4000	0	3 (42.9%)	0	5 (25%)
	MYR4001-MYR6000	0	0	0	1 (5%)
	MYR6001-MYR8000	0	1 (14.3%)	0	0
	MYR8001-MYR10000	0	0	0	0
	MYR10000-MYR30000	0	1 (14.3%)	0	2 (10%)

4.4. Eco-Tourism Products or Services Offered for Payment

Entrepreneurs do not only rely on homestay and chalet rental payments as sources of income. There are several other types of paid services offered by ecotourism entrepreneurs. The analysis outcomes revealed that most homestay and chalet entrepreneurs also generate income from entrance fees to the site. From the total number of entrepreneurs who set entry fees, 73.9% (17 people) began after the earthquake (Table 6). A large part of ecotourism revenue was also obtained through campsite rental services (77.8%). The supply of campsite rental services (66.7%) was found to begin only after the disaster. Moreover, the offer of parking payments (60%), swim boat rentals (53.8%), restaurants (81.8%), small mini markets (72.7%), and flying foxes (100%) were also primarily implemented after the incident. This study found that only tour guide services were actively offered before the disaster (Table 6).

Table 6. Types of paid/services offered to tourists.

Type of Facility	Entrepreneur A (n = 7) Frequency (Percent)		Entrepreneur B (n = 20) Frequency (Percent)	
	Yes	No	Yes	No
Entrance to the site grounds	6 (85.7%)	1 (14.3%)	17 (85%)	3 (15%)
Campsite rental	6 (85.7%)	1 (14.3%)	15 (75%)	5 (25%)
Parking payments	6 (85.7%)	1 (14.3%)	13 (65%)	7 (35%)
Swim boat rental	4 (57.1%)	3 (42.9%)	9 (45%)	11 (55%)
Restaurant	2 (28.6%)	5 (71.4%)	8 (40%)	12 (60%)
Small mini market	2 (28.6%)	5 (71.4%)	9 (45%)	11 (55%)
Tour guide service	5 (71.4%)	2 (28.6%)	3 (15%)	17 (85%)
Flying foxes	0	7 (100%)	1 (5%)	19 (95%)

5. Discussion

This study successfully proves that geohazards can have their own positive values, not just adverse effects. The earthquake in June 2015 centered in Ranau, Sabah is one example that proves this situation. If extensively examined, the earthquake was a catalyst for the occurrence of other disasters, such as rockfalls, debris hazards, and mud floods, around the foot of Mount Kinabalu [18]. This series of catastrophic events is categorized as a multi-geohazard.

There is no doubt that at an early stage of this multi-geohazard, harm was caused to the local population and the national economy, such as damage to public infrastructure (schools, hostels, homes, hospitals, mosques, water pipes, water tanks, houses of worship) as well as widespread panic, fear, and anxiety [18,38], causing child trauma [65] and additional casualties [66]. It was estimated that the total cost to repair the infrastructural damage in Sabah affected by the multi-geohazard would be more than RM 100 million. This includes expenditure for repairing 61 damaged buildings, roads, bridges, and slopes [67]. The image of tourism was also tarnished as a result of the geohazard incident [38]. This was proven when the number of tourist arrivals to Kinabalu Park sharply declined in the first 3 months after the earthquake [39]. This decrease has indirectly affected the economic resources of the local population around the Kinabalu Park area [37,38].

Nevertheless, the negative effects experienced by the locals in the early stages after the occurrence of the multi-geohazard were only short-term in nature. A year after the event, tourism activities around Mount Kinabalu continued as usual. Ironically, the number of tourist arrivals for climbing Mount Kinabalu was found to steadily increase each year [68]. Moreover, the effects of the multi-geohazard had also indirectly caused the area around Mount Kinabalu, especially Melangkap Village, to further develop. This is partly due to the change in the landform formation of the Panataran Kedamaian River [69]. After the disaster, the shape of the Panataran Kedamaian River was found to be more heterogeneous (diverse) and unique with the creation of new landforms, such as the middle island of the river and the sloping river banks (refer to Section 4.2). This situation is in line with Prasetyo's [70] statement that an area's landscape will only become more heterogeneous (diverse) in the presence of disturbances.

