

Mitigating Earthquake and Tsunami Risks in Coastal Tourism Sites in Bali

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Chapter 4

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33 Introduction

Earthquake is one of the most common disasters in Indonesia since its archipelagos are located in an area of high seismicity (Gioncu & Mazzolani 2011). Almost all regions in Indonesia are susceptible to earthquake and tsunami disasters that have caused massive casualties (Nguyen, Griffin, Cipta, & Cummins 2015; 30 Badan Meteorologi Klimatologi dan Geofisika [Meteorology, Climatology and Geophysics Agency] 2017). For example, the Aceh earthquake of 26 December 2004 reached a magnitude of 9.3 on the Richter scale and was followed by a tsunami killing at least 283,000 people and damaging thousand houses, buildings and public facilities along Aceh's coastal zones (Gioncu & Mazzolani 2011). Such natural disasters serve as a reference to plan and develop integrated disaster mitigation systems that help enable the minimization of such losses.

Bali in particular, has a very long history of earthquake and tsunami disasters. Nineteenth century earthquakes damaged infrastructure and led to the loss of thousands of lives. More recently, the 12 northern and eastern regions of the island were hit by earthquakes and tsunamis in 1976 and 1979 resulting in many fatalities (Khomarudin et al. 2010; 27 Struntz et al. 2011; Suppasri et al. 2012). The high threat of Bali from earthquake disasters is due to the southern region of Bali directly facing the Indo-Australian plate and the northern region being located on the edge of fault rise of the ocean base. When such disasters occur, they can have major impacts on tourism development (Huang and Min 2002). Preparedness for natural disaster mitigation is therefore essential and needs to be well-planned in order to reinforce resilience and be able to deal with disasters, achieve appropriate response and actions when it occurs and assist in recovery (McCool 2012). As a major international destination, it is therefore essential for Bali to have a particular agency which is able to coordinate and manage all tourism stakeholders such as government, hotel managements, local people and tourists in mitigating the risks of earthquake and tsunami disasters that threaten tourism sites. This is especially important for the southern coastal regions of Bali where most holiday resorts are located and the greatest number of tourists stay.

Bali is a small island in the Indonesian archipelago lying approximately eight degrees south of the equator with a total area of 5,780 km² and inhabited by a population of close to four million people. Unlike the majority of Indonesia, Bali's population is over eighty percent Hindu. This situation makes Bali culturally distinct from neighbouring islands such as Lombok and Jawa which have Muslim majority populations; providing a cultural element that compliments other tourist motivations to visit the island (Subadra 2015).

Bali is a major international holiday destination visited by ³⁴ millions of domestic and international tourists every year. Balinese culture is now central to tourism development in the island under provincial law by which Bali cultural tourism is to be used as the principal guidance in developing tourism in any regions of the island ¹³ (Regional Regulation of Bali Province Number 2 of 2012). Subadra (2015) argues that tourism in Bali today is not all about culture, but has also been extended to natural based tourism, as witnessed in the rapid development of dive centres, rafting companies, interisland cruises and beach tourism together with new attractions, such as water boom, bungy jumping, and ATV rides.

Bali has been a major component of tourism to Indonesia for many years (Table 4.1). In the space of 50 years the number of foreign visitors to Bali has grown from 11,278 to over six million. In 2018 Bali accounted for almost forty per cent of foreign visitors to Indonesia and the number of visitors to Bali is now approaching 150 per cent that of the number of permanent residents

<INSERT TABLE 4.1 ABOUT HERE>

Dating back to the initial stage of tourism on Bali island when the first international tourists visited Bali in the 1920s (Picard 1996), tourism developments have been concentrated in the southern regions of Bali including Nusa Dua, Kuta and the Sanur area. These were also the locations in which the rapid tourism development occurred during Soeharto's New Order regime between 1966 and 1998 with infrastructural developments such as roads, international airport, harbours and hotel accommodation (Subadra 2015). This period is also marked by the active promotion of the island by foreign authors who enthusiastically promoted the uniqueness of Balinese cultures and the island's beauty through creative branding as a "last paradise" (Powell 1982) and the "island of a thousand temples" (Moore 1970). The legacy of such branding remains to the present-day in terms of industry promotion and even the attraction reviews of tourists on Trip Advisor (Withnall 2016).

