

After the Wave: a wake up warning for Australian coastal locations

*King and Gurtner consider Australia's
vulnerability to tsunamis and storm surges*

Abstract

In common with much of Asia, most Australians live close to the sea, with a significant portion living in the immediate coastal hazard zone. In Queensland for example 87 percent of the population, over 2.8 million people, live in census collection districts within 30 kilometres of the coast. Of these people, over 400 000 are within one kilometre of the sea (ABS CData2001). It was the one kilometre coastal zone adjacent to the Indian Ocean that bore the impact of the tsunami of the 26th December 2004. The coasts of Asia are as variable as those of Australia, but in all places there is a greater concentration of population, settlements and infrastructure on the flattest and lowest land. This paper looks at the Phuket experience of the tsunami to draw some initial observations and lessons that should influence hazard mitigation in Australia and more generally, in coastal hazardous locations elsewhere in the region. There are four significant sets of issues that will be presented.

1. Critical infrastructure and lifelines in relation to response and recovery.
2. Land use and coastal built structures.
3. Tourists and the tourism industry.
4. Hazard education.

Introduction

In Australia we are as vulnerable as the people of Asia to the sea and its hazards. Tsunamis have occurred on both the western and eastern coasts of Australia, with some major events in the prehistoric past (Bryant 2001). While the west is the most likely coast to experience future tsunamis, our more densely settled eastern coasts

could be impacted by tectonic events in the Pacific (Bryant 2001). While we are probably less vulnerable to tsunamis as such, we are by no means exempt from similar impacts from cyclone generated killer waves and storm surges.

Storm surges associated with tropical cyclones can be as destructive as a tsunami. Fortunately the more gradual onset and modern forecasting of a cyclone allows for evacuation of most vulnerable populations and their treasured possessions. However, the buildings and belongings of people living in a storm surge zone (consistent with a tsunami impact zone) would be destroyed as totally as those of the Asian tsunami victims. In many places the tsunami wrought enormous damage and death from one or two waves that were around three metres in height. A storm surge can reach or surpass that height in a severe cyclone, with further wave set up on top of the surge level. Furthermore a storm surge may last for a few hours, when it will continue to batter, erode and undermine, unlike the relative minutes of the tsunami (although informants in Phuket reported that large waves continued to batter the coast and flood the beach roads throughout the rest of Sunday 26th)¹. While a storm surge rises more slowly than a tsunami it is still a powerful, rapidly rising inundation.

Both tsunamis and storm surges cause enormous damage from the debris they carry as they destroy buildings and vegetation. In the recent tsunami almost twice as many people were injured compared to fatalities as they were battered and swept along in debris-filled waters. The sheer quantity of debris seen in media images, as well as our own journeys to the tsunami affected region, underscore both the turbulent destructive power of water combining with the material projectiles of human structures, furniture, vehicles, vegetation, sand and stones. The tsunami piled cars on top of one another, twisted them into sculptures and carried them hundreds of metres. Fishing boats and

1. David King & Yetta Gurtner visited tsunami impacted areas of Thailand between 30th December and 8th January where they visited tourist locations and gathered information from a range of Thai and foreign informants who represented tourists, business people, volunteers and local residents.



PHOTO BY YETTA GURTNER

The Sofitel Magic Lagoon Resort in the Khao Lak region

even a Thai patrol vessel were deposited far inland. Buildings were demolished and pounded into heaps of rubble. Such images of the tsunami are no different from the images of cyclone, surge and even severe flood.

Thus, what we can learn from the tsunami is not simply about our own exposure and vulnerability to tsunamis in Australia. The much more probable and predictable hazards of cyclone, surge and severe flood can wreak just as much damage to our settlements, structures, infrastructure and livelihoods. In the face of more gradual onset disasters we will hopefully avoid loss of life through timely evacuation from the hazard impact zone.

Many of the lessons that are being learned from this tsunami are concerned with the tsunami warning system itself, the organisation of relief and response in the face of such massive multi-national disasters, and the issues of recovery, reconstruction, rehabilitation and development. Although the current focus and efforts are specific to South Asia and the Indian Ocean it will also influence the way nations and organisations deal with future severe disasters. There are lessons to be learned from this disaster that may be applied to mitigation of hazards in Australia. It may seem slightly insensitive and opportunistic to transfer experience of disaster in a poorer part of the world to mitigation in a developed nation; however, we all have a broader responsibility of mitigation. It is plausible to believe that these lessons we may absorb – primarily from Thailand's experience – are

applicable to many parts of the world, especially coastal locations with strong tourist industries.