The change in river formation, which is the main physical attraction of Melangkap Village, has made the area more attractive for tourists (refer to Section 4.2). This is reasonable since in addition to cultural appeal, attractive landscapes are the primary reasons why visitors arrive [71]. This is consistent with the findings of Ferrari et al. [72], who discovered that the emergence of new products in one tourist location dramatically influenced customer tastes. It is estimated that on average, more than 500 tourists travel to Melangkap Village every week for recreational purposes [73]. This situation is similar to what occurred in Wenchuan, China. The earthquake in Wenchuan changed the physical land formation of

part of the area, creating new tourist attractions, such as quake lakes [29]. Tucker et al. [74] also found that the existence of new physical attractions contributed to the increase in the number of tourists during the post-earthquake disaster phase in Canterbury Christchurch, New Zealand.

The impact of many tourists coming to Melangkap Village has led to the dramatic increase in the demand for homestay services, chalets, and camping sites. The high demand for homestay services in the post-earthquake phase has forced existing entrepreneurs to expand the size of their businesses. This includes expanding the size of the house, the number of rooms, and the number of employees. This high demand has further attracted other villagers to become involved in business. This can be seen with the increase in the number of homestay operators in Melangkap Village, from 7 entrepreneurs before the earthquake to 27 entrepreneurs after the disaster (refer to Section 4.3).

Ecotourism products or services offered on a paid basis are also diversified in the post-disaster phase to meet the demand of tourists (refer to Section 4.4). Therefore, it is not surprising if the total income of homestay entrepreneurs in the post-disaster phase sharply increases. Not only does it provide benefits to homestay entrepreneurs, but the rapid growth of the ecotourism industry in Melangkap Village in the post-disaster phase also creates new employment opportunities for locals (refer to Section 4.3). This demonstrates that geohazards have a long-term favorable influence on the economic growth of ecotourism, particularly in terms of expanding business size [39,75] and increasing the annual income of entrepreneurs and the working population in the ecotourism sector [43,75]. This situation is seen as positive since the development of ecotourism is vital and a means of promoting environmental conservation. It also serves as a medium for generating income among local communities. In other words, ecotourism is a form of sustainable tourism that generally emphasizes aspects of environmental conservation and the well-being of local communities [53]. The concept of environmental care for the goal of sustainability is widely acknowledged, particularly for the aim of enhancing the rural tourism industry [71,76].

6. Limitation of the Study

The limitation of this study was empirically proving the occurrence of drastic changes on the landscape of Sungai Panataran Kedamaian due to geohazards (earthquakes, rockfall, debris flow, and mud floods). There is no doubt that there are several methods that can be used to demonstrate the occurrence of morphological or landform changes of rivers. This includes time series remote sensing satellite data, or aerial photos using Geography Information System (GIS) software [77–79]. However, we were unable to access such data due to financial constraints. To overcome this limitation, this study employed the interview technique, as shown in Table 2. However, if this type of study is to be conducted in future, it is best to employ the remote sensing imagery for the analysis process.

7. Conclusions

In conclusion, this study successfully proves that although the earthquake centered in Ranau, Sabah had a negative impact, positive aspects can be seen, especially on the economic development of ecotourism in Melangkap Village, Sabah. Kampung Melangkap is in a highland location (Mount Kinabalu) irrigated by Sungai Panataran Kedamaian. A structured interview with 27 homestay operators in Melangkap found that the changes in the landscape of Sungai Panataran Kedamaian due to geohazards (earthquakes, rockfall, debris flow, and mud floods) have made the area more attractive with physical appeal (beautiful river, mountains, fresh air, and night atmosphere). Apparently, geohazards on the physical surface have led to the dramatic increase in the number of visitors to this area. There is no doubt that geohazards have a detrimental impact on visitor psyche, causing a sense of trauma. As a result, there will often be a decline in visitor arrivals in the year after the tragedy in areas that experience hazards. However, as this study has shown, the number of tourism arrivals in the area often rise with time, owing to the presence of new attractions such as landscape changes. This circumstance indirectly contributes to the

socioeconomic growth of the local community by increasing employment opportunities and income sources with the high demand of accommodation/camping. The results of this research must be recognized and highlighted since most previous studies regarding the Ranau earthquake in Sabah have mainly focused on the negative aspect. However, if observed closely, the adverse effects of the geohazard are only short-term in contrast to the positive impact that can be enjoyed over a long period of time, especially from the aspect of economic development due to ecotourism. This suggests that understanding the effect of geohazards from a positive perspective may boost a community's creativity and coping ability to stay resilient in the face of future geohazards.