As of 2018 the southern coastal region of Bali accounts for over 95 per cent of classified hotel room accommodation on Bali and approximately 63 per cent of non-classified hotel rooms and rooms in other accommodation. Growth in tourist visitation has also been accompanied by a massive increase in accommodation, provision of which has almost tripled between 2010 and 2018 (Table 4.2). Not surprisingly, the growth of tourism in the southern regions of Bali plays a great role in its regional development. In the Badung Regency (a term used to describe a second-level administrative division, directly administrated under a province, sometimes equivalent to a municipality) tourism serves as the main regional revenue generator which has meant that this region is the richest regency in Bali although negative impacts of tourism include traffic congestion, air pollution and the conversion of fertile cultivated land for tourism related development (Subadra 2015). Significantly for the purposes of the present chapter, the tourism amenities and attractions are mostly located and developed in the southern coastal regions of the island which is also most at risk of earthquake and tsunami (Kelman, Spence and Palmer 2008). However, tourists experience more difficulties than local people with respect to security and disaster preparedness since, as new temporary visitors to the region, tourists have little knowledge of the region and are unfamiliar with the environments which will affect their response to an emergency (Garg 2015; Jensen and Svendsen 2016). Therefore, effective disaster mitigation planning which involves all tourism stakeholders, including tourists, is crucial in responding to disaster.

<INSERT TABLE 4.2 ABOUT HERE>

Another important reason for disaster mitigation in southern Bali is the location of core infrastructure, such as the international airport and the power station – the latter supplying all electricity generation for the island, and both located in the high risk “red zone” of the southern coastal region. The operation of such infrastructure is clearly crucial to tourism operations on the island. The international airport of I Gusti Ngurah Rai for instance, located in Tuban Village, Badung Regency, currently serves as the main embarkation and disembarkation for **domestic and international tourists in Bali**. **The** closures **of the** airport on 29-30 November 2017 as a result of the Mount Agung eruption, for example, resulted in hundreds of flight cancelations and forced all airline operations to close for two days (Syahbana et al. 2019).

In the case of the Mount Agung eruption thousands of tourists who had booked to fly on those dates were unable to fly out and were required to patiently wait and remain for the airport

authority to reopen airports. In the emergency, some tourists were well treated by airline operators while others were unattended and waited around the airport for their flights to be rescheduled. It was very unclear as to where responsibility for tourist welfare ought to lie in such a situation, i.e. Bali's provincial government, airline operators, hotels or travel agencies. There was no coordination among stakeholders which left many unattended and disappointed. Similar issues affected those tourists who could not land on the island and were diverted to the nearest international airports located in the neighbouring islands, i.e. Lombok International Airport in Lombok Island and Juanda International Airport in Surabaya, Java. Given the travel chaos that occurred as a result of the eruption, it is therefore extremely important for Bali as an international tourist destination to develop a disaster mitigation system able to manage any kinds of natural disaster including volcanic and tectonic earthquakes and tsunamis. Overall tourism stakeholders in Bali appeared to have little awareness of natural disaster mitigation issues as they failed to manage the outcomes of the Mount Agung eruption. As McCool (2012) argues, the less awareness hotels have of disaster mitigation planning, the lower is their own level of disaster preparedness and corresponding resilience. Awareness of security and safety is not only essential for the tourists visiting the destination but also for hotel management, travel agencies and local people inhabiting the region.

Earthquake and Tsunami Risks on Bali

The location of Bali makes the island extremely vulnerable to earthquake and tsunami disasters. Earthquakes remain unpredictable and may arrive with no initial warning (Gioncu and Mazzolani 2011). For example, on 14 July 1976 a magnitude earthquake of 6.5, known locally as *Gempa Seririt*, hit northern coastal Bali and destroyed the entire sub-district of Seririt and severely affected other neighbouring districts and caused thousands of people to lose their properties (Utomo 2011). Historically, Bali has suffered such disasters many times and therefore the preparedness of the local people and government in mitigating earthquake and tsunami risk is essential. Over 350,000 permanent residents in Bali are potentially at risk from a tsunami, of which 65% reside on the Southern coast and 35% in the northern coastal regions such as Singaraja, Lovina, Seririt and Celukan Bawang (Bali Badan Penanggulangan Bencana Daerah (BPBD) 2017a). This number excludes the number of tourists staying in the hotels, villas and other types of accommodation located in the two coastal zones or touring those regions.

