

# Introduction to “TSUNAMI TOURISM”: Notes from Aceh, Indonesia

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**Abstract:** The 26 December 2004 Indian Ocean earthquake with magnitude of 9.0 – 9.3 on the Richter Scale triggered a big tsunami that killed more than 200,000 people all over the world. Aceh (or its full name is Aceh Darussalam province) is the area hardest-hit by the tsunami then which caused the loss of around 170,000 local people and destroyed many buildings and infrastructures. After the tsunami, Aceh become well-known all over the world. The geohazard, however, has inspired Aceh authority and supported by Indonesia government and foreign countries to build some tsunami-related sites such as the Aceh Tsunami Museum, the Tsunami Educational Park, the Tsunami Inundation Monuments, the fishing boat atop a ruined house, and the “Aceh Thanks the World” Memorial Park. The curiosity about the tragedy is driving a new kind of tourism, i.e. tsunami tourism. This paper will expose about the occurrence of the 2004 Aceh earthquake and tsunami, the emergence of tsunami tourism, and the tsunami-related sites. These sites are important not only as the centres of tsunami education and symbolic reminders of the 2004 tsunami, but also as new tourism spots in Aceh.

**Keywords:** Tsunami; tsunami tourism; tsunami-related sites; Aceh province; Indian Ocean.

## Introduction

Aceh is one of Indonesia’s 33 provinces which is located in the northern tip of Sumatra Island and lies between 2<sup>o</sup>–4<sup>o</sup> N and 95<sup>o</sup>–98<sup>o</sup> E. It is surrounded by three seas, by the Andaman Sea to the north, the Indian Ocean to the west and the south, and the Malacca Strait to the east and

bordered by the North Sumatra province to the south-east (Figure 1). The province has an area of 57,365.57 km<sup>2</sup> and a population of approximately 4.2 million in 2004 and after the tsunami, the population is estimated to be around 4 million in 2005 (UNEP, 2007; Wennmann and Krause, 2009).



Figure 1 The location map of Aceh province, Indonesia



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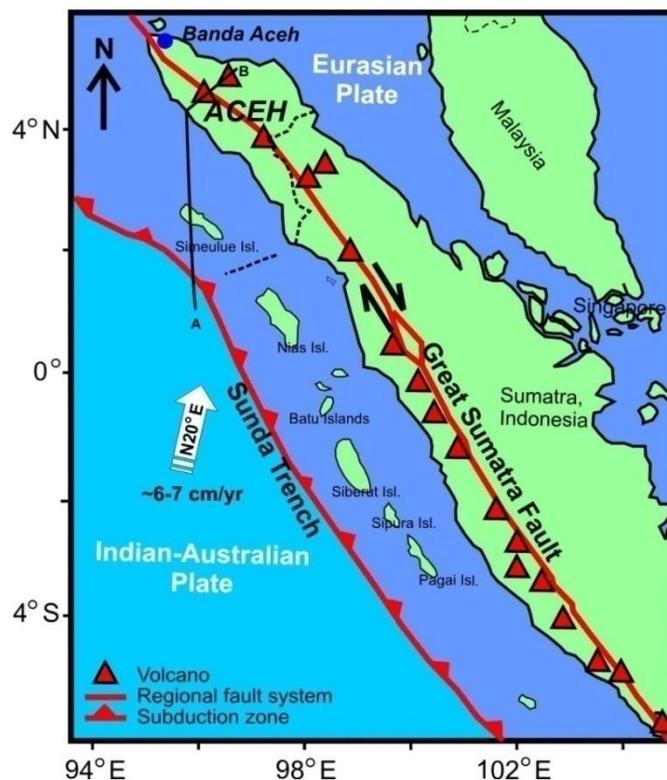
The province is the closest point of land to the epicentre of some giant earthquakes. One of them and the greatest one to date is the 26 December 2004 Indian Ocean earthquake struck off the western coast of Sumatra with magnitude of 9.0 – 9.3 on the Richter Scale at about 6:58 AM that triggered a big, devastating tsunami. After that day, the province has become the subject of international discussion. Its capital city is Banda Aceh, a beautiful city which is situated in the north west of the province and was the closest major city to the epicentre (about 155 miles off the coast of Banda Aceh). The city was suffered further damage when a tsunami struck shortly afterward.

