TSUNAMI MEDIA KIT

TABLE OF CONTENTS

Sawasdee,

The Great Boxing Day Tsunami of December 26, 2004 was a Lifetime Natural Disaster, a one-of-a-kind event deserving our reverence, respect, and rational understanding of the facts. In many natural disasters, casualty counts cannot be perfect, but somewhere over 200,000 people died in Indian Ocean countries. However, Peninsular Thailand received the least damage and casualties of all hard-hit areas including Aceh, Indonesia; Sri Lanka; and India. Phuket — a favorite media target — lost 260 fatalities, 110 of them Westerners, half residents, and half tourists.

On the six-month anniversary, Phuket was packed with journalists. With no briefing and no media kit, most believed 5,000 died in Phuket. One journalist actually called me a liar when I told him Phuket lost 260, including 110 Farang. When I showed him the official figures, he was shocked. He later thanked me, saying that with "my" facts, he was the only one of 100 who got it right. I started this project the same day.

This media kit organizes the facts into a true and honest assessment of the events of December 26 in South Thailand, discusses the probability of future events, and explains the Early Warning and Evacuation Plans designed to prevent loss of life in the rare case of a recurrence in our lifetimes.

Tsunamis can and do happen everywhere. The Mediterranean Sea experienced 300 Tsunami's over the past 4,000 years, an average of one every 133 years. The rapid disappearance of some Eastern Mediterranean civilizations perhaps resulted from Tsunamis. The Pacific Basin experienced four major Tsunami generated within the Aleutian-Kuril Islands in 18 years from 1946-64, leading to the development of the Pacific Tsunami Warning System. There is a significant Tsunami about once a year worldwide, many of them localized but still dangerous. Don't dismiss the "local" label. The highest known Tsunami — 525 meters — was a local Tsunami. New Guinea's 1999 local Tsunami killed 2,000 people.

Plate tectonics make Tsunami's a worldwide issue anywhere there are beachfront resorts, so this kit also includes a Tsunami awareness section. Hotel managers and international travelers should know Tsunami wherever we vacation near the sea, so please communicate the basic common-sense tsunami safety tips in this kit. They apply worldwide, including big storms such as hurricanes and cyclones.

We now know that with Tsunami awareness, Thailand's losses could have been minimal. In "After the Deluge", we called several hotels to alert staff, but the word "Tsunami" was unknown, and alerts never reached General Managers. In Khao Lak, waters recede for at least 20 minutes before the Big Wave came ashore, but nobody heeded the warnings of the La Flora General Manager, Mark Heather, who eventually saved 280 guests and staff with his common sense actions.

To be credible, we must maintain absolute accuracy and objectivity, so footnotes with internet links verify scientific concepts and the claims they support, and provide journalists with immediate access to a scientifically valid research base.

FACT SHEET

Boxing Day Earthquake, 07:58-08:03 (Phuket) December 26, 2004, Magnitude 9.3

Earthquake Comparisons					
Name	Magnitude	Rupture	Shake Time	Slippage	Fatalities
Sumatra 2004	9.3 (a)	1,200 K	3-5 minutes	11 meters	226,000
Chile 1960	9.5 (b)	1,000 K	5 minutes	18 meters	2,300 (b)
San Francisco 1906	7.8		90 seconds	4 meters	3,000
San Francisco 1989	6.9	19 K	15 seconds	2 meters	61
Kobe, Japan	7.1				6,000

a) magnitude is logarithmic, 2nd strongest earthquake in recorded history
b) Tsunami fatalities - Chile (120); Hawai'i (61 - 15 hours) ; Japan (122 - 22 hours)

Epicenter — Lat 3.298N Long 95.779E — 200K W of Sumatra, 250K S of Banda Aceh
Tsunami Open Ocean Speed — 750 Kph
Tsunami Onshore Arrival Speed — 80 Kph