Based on the histories of earthquakes and tsunamis in Bali, the Regional Disaster Management Agency found that any tsunami wave usually reaches the Southern coastal regions of Bali within

20 to 30 minutes of an earthquake; and in the Northern coastal areas in less than five minutes. This suggests that people living along the coastal regions of the island are highly vulnerable and have only a very limited time to reach safety. Therefore, a disaster risk mitigation system is integral to coping with such vulnerability.

Nguyen, Imamura and Iuchi (2016) identified two types of disaster vulnerabilities: physical vulnerability, which covers structure, infrastructure and natural damages; and social vulnerability, that includes the reliance on tourism by local people and business and also tourists due to their lack of knowledge of potential local hazard risks in the visited site and their lack of understanding of the local language. Indeed, due to the presence of tourists, earthquake and tsunami disaster mitigation in tourism destinations like Bali can be more complex than those that occur in non-tourism areas.

Earthquake and tsunami risk mitigations: policy and practice

Because of the social and economic threats they pose natural disasters such as earthquake and tsunami have become a priority project for Bali's government. Jensen and Svendsen (2016) argue that both local tourism stakeholders and tourists visiting the destination should have awareness of potential disasters threatening a destination. Such awareness corresponds to current central Indonesian government policy on disaster mitigation stipulated under Act of Republic of Indonesia Number 24 of 2007 (Undang-Undang Republik Indonesia Nomor 24 Tahun 2007) which legally requires the minimization of the impacts of disasters.

The Indonesian government implements this particular Act via a specific bureau, ²⁹ the National Disaster Management Agency (BNPB) (*Badan Nasional Penanggulangan Bencana*). This body is responsible for formulating policy on disaster mitigation; the management of people displaced as a result of disaster; and coordinating and implementing integrated and holistic disaster mitigation. However, the size of the Indonesian archipelago has meant that provincial and district Regional Disaster Management Agencies (BPBDs) (*Badan Penanggulangan Bencana Daerah*) have also been created at a regional level. "The sheer size and scale of Indonesia, frequency of disasters and logistical remoteness of many areas means that the critical first hours and even days of responses remain heavily dependent on local and provincial monitoring and response capacity, making BPBDs essential in some form" (Hodgkin 2016: 32).

In the case of Bali, the provincial government of Bali has a Regional Disaster Management Agency which is specifically responsible for mitigating disasters occurring within the province of Bali. This agency plays three vital roles in natural disaster mitigation in Bali including coordinator, evacuator and commander. As coordinator, this agency coordinates with other government authorities responsible for disaster mitigation including the Meteorology, Climatology and Geophysics Agency where official disaster informational notices are initially received and broadcast; the Department Social and Welfare that deals with displaced persons; the Department of Public Works which is responsible for infrastructure; the Department of Regional Revenue which manages and provides the provincial budget for disaster funding; and the police department and army which is responsible for order and security. Furthermore, the Regional Disaster Management Agency of Bali acts as the key evacuators in case of disaster with its officials backed up by the police and army in order to evacuate people from hazardous zones, preparing shelters for displaced persons and supplying displaced persons' basic needs. Lastly, as commander, the Bali BPBD is responsible for providing official disaster information and coordinating the actions of disaster mitigation stakeholders (BPBD 2017a).

The Bali BPBD also controls nine regional disaster mitigation agencies that are based in each regency of the island. As such, when any disaster occurs in a regency in Bali then it will be immediately coordinated by the BPBD. These includes the collection and distribution of funds for victims and the provision of search and rescue teams where necessary. Although provincial in scope the Bali BPBD follows national policies and regulations concerning disaster mitigation operations. This is aimed at ensuring that disaster mitigation is well executed by the assigned agency to protect the local people from threats, risks and impacts of disasters. The operation of disaster mitigation includes pre-disaster management, immediate-disaster management and post-disaster management (BPBD 2017a).