The catastrophe has inspired the authorities (both central and provincial governments), in collaboration with NGOs, local people, and with the assistance of foreign countries, to build and establish some important tsunami-related sites in Aceh including of the museum, the monument, the educational park, and the memorial park which are related to the tsunami disaster in Aceh. This paper provides geological setting of Aceh, an overview of the great 2004 Indian Ocean earthquake and

tsunami of 2004, the emergence of tsunami tourism, and some tsunami-related sites which are potential as new and favourite tourism destinations in Aceh.

## GEOLOGICAL SETTING OF ACEH

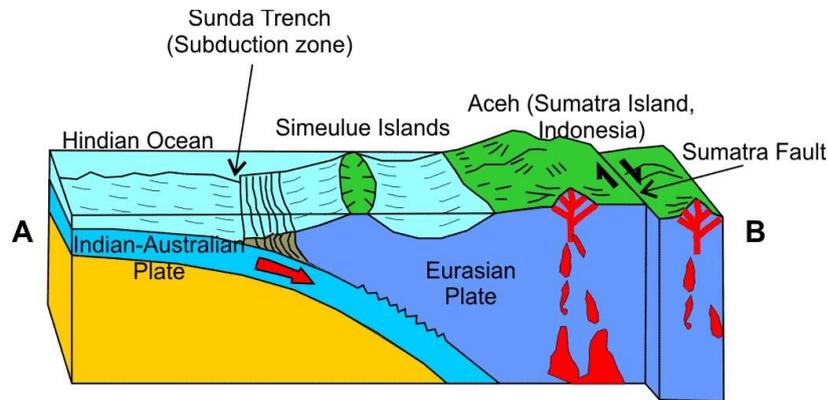
In regional tectonic framework, Aceh area and the island of Sumatra are attached to the Sunda Shelf (or Sundaland) of the Asian continent. Aceh, as a part of the Indonesian archipelago, is situated on the south eastern extension of the Eurasian Plate (Figure 2). It is bounded to the west and south by the Indian-Australian (Indian Ocean) Plate. Interaction between the Eurasian continental plate and the Indian-Australian oceanic plate are in collision (convergent) resulting the subduction zone (after Palunggono, 2000a). Palunggono (2000b) also stated that this zone of oblique convergence is marked by the active Sunda Arc-Trench system which passes through the offshore of the west coast of Aceh. This regional setting has also caused the magmatic activity in Aceh with the existence of two volcanoes, i.e. Mount Leuser and Mount Seulawah.



**Figure 2.** Regional tectonic setting of Aceh province and Sumatra Island, Indonesia. Aceh is situated on the northern tip of Sumatra Island. The dash lines show the provincial border between Aceh and its neighbouring province, North Sumatra.

In regional structures, following the interaction between the two major plates, in addition to the subduction zone and the magmatic activity, the convergence is also being accommodated by the strike-slip deformation (Figure 3). This regional structure is interpreted as being located along the Great Sumatra (or Semangko) Fault System. This

NW-trending fault zone is a major, 1,650-km-long structure of, right-lateral strike-slip fault segments that follows the Sumatra magmatic arc and parallel to the trench of the convergence between the Indian-Australian and Eurasian plates, from north to south.



**Figure 3.** The 3D block showing interactions between the Indian-Australian Plate and the Eurasian Plate which are responsible for the tectonic setting of Aceh

## MATERIALS AND METHODS

Materials of this study include photographs taken both directly from Aceh and other sources and literatures related to the study. Methods comprise office and field stages. At the office stage, literatures were collected. At the field stage, first-hand observation and data collection at all tsunami-related sites in Aceh were carried out during the Programme of Internationalization and Study of Tsunami Impacts held by Universiti Malaysia Kelantan in 2011.

## THE 2004 GEOHAZARDS IN ACEH

According to the United State Geological Survey (USGS, 2004), the 2004 Indian Ocean earthquake is the third largest earthquakes ever recorded since 1900. Other larger earthquakes are the 1960 Chilean ( $M_w = 9.5$ ) and the 1965 Alaskan ( $M_w = 9.2$ ) quakes. However, the impacts of the 2004 earthquake are far greater than other great earthquakes. Kanamori (2006) wrote that it occurred at the zone of convergence (subduction zone) between the Indian-Australian Plate and the Eurasian Plate along the north western Sumatra, near Aceh province. The faulting occurred on a low-angle thrust fault dipping *ca*  $10^\circ$  northeast with the Indian-Australian Plate moving northeast relative to the Eurasian Plate.