Members of the Centre for Disaster Studies visited Thailand, South India and the Maldives immediately after the tsunami in an attempt to understand the hazard, its impact, and the response and recovery of affected communities. Phuket and its surrounding tourist dependant provinces of Phang Nga and Krabi, is perhaps the most developed part of the tsunami impact zone. Although its population is much poorer than Australia, the level of development, infrastructure, services and facilities is comparable in many ways to a much more developed country. The Phuket region had a well developed infrastructure on which to draw in the aftermath of the disaster. Also, like many locations in Australia it has developed a high dependence on tourism, principally from developed countries.

Critical infrastructure and lifelines

In Thailand the tsunami waves had a varying impact on coastlines facing west towards the Andaman Sea. Phuket Island is mountainous having small bays on its west coast where the tourist industry has boomed. The tsunami waves behaved differently in each of these bays. People reported and indicated heights of inundation between two and five metres above the beach high water mark. It was also high tide when the tsunami struck the region. The pattern and differing extent of damage served to reinforce the influence and implications of pure physical geography. Some of



The beach clean up a week after the tsunami at Patong Beach in Phuket

these beaches sloped upwards steadily from the beach, especially at Patong, although Khamala further north had a greater area of flatland, and thus increased inundation behind the beachside tourist facilities.

At each of the exposed beaches furniture, equipment and personal possessions including beach umbrellas, chairs and even jet skis were destroyed or washed away. Small tourist hotels and guesthouses as well as shops, bars, restaurants and tour operations along the beach roads were severely impacted by the wave. Further back, within as little as 50 to 100 metres inland, especially at Patong, the gently rising land reduced the destructive impact. Larger resorts and especially hotels and businesses away from the beach, experienced much less direct force. The worst effects suffered by many of these places included disruption of electricity and telephone services, possible water contamination and the build up of debris deposits.

North of Phuket in Phang Nga province, the shallow, gently sloping beaches of Khao Lak, experienced a far more severe impact as the waves were much larger—up to 10 metres in height. The extensive flat coastal plain in this region, in some parts over a kilometre to the foot of the hills, resulted in a far greater inundation with an equally increased destructive backwash. Fatalities at the large modern resorts of Khao Lak were very high, both among tourists, resort workers and local residents. Similarly the relatively exposed island of Phi Phi Don and parts of the Krabi coastline experienced devastating

impact with high death rates and extensive destruction of buildings.

With the exception of fishing villages at the north and south ends of Khao Lak and Phuket Island, most of the wave's impact zone in Phuket, Phang Nga and Krabi provinces was almost exclusively developed for tourism, accommodation, entertainment and related businesses. The tsunami has severely destabilized the tourist economy of the region, despite the fact that more tourist infrastructure has survived than was damaged. With the majority of the wave's intensity sustained by the structures closest to the coastline, over 80 percent of tourism service providers have remained operational. In the more developed tourist areas of the island, access to drinking water, food and basic services was never seriously jeopardised. While mobile phone services were heavily burdened, they still remained operational.

Official Thai figures almost four weeks after the event recorded 5246 confirmed deaths, 8457 injuries and 4499 people still missing (Wikipedia January 22, 2005). The permanent population of this region is over 820,000 with most of the settlement, services, industry and, in particular, the critical infrastructure, outside the tourist dominated tsunami zone. The immediate post disaster response came from an intact urban infrastructure that included heavy machinery like backhoes, bulldozers and large dump trucks, as well as a vibrant building industry with all of its resources and workers. Additionally there were 19 hospitals in the

region, an international airport, and a fully functioning provincial government that took on the co-ordinating role. The main highways out of Phuket were relatively undamaged by the waves although the tsunami had crossed the highway in several places at Khao Lak that resulted in many deaths.

The local government in Phuket was able to respond rapidly because it was outside the coastal hazard zone. This would not be the case in many Australian tourist centres, particularly the Gold Coast, Hervey Bay, Cairns, Darwin and Broome. In towns such as these, critical infrastructure for response and recovery is directly in the coastal hazard zone (where each of these locations is vulnerable to cyclone and storm surge). Apart from losing critical tourist facilities, local governments would be severely constrained in efforts to provide relief and to lead recovery. The coastline is an essential resource for the tourist industry, but it is an inappropriate zone for health and education buildings, local government offices and facilities, power, community structures and emergency services. The lesson for all places that are reliant on a coastal resource is to begin the long strategic process of moving critical infrastructure and lifelines out of the hazard zone.