Pre-disaster Mitigation Programs

The Bali BPBD has initiated pre-disaster management programs that cover formation of a disaster crisis centre, earthquake and disaster mapping, installing evacuation zone signage, and disaster management training. These programs involve a number of stakeholders including government, local people, tourism industries, academics and tourists.

In the effort to maximize a quick response to disasters, Bali's BPBD has formed a particular "Crisis Centre" unit which operates and monitors 24/7 and provides an early warning system and

disaster management control. This unit collects and conveys information on any potential disasters that may occur to the appropriate government authorities and aids in reducing disaster risks by taking the immediate steps to minimize casualties (see also Glaesser 2003).

31

In order to reduce the vulnerability of the southern coastal regions of Bali to tsunami related disaster, the BPBD of Bali has mapped the areas most likely affected by tsunami. In term of pre-disaster mitigation, these maps have been used to help government and others to better understand tsunami threats in terms of their location, and the affected population, public services and territory. Additionally, the agency has also posted a tsunami warning board and determined evacuation zones and assembly points completed with signage on the coastal roads in Denpasar City and Badung Regency. These efforts are primarily aimed at preparing appropriate directions for the local people and tourists in a tsunami emergency (BPBD 2017a).

In addition to government funded signage, government policy and regulations also require hotels sited along the coast to display evacuation information. The instalment of signage is usually a part of a hotel safety program that aims to show the sense of awareness of the hotel management on the danger of tsunami and the significance of a mitigation program to staff and tourists staying in the hotel. Prama Sanur Beach Hotel for instance, displays at least five tsunami disaster signs along the beach front located off Sanur Beach (plate 4.1). The installed signage shows clear directions for guests and staff regarding where to go to and assemble.

<INSERT PLATE 4.1 Hotel displaying tsunami evacuation signage at Sanur Beach, 2017
ABOUT HERE (source: author)>.

The Bali BPBD also cooperates with another government body, the Geophysics, Climatology, and Meteorology Agency, to develop tsunami early warning systems. As of early 2018 there were nine tsunami early warning system devices installed with the number being increased each year depending on budget availability to eventually cover at least in nine major points around the island including Sanur, Serangan (Denpasar City), Tanjung Bena, Nusa Dua, Kedonganan, Kuta, Seminyak (Badung Regency), Tanah Lot (Tabanan Regency) and Seririt (Buleleng Regency) (BPBD, 2017a). The early warning system is connected to the data centre of the Geophysics, Climatology, and Meteorology Agency of Bali to allow monitoring of tsunami risk, provide a basis for public announcements on the level of risk; and coordinate with the BPBD to decide any emergency actions. The devices are regularly maintained by the BPBD with a monthly test occurring on the twenty-sixth day of each month to ensure all sirens work well and

are able to submit data on any tsunami potency to Geophysics, Climatology, and Meteorology Agency.

The BPBD has also developed an information dissemination system that uses a number of media, including VHF Radio, which is connected to all villages in Bali, social media, email, television, relevant websites, text messaging and a call centre. This system also aids in educating and increasing awareness of local people on the risks of earthquake and tsunami. The mitigation program does this by promoting understanding on earthquake and tsunami disasters and their dangers; and also widening knowledge on what to do and where to escape to when such natural disasters happen.

To support mitigation planning, Bali's BPBD has built a temporary evacuation centre on the isle of Serangan, a small village located in southern Denpasar (plate 4.2). This three-storey building accommodates 2000 people in the matter of emergency. This centre is completely furnished with and equipped with kitchen equipment to meet the immediate needs of disaster refugees. The development of this evacuation centre was initiated by research conducted by the agency which concluded that evacuation in this small island required vertical evacuation as it is impossible to escape from tsunami disaster horizontally within 15 minutes due to its location by the ocean. Other flat areas in the southern coastal regions such as Kuta, Sanur and Nusa Dua use horizontal evacuations which allow people on the seashore to escape. As the evacuation centre numbers are still very limited, it will eventually be extended to other villages along the southern coast of Bali that are assumed to be vulnerable to tsunami.