When an earthquake occurs beneath the seafloor, the resulting deformation of the seafloor displaces water. This disturbance propagates in the ocean as tsunami with long wavelengths, which

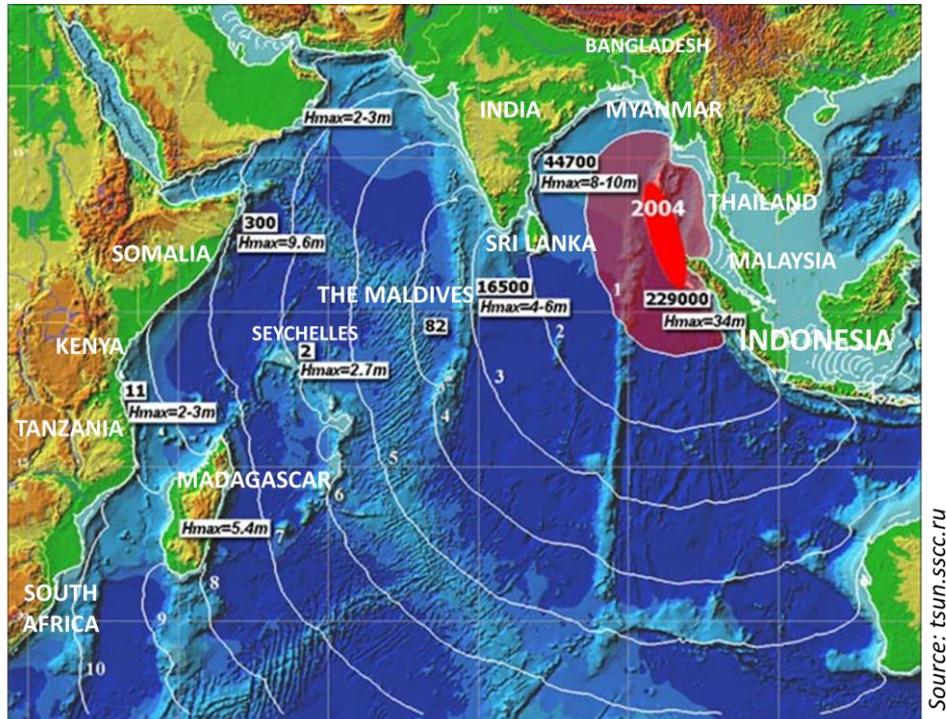
propagate all the way to the coast and often cause extensive damage. Tsunami is destructive sea waves generated when the sea floor undergoes sudden, vertical movements. Many tsunamis are triggered by submarine earthquakes, such as the 2004 Indian Ocean earthquake, but volcanoes at sea or submarine landslides can also cause them.

According to Thompson and Turk (2007), the resulting earthquake of magnitude 9.0 to 9.3 lasted for almost 10 minutes and this tremendous displacement of rock initiated a massive tsunami that radiated in all direction. Survivors reported that, moments prior to the deadly wave, coastal water retreated, exposing dry mud in ocean bays. Then the wave raced inland as much as 30 meters, as high as a ten-storey building. Monroe *et.al.* (2007) recorded that the 26 December 2004 earthquake struck 160 km off the west coast of northern Sumatra, generating the deadliest tsunami in history. Within less than one hour, wall of water pounded the coast of Aceh, Indonesia. Within some hours, other countries were also affected by the “harbour wave” such as Malaysia, Thailand, Myanmar, Sri Lanka, India, Somalia, the Maldives, and some others (Figure 4). This big tsunami killed more than 200,000 people all over the world and destroyed many buildings and infrastructures.

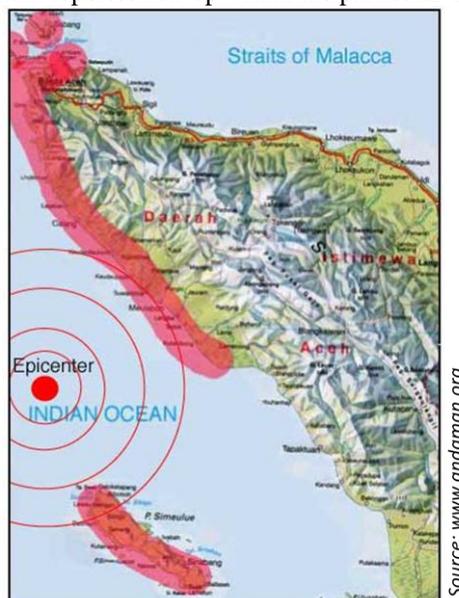
Most areas around the Indian Ocean suffered serious damage from the event of 26 December 2004. The western coast of Aceh was the most tremendous and grievous impacted area (Figure 5). This is the landmass closest to the epicentre of earthquake and tsunami. Banda Aceh, its capital city, immediately became the subject of

international discussion after 26 December 2004, the day when the Indian Ocean earthquake struck off the western coast of Sumatra, and suffered further damage when a tsunami struck shortly afterward. It was the worst hit area out of all the locations hit. After the tsunami, total destructions

can be seen in most parts of the city, such as in its north shore area (Figure 6). It was not so much because of the earthquake, but the following tsunami that caused the horrific loss of life and damages in most parts of Aceh province (Figure 7).