Travel Times	Aceh	Andamans	Phuket	Sri Lanka	Maldives	Somalia
Minutes	15	30	98	120	210	420

Tide: High
Wrap Angle: Epicenter — Banda Aceh — Phuket 70 degrees
Open sea wave width (Thickness): 200 Km
Open sea wave height: .3 meter (1 foot)
Wave Height: Patong - 5 meter cresting wave, Khao Lak - 11.6 meter rising flood, Phi-Phi - 6-8 meter cresting wave
Run-up: Patong 200 meters inland, 2 meters high; Khao Lak 3 Km inland, 5-10 meters high; Phi-Phi - over-ran Peninsula, 3-4 meters high

TAT Official Figures	Total Rooms	Hotels Open	Available Rooms	% of hotels in Operation
Phuket	33,587	471	26,302	78.31 (a)
Phang Nga	6,359	45	1,074	16.79
Krabi	9,867	292	9,042	91.64

(a) Many hotels closed until restaurant-only damage was repaired. Casualty Comparisons (Feb. 2005)

Location	Fatalities	Injured	Missing
India	16,000	Not available	6,000
Indonesia	166,320	220,000	127,774
Sri-Lanka	50,000+	Not available	Not available
Thailand Total	5,392	8,457	1,606
- Phuket	260	1,111	646
- Phang Nga	4,221		
- Krabi/Phi-Phi	721		
Indian Ocean Total	**226,566**		**160,000**

JUST BAD LUCK

Almost unnoticeably, Phuket started shaking at 07:58, December 26, 2004. The USGS Shake report was up before 0814, showing an epicenter 125 miles west of Sumatra and 150 miles south of Banda Aceh. Preliminary Richter scale reports listed the quake at 8.3, well above the Tsunami generation level and dwarfing the Great San Francisco earthquake of 1906.

There was no doubt about an Aceh Tsunami, but what about South Thailand? Would the wave make the 70-degree "wrap"? If it did, would the wave have damaging power? Obviously, the further north one goes up Thailand's Andaman Coast, the lower the angle of attack and greater the risk of a large Tsunami. Khao Lak was at greater risk than Phuket, and Ranong greater than Khao Lak. Sri Lanka and India are situated for a direct hit.

First Bad Luck — The earthquake's adjusted shock registered 9.3, the second largest quake since the invention of the Richter scale over 100 years ago.. Seismologists estimate another 350-650 years until another event of this magnitude along the Indian-Sunda fault.

Second Bad Luck — Not only the epicenter slipped, but also a 1,200-kilometer section of the Subducting fault approximately 100 kilometers wide uplifted 11 meters from the epicenter north to the Andaman Islands. (The San Francisco 1906 quake slipped four-meters.) This slip uplifted a tremendous "bubble" of water, which becomes a "Tsunami". Even so, the intensity of the slippage decreased as it traveled north along the fault line. Fronted by extensive mud flats, Khao Lak lay in the direct line of fire.

Third Bad Luck — The tide was relatively high when the Tsunami reached land almost two hours after the shock. This placed a meter of water over the mud flats of Khao Lak, Layan, Bang Tao and Kamala before water retreated — a Tsunami's red carpet to flow unobstructed across the flat bottom with virtually no lift. (A steep beach such as Patong creates a cresting wave that dissipates energy as it uplifts heavy water.).

Fourth Bad Luck — Boxing Day, the morning after Christmas, is "Peak-Peak" high season. December 26 in 2004 was a Sunday. The day after Christmas, all hotels were at 100% occupancy — and the early-morning mood was still holiday reverie. Travelers were either at the beachfront breakfast buffet, still in bed, or on the beach.

Fifth Bad Luck — In Phuket, only a few yachties and one sea kayaker had Tsunami "awareness", the key to survival. Only a handful felt the quake, even less predicted a Tsunami — and in South Thailand, the word was unknown. Because nobody knew the word, Tsunami alarms passed without response.