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References

1. Blaikie, P.; Cannon, T.; Davis, I.; Wisner, B. *At Risk: Natural Hazards, People's Vulnerability and Disasters*; Routledge: New York, NY, USA, 2004.
2. Jafar, A.; Mapa, M.T.; Sakke, N.; Dollah, R.; Joko, E.P.; Atang, C.; Geogre, F. Vaccine hesitancy in East Malaysia (Sabah): A survey of the national COVID-19 immunisation programme. *Geospat. Health* **2022**, *17* (Suppl. 1), 1037. [CrossRef] [PubMed]
3. Tarbotton, C.; Dall'Osso, F.; Dominey-Howes, D.; Goff, J. The use of empirical vulnerability functions to assess the response of buildings to tsunami impact: Comparative review and summary of best practice. *Earth Sci. Rev.* **2015**, *142*, 120–134. [CrossRef]
4. Dickson, E.; Baker, J.L.; Hoornweg, D.; Tiwari, A. *Urban Risk Assessments Understanding Disaster and Climate Risk in Cities*; The World Bank: Washington, DC, USA, 2012; p. 26.
5. Apthorpe, R. *Towards Emergency Humanitarian Aid Evaluation*; Asia Pacific Press: Canberra, Australia, 1998; p. 103.
6. Kapucu, N.; Özerdem, A. *Managing Emergencies and Crises*; Jones & Bartlett Publishers: Burlington, MA, USA, 2011; p. 288.
7. Jafar, A.; Sakke, N.; Mapa, M.T.; Dollah, R.; George, F. The adaptive capacity in flood hazards and enhancement of local knowledge among floodplain community in Beaufort district, Sabah, Malaysia. *Int. J. Clim. Change Impacts Responses* **2022**, *14*, 35–47. [CrossRef]
8. Jafar, A.; Sakke, N.; Mapa, M.T.; Dollah, R.; Joko, E.P. Assessing flood risks and the coping strategy: A community adaptation in floodplain areas at Beaufort district in east Malaysia. *Disaster Adv.* **2022**, *15*, 1–11.
9. Chan Ngai Weng. *Development, Urbanisation and Increasing Water Disaster Hazards in Malaysia: Issues, Management and Challenges*; Universiti Sains Malaysia Press: Pulau Pinang, Malaysia, 2002; p. 82.
10. Jafar, A.; Sakke, N.; Hung, C.V.; Mappa, M.T.M.; Ibrahim, M.H.; Hashim, M.H.; Maseleno. Flood risk Assessment in Beaufort, Sabah, Malaysia. *Int. J. Pharm. Res.* **2020**, *12*, 2772–2783.
11. Jhariya, M.K.; Raj, A. Effects of wildfires on flora, fauna and physico-chemical properties of soil-An overview. *J. Appl. Nat. Sci.* **2014**, *6*, 887–897. [CrossRef]
12. László, F.; Rajmund, K. Characteristics of forest fires and their impact on the environment. *AARMS Acad. Appl. Res. Mil. Sci.* **2016**, *15*, 5–17.
13. Donald, D. Positive Effects of Floods. 2019. Available online: <https://sciencing.com/positive-effects-of-floods-12489990.html> (accessed on 23 August 2021).
14. Zhang, G.; Feng, G.; Li, X.; Xie, C.; Pi, X. Flood effect on groundwater recharge on a typical silt loam soil. *Water* **2017**, *9*, 523. [CrossRef]