**Figure 4** Tsunami travel time chart for the 2004 Aceh tsunami. The red, solid ellipse marks position of the earthquake source. The red, transparent zone shows the area within 1-hour propagation time, i.e. Aceh province. Digits near the isochrones indicate the propagation time (in hours). Digits in bold show the reported fatalities, and digits in italic show the maximum reported run-up within the particular TTT interval.



**Figure 5.** The tsunami map shows the areas that were most affected by the 2004 Indian Ocean tsunami. The tsunami map also shows the epicentre of the earthquake (in Indian Ocean, near Aceh province, Sumatra, Indonesia) which caused the tsunami, which is indicated by concentric circles.



**Figure 6** Satellite images of the north shore of Banda Aceh, the capital city of Aceh province. (A) Image taken on June 23, 2004 (before the tsunami); (B) Image taken on December 28, 2004 (two days after the tsunami struck). Notice the total destruction of all building and one bridge.



**Figure 7.** Some impacts of the 26 December 2004 tsunami in Aceh. (A) Destruction in front of the Baiturrahman Grand Mosque, Banda Aceh (the landmark of Aceh province); (B) The Baiturrahim mosque is the only building stand in a destroyed coastal village in Ulee Lheue, Banda Aceh; (C) The bodies of the December 26, 2004 tsunami victims were gathered before buried in Banda Aceh; and (D) An overview shows the Sumatra's west coast city of Meulaboh, Aceh after hit by the 2004 tsunami.

## Tsunami Tourism

After the tsunami, a new niche of tourism, i.e. “tsunami tourism”, was born in Aceh. There is still no clear definition of the term, but it can be defined generally as a tourism which consists largely of visits to tsunami-related sites. Rahmadhani, an Acehnese who studied tourism management at a graduate school in Australia and now works as the director of Aceh Tsunami Museum, has for the first time proposed and promoted “tsunami tourism” when he spoke at a symposium in Osaka Prefecture organized by the National Museum of Ethnology in 2012. He said in the symposium that the best way to save lives in a tsunami is not by building sea walls but by showing residents what happens. It will give knowledge to them, so they can save their lives if another tsunami comes to their area in the future.

The Aceh authority is now actively promoting the tsunami tourism. More tourists come to Aceh to see the aftermath of the tsunami first hand than to see the area’s wide and sandy beaches. The tsunami-related sites in Aceh have turned into tourist attractions. Many local people choose these sites as weekend picnic spots. A growing numbers of domestic and international tourists are coming to see and enjoy these sites while studying about the tsunami and tsunami destruction in Aceh.

By promoting this kind of tourism, it is hoped that the governments, municipalities, and tourism associations will seize the opportunity to develop the local economy. Local people will get some benefits as well especially in generating their income by participating in this new kind of tourism.

## Some Tsunami-Related Sites In Aceh

Some important tsunami-related sites in Aceh have been identified and visited during the Programme of Internationalization and Study of Tsunami Impacts conducted by University Malaysia

Kelantan in 2011, such as the Aceh Tsunami Museum, the Tsunami Educational Park, the Tsunami Inundation Monument, a fishing boat atop a house, and the “Aceh Thanks the World” Memorial Park.

## 1. Aceh Tsunami Museum

The Aceh Tsunami Museum (Figure 8) is located at Iskandar Muda street, Banda Aceh. It is a museum with a unique architecture which was built to commemorate the 2004 Indian Ocean earthquake and tsunami disasters, as well as an educational centre and an emergency disaster shelter in the event of another tsunami (Williamson, 2009). It was officially opened in February 2008. The museum is a 2,500 m<sup>2</sup> four-story structure and has long curving walls. From above, the roof resembles a tidal wave. The ground floor is modelled on the kind of a traditional Acehnese stage house that was best equipped to survive the tsunami. Inside, visitors can enter through a dark, narrow corridor between two high walls of falling water which is meant to create the real situation of the tsunami.