Land use planning

Part of the process of relocation of lifelines and infrastructure involves planning decisions and changes in land use. Other problems include the types of tourist structures and their proximity to the beach. The Phuket tourist industry rapidly grew from small cottages, hotels and guesthouses built along the edge of the beach. At the time of the tsunami these appeared to be gradually evolving into larger resorts along the beach roads. The disaster will probably speed up that evolutionary process, as most of the beachfront operations will be uninsured and many will be unable to rebuild. Inevitably people will sell to larger resort operators, while smaller businesses will concentrate where they already are, a block back from the beach.

At Khao Lak Beach many of the large multi-room resort buildings were at direct right angles to the beach. Thus, although first and second floor rooms were flooded and damaged, with people trapped and drowned, the buildings themselves survived largely intact. Between these larger structures and the beach, many of the Khao Lak resorts had also constructed restaurants, bars, and single suited separate cottages and bungalows. These buildings were devastated, in some cases reduced to piles of rubble, slabs tipped on their sides and piles snapped, despite being constructed of block and concrete. Similarly many of the smaller beach front buildings on Phuket had been completely wrecked.

A few days after the disaster, the Thai government released a number of statements regarding the redevelopment of the devastated tourist areas. Together with a greater commitment to environmental preservation and an enforced legislative compliance to accepted building standards—accommodation structures would be required to be 100 metres inland from the beach. The concept is of an open recreational landscaped zone existing between high water and residential buildings, possibly between the beach roads and beach itself. Whether or not that zone will contain restaurants will depend upon the evolving land use plan.

The problem of tourist and residential buildings encroaching too close to a coastal hazard zone is not unique to Phuket. As in Phuket, tourist locations in Australia are rapidly evolving and experience pressure to provide accommodation as close to the beach as possible. As with relocating critical infrastructure, hazard mitigation and reform through land use is inevitably going to be a slow process. Substantially constructed buildings with strong foundations may survive storm surge or even a tsunami, but the majority of beach front residential development or construction of single storey tourist accommodation is not hazard proof. Beach zone recreational areas will not only enhance community amenity, but will also mitigate against coastal hazards. In cyclone prone areas, as on tsunami coasts, we have to back away from the beach, or in heavily urbanised sectors ensure that buildings are substantially hazard proof.



PHOTO BY YETTA GURTNER

Beach front bungalows at Orchid Beach Resort in the Khao Lak area—these types of structures fared particularly badly in the tsunami

Tourism and hazards

Tourist fatalities and ensuing media attention are detrimental to any tourist destination. Phuket's tourist industry has been devastated by both a loss of tourist capacity and a loss of tourist confidence. Risk, whether real or perceived, is a strong deterrent to any traveller. After the terrorist bombing, Bali has taken years to rebuild tourist confidence towards its former economic success. Phuket will face a similar struggle to re-attract tourists, although numerous people (Thais and tourists) expressed an attitude that it was better to deal with a natural disaster or "act of God", rather than the horror of an intentional act of terrorism.

History has consistently demonstrated that the tourist industry is robust and resilient. An adverse perception or problem in any specific destination simply results in a substitution with another destination. The impact of any disaster generally falls on the affected destination rather than the industry as a whole. Thus, for Phuket, there was not just the problem of dealing with the deceased, injured, displaced, and their friends and relatives. There was also the necessity of restoring the tourist location to operational capacity, catering for the remaining tourists and the challenge of attracting back potential visitors.

Much of the recovery of this local tourism sector will depend on the level of lost business. To further intensify the situation, the disaster occurred at what is traditionally the pinnacle of Thailand's peak season. Long-term recovery is dependant on Phuket's tourist industry remaining viable until the mid year low season.

Within days of the disaster a massive clean up of the beaches and beach areas of Phuket had begun to restore the tourist zones. A concerted effort from government, private enterprise (on contract), and businesses renovating their own premises, as well as teams of volunteers had restored most beachside areas to a functional level within eight days. This reinforces the earlier point about the importance of critical infrastructure remaining intact after the hazard. More difficult was the task of countering the media images of horror, disaster and loss, that in the first days after the tsunami, gave the impression to the outside world that all of Phuket was an uninhabitable catastrophe zone with secondary health crises and destroyed infrastructure. In stark contrast to this impression, within two days the hotels association had published – both in print and on the Internet – a comprehensive list of all local hotels and their operational status. By the second week, with most immediate concerns under control on Phuket, Thais were able to persuade media representatives present, as well as the second wave media, to portray more positive stories, including the ongoing tourist industry and the need for potential tourists to maintain their holiday plans.