15. Tilling, R.I.; Heliker, C.; Swanson, D.A. Eruptions of Hawaiian Volcanoes—Past, Present, and Future. Photograph Courtesy of the Bishop Museum, Honolulu, Kilauea 1924', General Information Product, U.S. Department of the Interior, U.S. Geological Survey 2010; p. 117. Available online: http://pubs.usgs.gov/gip/117/gip117_ebook.pdf (accessed on 5 February 2018).
16. Gaudru, H. Volcano tourism: The effect of eruptions and disasters. In *Volcanic Tourist Destinations*; Erfurt-Cooper, P., Ed.; Springer: Berlin/Heidelberg, Germany, 2014; pp. 337–350.
17. United State Geological Survey. M6.0–14km WNW of Ranau, Malaysia. 2015. Available online: <https://earthquake.usgs.gov/earthquakes/eventpage/us20002m5s/shakemap/inensity> (accessed on 17 March 2020).
18. Kassem, M.M.; Nazri, F.M.; Adnan, A.; Alel, M.N.A. Malaysia Seismic Provision Design Standard Approach for Bridge Design Based on Ranau Earthquake. 2022. Available online: https://assets.researchsquare.com/files/rs-1599790/v1_covered.pdf?c=1651765757 (accessed on 23 August 2021). [CrossRef]
19. Rodeano, R.; Felix, T.; Hennie, F.W.; Hazerina, P.; Yusof, M.A. (Eds.) *Bencana Alam Ke Arah Pengurusan Bencana Yang Mapan (Natural Disasters Towards Sustainable Disaster Management)*; Natural Disasters Research Centre, Universiti Malaysia Sabah: Kota Kinabalu, Malaysia, 2017; p. 185.
20. Abdullah, M.I.U. Kota Belud Floods Result of 2015 Earthquake (Banjir Kota Belud Kesan Gempa 2015). BH Online. 2017. Available online: <https://www.bharian.com.my/berita/kes/2017/10/340100/banjir-kota-belud-kesan-gempa-2015> (accessed on 5 March 2020).
21. Guo, Y.; Zhang, J.; Zhang, Y.; Zheng, C. Examining the relationship between social capital and community residents' perceived resilience in tourism destinations. *J. Sustain. Tour.* **2018**, *26*, 973–986. [CrossRef]
22. Danting, Z.; Quoquab, F.; Mahadi, M. Enhancing the tourism operation success in Sabah Malaysia: A conceptual framework. *Int. J. Eng. Technol.* **2018**, *7*, 147–151. [CrossRef]
23. Saidi, Z.A.; Ahmad, H. Karakteristik pelancong belia terhadap pelancongan acara tahun melawat Malaysia (Characteristic of local youth tourists in event tourism of visit Malaysia year). *e-Bangi* **2018**, *15*, 107–119.
24. Tiung, L.K.; Othman, S.S. Pertumbuhan dan pelestarian industri eko-pelancongan: Kajian pulau-pulau peranginan sekitar pantai timur Sabah, Malaysia (Growth and sustainability of the eco-tourism industry: A study of resort islands around the east coast of Sabah, Malaysia). *Sosiohumanika* **2010**, *3*, 273–294.
25. Ferrari, G.; Mondéjar-Jiménez, J.; Vargas-Vargas, M. Environmental sustainable management of small rural tourist enterprises. *Int. J. Environ. Res.* **2010**, *4*, 407–414.
26. Min, J.; Kc, B.; Kim, S.; Lee, J. The impact of disasters on a heritage tourist destination: A case study of Nepal earthquakes. *Sustainability* **2020**, *12*, 6115. [CrossRef]
27. Hussin, R. Ecotourism and community participation in the homestay programme of Sukau Village: Long-term or limited benefits? *J. Sarjana* **2008**, *23*, 72–86.