In addition to its role as a memorial for the 2004 tsunami disaster, the museum also offers a place to study the tsunami phenomenon and how it affects people in Aceh. The museum exhibits many features, such as photographs, documentaries and models related to the 2004 Indian Ocean earthquake and tsunami, an electronic simulation of the earthquake and tsunami, and other important information related to the 2004 tsunami (World Architecture News, 2009). It will also serve as an emergency disaster shelter for Aceh people in case the area is ever hit by a tsunami again. The Aceh Tsunami Museum is one of a few tsunami museums built in the world. The other ones are the Pacific Tsunami Museum in Hilo, Hawaii, USA and the International Tsunami Museum in Khao Lak, Thailand.



**Figure 8** The Aceh Tsunami Museum in Banda Aceh: (A) The museum from outside; (B) “The water wall”, a narrow entry corridor of the museum; (C) The inside of the museum; and (D) The exhibition within the museum.

## 2. Tsunami Educational Park

The Tsunami Educational Park is located in Banda Aceh's Punge Blang Cut village. This 2-hectare park is actually a place where a 2,600-ton electric generating barge initially floating offshore in Ulee Lheu seaport, Banda Aceh, stranded after being swept around 5 km inland by the disastrous 2004 Indian Ocean tsunami. It is now sitting on an old road, which can be seen leading up to this enormous barge, then continuing out on the other side. This huge barge (its local name is "PLTD Apung 1", means floating diesel power plant) was owned by Indonesia's national electric generating company, PLN, and has become the main attraction and the centrepiece of the park. A beautiful educational park was built nearby and surrounding the barge (Figure 9).

Originally, the barge has a diesel power plant mounted on it used to generate and supply electricity to Banda Aceh city. This power plant used to produce 10.5 MW electricity which can meet one third electricity uses in Banda Aceh. The existence of this huge barge here is a mute witness

to show how tremendous the tsunami wave is. Since the barge is far too large to be removed, the power plant has been refurbished, with new power lines leading from the electric panels on the barge into the neighbourhood area surrounding the barge's new place. This site is now owned by the Banda Aceh Municipality and developed mainly for education and tourism. This has become a tourist attraction and testament to the power of the tsunami.

The park is also equipped with recreational facilities, including playgrounds, outdoor theater, public facilities and seating area for visitors. In another side of the park, we can see a number of tsunami-related historical records and photos. A monument tower built in front of the park lists the names of 1,077 people from five districts who died in the disaster. A clock atop the tower is fixed at shortly before 8 AM, the time when the 2004 earthquake struck (The Asahi Shimbun, 2012). This is the one and only in this kind of park in the world. The authority tries to develop and upgrade this park from time to time.



**Figure 9.** The Tsunami Educational Park in Punge Blang Cut district, Banda Aceh. (A) A huge barge with a diesel power plant (its local name is "PLTD Apung 1") is the main attraction and the centrepiece of the park; (B) The barge when was still anchored offshore before the tsunami (near the Ulee Lheu seaport); (C) The aftermath of the 26 December 2004 tsunami; (D) The barge now at night; (E) The another side of the park; (F) The monument tower in front of the park.

### 3. Tsunami Inundation Monuments

Some monuments of tsunami inundation were built in some locations in Aceh as the reference for the height of the 2004 Aceh tsunami. The different heights of the monuments indicate the various heights of the 2004 tsunami wave in different locations. Such monuments were made according to the maximum heights of the water inundation at the time of the tsunami swept the area. Some references such as coconut trees and buildings which still

stand when hit by tsunami were used to determine the vertical height of the inundation onshore above the sea level, often called the tsunami run-up height. These monuments can be found at common public places such as schools, mosques, and other places (Figure 10). Based on the direct field observation, it can be concluded that the nearer a location to the shoreline, the higher the tsunami run-up in the area.



**Figure 10** The tsunami inundation monuments were built according to the heights of the tsunami run-up in the area at the time of the tsunami. (A) The 7-meter high tsunami inundation monument in Aceh Besar is very close to the shoreline; (B) The monument shows the height of the tsunami in the location of 2.50 km far from the shoreline is 4.60 meter; (C) The plaque of the monument no.39. In the plaque, it is also stated that the arrival time of the wave is 8.30 AM Indonesian time; (D) The tsunami inundation monument in Lamingin village, Banda Aceh; (E) It is stated in the plaque of the monument that its height is 3.15 meter and the distance from the shoreline is 2.80 km.