<INSERT PLATE 4.2 Temporary Tsunami Evacuation Centre in Serangan Village ABOUT
HERE (Source: Author)>

The BPBD has also established a disaster prepared village (*desa siaga bencana*) program which aims to develop resilient disaster villages in which local people have been trained with respect to earthquake and tsunami disaster risks in conjunction with officials prepared by the agency. This program has been applied in villages located in the southern coastal regions of Badung regency such as Tanjung Benoa, Nusa Dua, Jimbaran, Kuta and Legian villages; and also in Denpasar city, including Sanur and Serangan villages, where most of hotel resorts and tourist attractions are located. In addition to training programs for local people, the Regional BPBD has also developed "train the trainer programs" in which officials required to attend short courses on disaster mitigation conducted in Bali, the central government of Jakarta, and even overseas in

order to increase their disaster management competences. In 2017 for instance, two officials of the agency were invited to attend a two-week short course on disaster risk mitigation offered by the National Critical Care and Trauma Response Centre (NCCTRC) of the Northern Territory Department of Health in Australia. Three months after the course, a team from the Australian department came to Bali and trained all officials working for the Regional Disaster Mitigation of Bali in a Major Incident Medical Management and Support Course. The training included an in-class course to increase knowledge of disaster and risk mitigation and also an out of class simulation to allow staff to practice the knowledge gained during the course and acting out their disaster management roles (BPBD 2017b; Bali Post 2017). This government to government program is not only aimed at increasing the competence of the BPBD officials on disaster management, but also strengthening bilateral cooperation between Indonesia and Australia.

Immediate and Post Disaster Mitigation Programs

Emergency response management deals with impacts of the immediate disaster and includes searching, rescuing and evacuating victims; fulfilling the basic needs of the victims; organising and managing displaced persons; and recovering the affected infrastructure. The earthquake and tsunami disaster mitigation programs organized by the BPBD since 2012 have not been tested in a real case. However, the planned programs have been frequently applied to other natural disasters occurring on the island including floods, landslides and also the 2017 volcanic eruptions which continue to the present day.

In term of the post-disaster management plan, there are two major programs included in the long-term mitigation and recovery program including building reconstruction and the rehabilitation of people affected by disasters. The reconstruction of public service facilities and housing involves the Bali Department of General Works and regional government. Rehabilitation programs dealing with stress and trauma are undertaken in cooperation with the Health Department of Bali which coordinates the regional public hospitals and other medical centres located in each district. Funding for these programs comes from central, provincial and regional governments; voluntary donations; and international aid. Recovery programs are focused on local people and public services, as well as tourism amenities and disaster affected tourists. As Huang and Min (2002) argue, tourism recovery is essential and aimed at attracting the tourists back to visit the destination and increasing the number of tourist visits.

In 2014 the Bali BPBD also formulated a strategic plan which serves as the principal guidance for mitigating the impacts of earthquake and tsunami disasters in Bali. This plan is aimed at ensuring integration among the planning, budgeting, application and supervisory functions; prescribing the vision, mission, program and activities; executing the annual plan for a five-year term; and stipulating policy and programs for in accordance with the principal duties and function of the agency.

Stakeholder involvement in disaster mitigation

Mitigating the risks of natural disasters like earthquake and tsunami requires the integrated involvement of stakeholders. The government of Bali through the BPBD cooperates with numerous stakeholders including all government bodies (regency, sub-district and village), local people, hoteliers and other tourism related industries to work together to reach the maximum preparedness for dealing with disasters. The level of preparedness of particular tourism stakeholders is different from each other and can require education to help develop competence for disaster mitigation (Muttarak & Pothisiri 2013).

Accordingly, the agency has developed a number of programs to encourage the participation of stakeholders to minimize the risks of earthquake and tsunami (BPBD 2017a). These cover familiarization with the dangers to local people residing in the southern coastal region where tsunami potentially occurs, e.g., in Tanjung Benoa, Nusa Dua, Kuta, Serangan and Sanur villages. Local communities are invited to *Bale Banjar* (a sub-village meeting pavilion) and receive material on earthquake and tsunami and their dangers by the assigned government officials, including information on the detailed maps and evacuation zones available for their villages. They are also obligated to be involved in a simulation to provide a brief overview as to how disaster can be mitigated. These programs are conducted regularly each year moving from one village to another to ensure all villages along the coastal zones are well trained.