So close to the epicenter and built on flat lands created by hundreds of similar Tsunami's, Aceh was doomed. However, for South Thailand, the Boxing Day tsunami was truly Mother Nature's Ultimate Sneak Attack — created by the second largest earthquake in history. Between 1946-64, the Pacific Basin experienced five major Tsunami's, four from the Aleutian-Kuril fault system and the largest quake in history, 1960's Chile 9.4 shake.

The Indian-Sunda fault had significant aftershocks including the March 28 Nias 8.4 aftershock, but epicenters are migrating south, placing Sumatra firmly between the shakes and South Thailand. Sri Lanka, Maldives, India, and Western Australia remain at risk.

Until June's 7.2 Andaman Islands quake, seismologists considered the Andaman-Nicobar section a possible risk. Although the quake generated the first test of the early Warning system, no tsunami formed but significant plate pressure was released.

FACT SHEET STATISTICS

Phuket	543 square kilometers
Official population	528,480
Unofficial Population	800,000-900,000
Average revenue/person	B172,932 — More than double than any other South Thailand province
2003 Tourism Arrivals	4,050,077
2004 Tourism Arrivals	4,783,252
2005 Q1 Arrivals	455,303
Tourism Revenue	72.6 Billion Baht/yr = US$1.86 Billion
Economic Damages	13 Billion Baht/yr = US$520 million
Human Damages	260 dead (149 Thai; 111 Foreigners) 1,111 injured (591 Thai; 520 Foreigners) 646 missing (261 Thai; 385 Foreigners
Structural damages	Hotel Rooms Damaged — 7,285 (99% now operating) 402 Homes totally lost; 550 homes partially damaged

Patong sustained the most damage with expensive beachfront business district. Run-up only 200 meters.
Kamala next with mud flat bay, beachfront damage and up to 800 meter run-up
Bang Tao with shallow sand bottom received a pocket of extensive damage with 500 meter run-up sitting on-land one hour.
Layan Bay mud flats created 800 meter run-up with damage limited to construction zone only.
Karon, Kata, Kata Noi, Nai Yang, Nai Thon, Mai Khao, *Rawai*, *Chalong Bay*, and *Raya Islands* received minimal damage only.
Infrastructure: Electricity, Telephone, Water, Roads and Bridges intact on 99.7% of Phuket Island was undamaged. Remaining 0.3% of services restored in under one week.

Patong Beach Development	Phase One (Completed) — B318 million = US$8 million Phase Two (Near Finish) — B395 million =US$10 million
Kamala Beach Development	Phase One (Completed) — B180 million = US$4.5 million Phase Two (Near Finish) - B120 million = US$3 million
Phuket Housing Restoration	B30 million = US$750,000

SOUTH THAILAND EXPERIENCE

South Thailand received varying degrees of damage. To be accurate, media coverage should consider the facts on a beach-by-beach basis. Phuket received minimal damage, but sandwiched between Khao Lak and Phi-Phi, the world-famous resort was the focus of inaccurate coverage, causing an instantaneous economic depression based upon inaccurate media coverage that continues until this day.

Phuket — Patong's cresting wave was visually dramatic, but damaged Beach Road and down the Soi's for only 200 meters. Signage above the two-meters was undamaged. Phuket received the brunt of media attention because media crews enjoyed the intact infrastructure and there were many survivors with intact home video cameras. Aside from Beach Road, most damage was limited to Kamala, Bang Tao, Layan, and Nai Yang beaches — all with low, flat bottoms of mudflats or sand.

Khao Lak — Two hours drive north of Phuket Town, Khao Lak is in Phang Nga province. Low-lying mud flats extend almost two kilometers into the sea and floodplains extend about three kilometers inland, creating a flat, ever rising wave that reached 10-12 meters high. Videos of the Khao Lak "Flooding" Tsunami are rare because few camcorders survived. Properly constructed with reinforced concrete, La Flora Resort survived, but virtually all other structures were leveled. With no Tsunami awareness or advance warning and limited access, high density Khao Lak suffered 4,200 fatalities.