### 4. A Fishing Boat Atop of a Ruined House

This is a 25-meters long and 5.5-meters wide wooden fishing boat stranded inland on top of the ruins of a house due to the 26 December 2004 tsunami (Figure 11). It is located in Lampulo village, Kuta Alam sub-district, Banda Aceh. According to village chief, actually there were around 15 fishing boats stranded on the roofs after the tsunami hit the area. However, other ships have now been taken down. They only left the 20-ton wooden boat remained in the area as a memorial of the disaster. On the day of the tsunami, the boat's owner, Zulfikar planned to use the newly-repaired boat to go fishing into the Aceh river (within 1 mile

from the position of the boat now). The plan, however, was eventually cancelled due to the catastrophe came and the boat itself aground atop of a house owned by Misbah (Boyozamy, 2012). There were 59 survivors aboard when tsunami pushed the boat inland and crashed down on the roof. Below the boat and nearby one side of the house, there is a plaque that states: *“This fishing boat is located here after being carried by the force of the tsunami on 26 December 2004. The boat’s current position is a very real symbol of the mighty force of the tsunami wave. The boat saved 59 people in this incident.”*



**Figure 11** Aceh's tsunami boat as one of important tsunami-related sites. (A) A fishing boat dumped atop a house in Lampulo village, Banda Aceh, as one sign of the nature's power; (B) A few days after the 26 December 2004 tsunami; (C) The plaque that tells about the site.

This fishing boat shows us the enormity of the tsunami waves in Aceh then. The boat which was perched on top of a house and can be viewed from a platform has become an attraction now. Many local and foreign tourists come to the area to see the stranded boat. To strengthen its position, the local government built two foundations for the boat. The government also made the way to the deck. The boat was standing on a land of 1,196 m<sup>2</sup>.

#### 5. "Aceh Thanks the World" Memorial Park

After the 2004 Indian Ocean tsunami, Aceh was severely devastated. The disaster has claimed around 170,000 local people, destroyed many buildings and infrastructures in Aceh. Fortunately, there was a huge response and contributions from

all over the world to Aceh. In order to show its gratitude, Aceh built a memorial park consisting among others of tsunami wave monument (the replica of tsunami) and the tsunami monument (Figure 12). Walking around the curved pathway in the park, we can see 53 individual plaques which were inscribed with a flag of the country and the words "Thank You and Peace" in 53 languages for the respective donor countries which have given their support and aids for Aceh's reconstruction (Virtual Tourist, 2012). It is a simple yet beautiful memorial park. This park is situated in Blang Padang area, Iskandar Muda street, Banda Aceh. The memorial is located very close to the Aceh Tsunami Museum.



**Figure 12.** “Aceh Thanks the World” Memorial Park. (A) The replica of tsunami; (B) The monument of tsunami; (C) The plaque in the monument of tsunami; (D) The flags of 53 donor countries which gave support and aid for rehabilitation of Aceh; (E) One side of the memorial park; (F) One of 53 plaques of “Aceh Thanks the World”. This plaque is for Malaysia and is written in Malay “*Terima kasih dan Damai*” (“Thank You and Peace”).

### Conclusion

The tsunami-related site in Aceh, whether it is museum, educational park, memorial park, or monument, is very important not only for education but also for tourism development. These sites have turned into tourist attractions, mainly the tsunami museum, the tsunami educational park, the memorial park, and the fishing boat stranded atop of a ruined house. More tourists come to Aceh to see the aftermath of the tsunami. Tsunami tourism has now become popular in Aceh. It will provide opportunities to governments, municipalities, tourism association and other involved parties to use this kind of tourism as an effective way to educate people about the tsunami and at the same time to develop the local economy. It will also provide real benefits for the local people whose environments we visit. The trauma of the tsunami is perhaps still not completely healed for Acehese, but they hope they can get at least some benefits from the tourism developed after the hazard, including generating their income by participating in this kind of tourism.

### Acknowledgments

I would like to acknowledge the management of Universiti Malaysia Kelantan, especially the Department of Student Affairs for giving me the

great opportunity to visit Aceh, Indonesia, and join the Programme of Internationalization and Study of Tsunami Impacts there during 4 – 9 November 2011. I am also grateful to students of *Pembimbing Rakan Siswa (PRS) UMK* and students of IAIN Ar-Raniry, Banda Aceh for their assistance when I visited Aceh. This paper is especially dedicated to Aceh people to help them to promote their area as an important place for the tsunami education and the tsunami tourism.

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