28. Haque, T.H.; Haque, M.O. The swine flu and its impacts on tourism in Brunei. *J. Hosp. Tour. Manag.* **2018**, *36*, 92–101. [CrossRef]
29. Huang, J.H.; Min, J.C. Earthquake devastation and recovery in tourism: The Taiwan case. *Tour. Manag.* **2002**, *23*, 145–154. [CrossRef]
30. Yang, W.; Wang, D.; Chen, G. Reconstruction strategies after the Wenchuan earthquake in Sichuan, China. *Tour. Manag.* **2011**, *32*, 949–956. [CrossRef]
31. Rucińska, D.; Lechowicz, M. Natural hazard and disaster tourism. *Misc. Geogr. Reg. Stud. Dev. Sciendo* **2014**, *18*, 17–25. [CrossRef]
32. Wallace, A. Presenting Pompeii: Steps towards reconciling conservation and tourism at an ancient site. *Inst. Archaeol.* **2013**, *22*, 115.
33. MASB, Sabah/Immigration Dept, Sabah/Air Asia. Visitor Arrivals 2014 2015 2016 & 2017. Research Division for Sabah Tourism. Available online: <https://www.sabah tourism.com/statistics/?locale=en> (accessed on 23 August 2021).
34. Beirman, D.; Upadhyaya, P.K.; Pradhananga, P.; Darcy, S. Nepal tourism in the aftermath of the April/May 2015 earthquake and aftershocks: Repercussions, recovery and the rise of new tourism sectors. *Tour. Recreat. Res.* **2018**, *43*, 544–554. [CrossRef]
35. Mendoza, Á.G.F.; Mateos, M.R.; Reinoso, N.G. Perception and rating of tourism entrepreneurs in the recovery of travel destinations affected by social-natural disasters: Case study from the April 16th earthquake in Ecuador. *Int. J. Disaster Risk Reduct.* **2021**, *64*, 102488. [CrossRef]
36. Rathakrishnan, B.; Kiflee, D.N.A.; Talip, R.; Zulfikar, Z.; Lan, A.S.S. Penilaian pengetahuan dan kesedian menghadapi bencana gempa bumi dalam kalangan guru sekolah di Ranau, Sabah (Assessment of readiness and earthquake disaster prevention knowledge of school teachers' in Ranau, Sabah). *e-Bangi* **2018**, *13*, 73–88.
37. Anas, R.; Hussin, R.; Afrizal, T. Penyertaan komuniti dalam program pemulihan pelancongan pasca bencana di Kampung Mesilou Kundasang, Sabah (Community participation in the tourism recovery programme post-earthquake disaster in Mesilou Village of Kundasang, Sabah). *Geogr. Malays. J. Soc. Space* **2018**, *14*, 116–127. [CrossRef]
38. Matusin, A.M.R.A.; Othman, N.; Siwar, C.; Halim, S.A. Malaysia's sustainable tourism to face natural disaster: A case study of Ranau earthquake 2015 (Pelancongan lestari Malaysia mendepani bencana alam: Kes gempa bumi Ranau 2015). *Asian J. Environ. Hist. Herit.* **2019**, *3*, 15–23.
39. Matusin, A.M.R.A.; Siwar, C.; Halim, S.A. Assessment of tourism entrepreneurs' exposure to natural disasters: A case study of Ranau earthquake 2015. *J. Sustain. Sci. Manag.* **2020**, *15*, 167–190. [CrossRef]
40. Tongkul, F.; Roslee, R.; Musta, B.; Rahim, I.A.; Bidin, K.; Erfen, H.F.W.S.; Husin, M.A.Y.M. Perancangan pembangunan di kawasan berisiko gempa bumi: Pembelajaran dari gempa bumi 5 Jun 2015 Ranau, Sabah (Development planning in earthquake risk areas: Learning from the 5 June 2015 Ranau earthquake, Sabah). In *Bencana Alam Ke Arah Pengurusan Bencana Yang Mapan*; Rodeano, R.,