Education

Clearing up the tourist destination after adversity is only one part of the duty towards tourists. In much of the world, the tourism industry, its operators and service providers, avoid the issue of natural hazard risk to tourists. To a large extent the suddenness and speed of the tsunami made disaster inevitable, but if there had been a warning, and if people had known how to react, perhaps more lives would have been saved. The immediate political and popular response to the tsunami is the need for a warning system similar to that which exists in the Pacific. This is achievable and was endorsed by the UN World Conference on Disaster Reduction in its otherwise vague and general Hyogo Declaration (January 2005). Yet in the week after the tsunami, as we walked around the streets of Phuket and the ruined resorts of Khao Lak, we were faced with the grassroots reality of how to get the warning down to that complex and dynamic level. That problem is a process that is to be determined in each country, province and city that is involved in the warning system.

Even if all of such levels and processes of a warning system are successfully put in place, there still remains the primary issue of how people will respond. Perhaps the most disheartening stories of the tsunami disaster were accounts throughout the region of multitudes of people flooding back onto the beaches after the initial wave retreated and the seas rapidly withdrew. This did not happen in all places. In some locations the tsunami simply rushed in with little or no warning. In Phuket however, people described the sea retreating with a gap of 15 to 20 minutes before the second, larger and most destructive wave hit. If people, both local Thais and tourists, had recognised this as a warning sign, safe evacuation of many people could have occurred. This is exemplified in the story of Tilly, the 10 year old British girl who saved hundreds of lives on a Phuket beach by recognising the warning signs of a tsunami as learnt in school geography.

A warning system only really works if the people, adults and children, are all aware of the meaning of the warning. Research carried out by the Centre for Disaster Studies on people's perceptions of cyclone warnings in North Queensland, and of backpacker tourist knowledge of the cyclone risk (King 2004, Hoogenraad et al 2004), has shown that the population is neither fully knowledgeable of local hazards nor prepared for appropriate behaviour in the event of a natural hazard. Tourists are particularly vulnerable because they are out of their familiar environment, are having fun and trusting in the knowledge and hospitality of their hosts, accommodation and service providers. Such vulnerability is increased where language difficulties exist.

The basic and most fundamental lesson to be learned from the tsunami tragedy is that everyone must be educated and informed about natural hazards. Only if the whole population is aware can the risk be mitigated, warnings understood and appropriately acted upon, and lives ultimately protected and saved. The most fundamental starting point is for local hazard education to occur in all primary schools throughout the world, as a compulsory component of the curriculum. Children will carry some of that knowledge for life, but they also involve and inform their parents, siblings, extended family and community. The importance of education, especially of children, was stressed in both the Hyogo Declaration and the statement of the Special Session on the Indian Ocean Disaster at the UN World Conference on Disaster Reduction, held in Kobe, Japan at the end of January (UN 2005 a & b). Tourists also need to be educated to take greater awareness of the different hazards in the places they visit, while tourism operators and service providers must take responsibility to supplement and reinforce that knowledge, thereby extending their duty of care without liability. At the final level of any warning system local government must accept the responsibility for educating, informing and communicating with its own local population, working in conjunction with them to bring about effective disaster resilient communities.

Conclusion

As the final human, economic, social and psychological costs of this disaster are yet to be determined it is hoped that the world never again experiences such devastation. The reality however, is that as long as people continue to build and develop along the coastline they remain vulnerable to sea related hazards. While tsunamis are currently a topical issue, severe cyclones, storm surges and flooding are just as serious and can be equally destructive. Many of the lessons and experiences of this disaster are pertinent to Australia. The increasing emphasis on disaster reduction through mitigation and preparedness has put greater responsibility on local government and relevant authorities to ensure that such lessons are understood and used to mitigate future contingencies. The tsunami is a warning that reinforces current mitigation efforts, and in particular, the long-term goals of education and the planning of coastal land use.



PHOTO BY YETTA GURTNER

The clean up – a week after the tsunami at Patong Beach on Phuket

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