The involvement of local people on tsunami disaster mitigation simulation is significant. It not only encourages them to engage with training, but also includes “their culture” especially relating to traditional technology such as the *Kul Kul*, a wooden bell primarily used for traditional and religious-related activities. This wooden bell is found in all traditional village meeting pavilions and Hindu temples in Bali. Balinese people mainly use *Kul Kul* to invite the members of a village to gather in the *Bale Banjar* to attend a meeting or to be involved in *ngayah* – a voluntarily devotional service conducted in the temples. In some cases, *Kul Kul* have been

used to alert Balinese people in the case of emergency. During the Mount Agung Eruption for instance, these bells were used during the evacuation process of people living within one to twelve kilometres from the mountain. The author's family and relatives who live nine kilometres from Mount Agung never took notice of the village officials that approached them or the miscellaneous messages circulated by their family and friends to vacate their houses before the alert status in November 2017 as they considered that it was not about to erupt based on their experiences of the 1963 eruption. However, when the Kul Kul was hit and sounding in all meeting pavilions; they left their houses voluntarily and very promptly gathered in Bale Banjar which served as assemble points for evacuation (Author's field note 22 November 2017). This suggests that Kul Kul have such a significant power in traditional Balinese communities that it is used both for traditional and Hindu related-rite activities as well as for emergency alerts. For these reasons, the use of the Kul Kul has been codified and agreed with Balinese communities to be used to provide a tsunami alert to support the modern early warning system devices installed in the coastal zones. This also assists Balinese people in being able to sustain their culture even if the island has become 'globalized' due to the rapid growth of domestic and international tourist visits (Subadra 2015).

Familiarization and simulation programs have also been introduced to employees of hotels and restaurants sited within the tsunami zones. Such information cannot only inform them how to save their own lives but also the best procedures to evacuate guests. Hotels that had undertaken such programs can be certified by the BPBD in terms of earthquake and tsunami disaster preparedness. These simulation and certification programs are organized in cooperation between the Bali BPBD, the Bali hotel association, and the association of Indonesian hotels and restaurants.

Such projects correspond to the United Nations (UN) (2007) "Bali Declaration on Sustainable Tourism Development" whereby hotels and other tourism-related businesses are encouraged to become competent on disaster crisis and risk management. Safety and risk management programs have also been included in certification programs developed as part of national policy under the *Tourism Act of Republic of Indonesia Number 10 of 2009* and also regional regulations in Bali which obligate hotels to accomplish compulsory certification as part of their business permit requirements. As of early 2018, 43-star hotels have been assessed and certified to be well-prepared-disaster hotels. The online publication of this certified assessment on the hotel's website helps consumers find safe and secure accommodation for their holidays in Bali and also serves as an "added value" in supporting the marketing of hotel rooms.

The Bali BPBD has also facilitated cooperation between traditional villages and hotel management to use the nearest multi-storey hotels as assembly points and evacuation centres for local people when there is a tsunami. This applies the same notion of vertical evacuation, as on Serangan island, since the area of Tanjung Benoa has a flat foreland where hundreds of hotels and other tourism facilities are situated. Currently, there are at least three 5-star hotels officially designated by the government as assembly points in case of an earthquake or tsunami emergency. The people living near to the hotels have been trained by the assigned officials to recognise the nearest places to assemble when a tsunami occurs. The involvement of the hotel sector in disaster management has a great meaning in Bali in terms of the prevention and mitigation of natural disasters.

Conclusion

The popularity of Bali as a tourism destination means that it attracts millions of international tourists each year. and serves as the economic engine of the island. The southern coastal regions of Sanur, Kuta and Nusa Dua are currently the main tourist hubs where most hotels and resorts have been established. However, these locations, along with other parts of the island, are at great risk from earthquakes and tsunami. In other words, Bali is unavoidably susceptible to the threats of those disasters which can damage local people's and tourism properties and kill local residents and tourists in the coastal region. The only efforts which can be prepared to prevent and mitigate such disasters are increasing the existing disaster management capacities including improvements in preparedness and levels of knowledge of locals and tourism employees; improving tourist awareness of appropriate actions when a disaster occurs; upgrading the competencies of the government officials who deals with disaster mitigations through training, workshop and seminars; improving coordination within and between government departments and tourism stakeholders; and finally, increasing the budgets for disaster mitigation at regional, provincial and central government levels.

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