- Felix, T., Hennie, F.W., Hazerina, P., Yusof, M.A., Eds.; Pusat Kajian Bencana Alam (NDRC) Universiti Malaysia Sabah: Kota Kinabalu, Malaysia, 2017; pp. 49–59.
41. Diamantis, D. The concept of ecotourism: Evolution and trends. *Curr. Issues Tour.* **1999**, *2*, 93–122. [CrossRef]
 42. Stronza, A.L.; Hunt, C.A.; Fitzgerald, L.A. Ecotourism for conservation? *Annu. Rev. Environ. Resour.* **2019**, *44*, 229–253. [CrossRef]
 43. Rome, A. Ecotourism Impact Monitoring: A Review of Methodologies and Recommendations for Developing Monitoring Programs in Latin America. 1999. Available online: https://www.uhu.es/pablo.hidalgo/docencia/effects/AADD/d_4_e_ecotourism_impacts_monitoring_eng.pdf (accessed on 27 June 2020).
 44. Lindberg, K.; Hawkins, D.E. (Eds.) *Ecotourism: A Guide for Planners and Managers*; Ecotourism Society: North Bennington, VT, USA, 1993; p. 175.
 45. Goodwin, H. In pursuit of ecotourism. *Biodivers. Conserv.* **1996**, *5*, 277–291. [CrossRef]
 46. Weaver, D.B. Comprehensive and minimalist dimensions of ecotourism. *Ann. Tour. Res.* **2005**, *32*, 439–455. [CrossRef]
 47. Buckley, R. In search of the narwhal: Ethical dilemmas in ecotourism. *J. Ecotourism* **2005**, *4*, 129–134. [CrossRef]
 48. Hvenegaard, G.T. Ecotourism: A status report and conceptual framework. *J. Tour. Stud.* **1994**, *5*, 24–35.
 49. Dolnicar, S. Nature-conserving tourists: The need for a broader perspective. *Anatolia* **2006**, *17*, 235–255. [CrossRef]
 50. Ceballos-Lascrain, H. Introduction. In *Ecotourism: A Guide for Planners and Managers*; Lindberg, K., Epler-Wood, M., Engeldrum, D., Eds.; The Ecotourism Society: North Bennington, VT, USA, 1998; pp. 7–10.
 51. Nyaupane, G.P. Ecotourism versus Nature-based Tourism: Do Tourists Really Know the Difference? *Anatolia* **2007**, *18*, 161–165. [CrossRef]
 52. Fennell, D.A. *Ecotourism*, 3rd ed.; Routledge: New York, NY, USA, 2008; p. 303.
 53. Nastase, C. Ecotourism in Piatra Craiului National Park. *Commer. J.* **2006**, *7*, 24–29.
 54. Hall, D.R. Tourism development and sustainability issues in Central and South-Eastern Europe. *Tour. Manag.* **1998**, *19*, 423–431. [CrossRef]
 55. Fons, M.V.S.; Fierro, J.A.M.; Patiño, M.G. Rural tourism: A sustainable alternative. *Appl. Energy* **2011**, *88*, 551–557. [CrossRef]
 56. Dorobantu, M.R.; Nistoreanu, P. Rural tourism and ecotourism—The main priorities in sustainable development orientations of rural local communities in Romania. *Econ. Transdiscipl. Cogn.* **2012**, *15*, 259–266.
 57. Jafar, A.; Dambul, R.; Dollah, R.; Sakke, N.; Mapa, M.T.; Joko, E.P. COVID-19 vaccine hesitancy in Malaysia: Exploring factors and identifying highly vulnerable groups. *PLoS ONE* **2022**, *17*, e0270868. [CrossRef] [PubMed]
 58. Dollah, R.; Jafar, A.; Joko, E.P.; Sakke, N.; Mapa, M.T.; Atang, C.; Hung, C.V.; George, F. Perception of youth in East Malaysia (Sabah) towards the Malaysia National COVID-19 Immunisation Programme (PICK). *J. Public Health Dev.* **2022**, *1*, 203–217. [CrossRef]
 59. Idris, A.; Mohamad, S. Kelangsungan dominasi Barisan Nasional di Sabah dalam Pilihan Raya Umum ke-13. *Kaji. Malays.* **2014**, *32*, 171–206.
 60. Melangkap Community Protocol. 2017. Available online: <https://sabc.sabah.gov.my/sites/default/files/uploads/attachments/2019-11/Protokol-Komuniti-Melangkap.pdf> (accessed on 12 January 2020).
 61. Yin, R.K. *Case Study Research: Design and Methods*, 4th ed.; Sage: Thousand Oaks, CA, USA, 2009; p. 240.
 62. Sekaran, U.; Bougie, R. *Research Methods for Business: A Skill Building Approach*, 8th ed.; John Wiley and Sons: New York, NY, USA, 2019; p. 432.
 63. Braun, V.; Clarke, V. Using thematic analysis in psychology. *Qual. Res. Psychol.* **2006**, *3*, 77–101. [CrossRef]
 64. Creswell, J.W.; Poth, C.N. *Qualitative Inquiry and Research Design: Choosing Among Five Approaches*; Sage: Thousand Oaks, CA, USA, 2016; p. 448.
 65. Bikar, S.S.; Rathakrishnan, B.; Kamaluddin, M.R.; Che Mohd Nasir, N.; Mohd Nasir, M.A. Social sustainability of post-disaster: How teachers enable primary school students to be resilient in times of Ranau earthquake. *Sustainability* **2021**, *13*, 7308. [CrossRef]
 66. Yusof, N.; Wahar, H. Gempa Bumi: Sejumlah 19 Mayat Telah Ditemui di Gunung Kinabalu (Earthquake: 19 Bodies Found on Mount Kinabalu). *BeritaBenar*. 2015. Available online: <https://www.benarnews.org/malay/berita/MY-MAYAT19-06082015184019.html> (accessed on 23 March 2020).
 67. Fadillah, Y. More than RM100 Million Needed to Repair Sabah Earthquake Damage, Mud Flood (Lebih RM100 Juta Diperlukan Baiki Kerosakan Gempa Bumi, Banjir Lumpur Sabah). *MStar*. 2015. Available online: <https://www.mstar.com.my/lokal/semasa/2015/07/06/baiki-kerosakan-akibat-gempa-sabah> (accessed on 23 June 2020).
 68. BorneoToday. Mount Kinabalu Receives More Climbers after June 2015 Earthquake (Gunung Kinabalu Terima Lebih Ramai Pendaki Selepas Kejadian Gempa Jun 2015). 2020. Available online: <https://www.borneotoday.net/gunung-kinabalu-terima-lebih-ramai-pendaki-selepas-kejadian-gempa-jun-2015/> (accessed on 5 June 2020).
 69. Utusan Borneo Online. Threat of a Potential Debris Flow Disaster Occurs in Sabah (Ancaman Bencana Aliran Debris Potensi Berlaku di Sabah). 2021. Available online: <https://www.utusanborneo.com.my/2021/08/30/ancaman-bencana-aliran-debris-potensi-berlaku-di-sabah> (accessed on 30 August 2021).
 70. Prasetyo, L.B. *Pendekatan Ekologi Lanskap Untuk Konservasi Biodiversitas (Landscape Ecological Approaches to Biodiversity Conservation)*; Institut Pertanian Bogor (IPB) Press: Bogor, Indonesia, 2017; p. 76.
 71. Vargas-Vargas, M.; Mondéjar-Jiménez, J. Environmental impact and business management in rural tourism. *J. Appl. Bus. Res. (JABR)* **2010**, *26*, 93–98. [CrossRef]

72. Rahman, A. Mandi Sungai Bersaksikan Gunung Kinabalu, Pengalaman ini Anda Patut Rasa Sendiri (River Bathing and Witnessing Mount Kinabalu, You Should Feel This Experience Yourself). GempakTravel. 2019. Available online: <https://gempak.com/berita-terkini/gempaktravel-mandi-sungai-bersaksikan-gunung-kinabalu-pengalaman-ini-anda-patut-rasa-sendiri-25040> (accessed on 12 March 2021).
73. Ferrari, G.; Lorenzo, J.M.M.; Jiménez, J.M.; Vargas, M.V. *Investigaciones, Metodos y Análisis del Turismo*; Oviedo: Septem Ediciones, Spain, 2014.
74. Tucker, H.; Shelton, E.J.; Bae, H. Post-disaster tourism: Towards a tourism of transition. *Tour. Stud.* **2017**, *17*, 306–327. [[CrossRef](#)]
75. Kiper, T. Role of ecotourism in sustainable development. In *Advance in Landscape Architecture*; Murat, O., Ed.; IntechOpen: London, UK, 2013; pp. 773–802.
76. Rowland, J.C.; Shelef, E.; Pope, P.A.; Muss, J.; Gangodagamage, C.; Brumby, S.P.; Wilson, C.J. A morphology independent methodology for quantifying plan view river changes and characteristics from remotely sensed imagery. *Remote Sens. Environ.* **2016**, *184*, 212–228. [[CrossRef](#)]
77. Sharpley, R.; Roberts, L. Rural tourism—10 years on. *Int. J. Tour. Res.* **2004**, *6*, 119–124. [[CrossRef](#)]
78. Lallias-Tacon, S.; Liébault, F.; Piégay, H. Use of airborne LiDAR and historical aerial photos for characterising the history of braided river floodplain morphology and vegetation responses. *Catena* **2017**, *149*, 742–759. [[CrossRef](#)]
79. Kang, C.S.; Kanniah, K.D. Land use and land cover change and its impact on river morphology in Johor River Basin, Malaysia. *J. Hydrol. Reg. Stud* **2022**, *41*, 101072. [[CrossRef](#)]