Similan Islands — Mr. Tanawat Kongpan and Suvit Kamchiangnung filed the following report with the office of Vice-Minister Smith Dharmasaroja:

09:35	Water receded from the beach for 100 meters out for five minutes
09:38	Wave 2 meters high hit the beach and inland for 2-3 minutes
09:43	Three or four waves of 6-7 meters for five minutes.
10:03	Wave goes to 10 meters with 500 meter run-up for 20 minutes. Greatest damage.
10:20	Wave at five meters. Run-up until 11:00 AM.

Buildings under 4-meter elevation — 80% damage. Building above 4-meter suffered 50%.
Deep beach waters have little damage. Shallow beaches have much damage.
Similans suffered 100 fatalities.
20% coral damage

PHI-PHI — The high-density development on the low-lying Phi-Phi isthmus is often criticized as "Tourism Gone Wrong". Right or wrong, it was a perfect Tsunami target. Waves wrapped around the island and met in the middle of the isthmus creating a washing-machine effect with high-density debris, an environment not even the strongest swimmer could negotiate. The entire isthmus was devastated.

TSUNAMI HISTORY

When conditions align in properly, 7.0+ submarine subduction earthquakes generate Tsunamis. The Richter scale is logarithmic, so an 8.0 is ten times larger than a 7.0, and a 9.0 100 times larger. A rare 9.3 magnitude "Great Earthquake" (9.0 or greater) generated the December 26 Tsunami, with 26 aftershocks 7.0 or greater the same day.

Guaranteed killers, "Great Quakes" occur worldwide about every 50 years, but only 400-600 years in the same location. The last Great Quake was Chile in 1960, a 9.5 monster. Although the Chile Tsunami killed in Hawai'i and Japan, the majority of casualties were land-based in Chile — only 120 dead and 2,000 injured.

Although the first Tsunami recorded in human history was Syria 2150 BC, scientific records go back only 150 years, with only five Great Quakes recorded since 1850 (Seismologists include the Lisbon November 1, 1775 and Cascadia January 26, 1700 Tsunami, but there were no measuring devices in that era).

In the 20th Century, 141 "damaging" Tsunami's worldwide accounted for 70,000 dead. Nine hundred more were non-damaging. Since 2150 BC, over 300 Mediterranean Tsunamis were recorded, an average of one every 133/years. Seismologists attribute the sudden decline of at least three Eastern Mediterranean cultures to Tsunamis.

Pre-1900 records are sketchy with estimated statistics only, but this list demonstrates the rarity of events similar to the Boxing Day Tsunami. Asia's mudflat/floodplain topography contributed to the unusually high fatalities, especially in Aceh.

Tsunami/Famous Quake	Magnitude	Date	Type	Height, m	Fatalities
Sumatra	9.3	12/26/2004	Megathrust	15	222,000+
Vanuatu	7.3	11/26/1999	Megathrust	Local N/A	10
New Guinea	7.1	07/17/1998	Sub landslide	12	2,000
Kobe, Japan	6.9	1995	Sideslip	*****	5,502
San Francisco (Loma Prieta)	6.7	1989	Sideslip 15 sec	1 m slip	61
Mindanao	7.6	08/16/1976	Megathrust	Unlisted	5,000
Prince William Sound AK	9.2	03/29/1964	Megathrust	67	106
Chile	9.5	05/22/1960	Megathrust	25	2,200
Lituya, AK	8.0	07/09/1958	Landslide	525	5
Aleutians AK	8.3	03/09/1957	Megathrust	23	N/A
Kamchatka	9.0	11/04/1952	Megathrust	20	N/A
Aleutians AK	9.0	04/01/1946	Megathrust	35	165
San Francisco	7.8	1906	Sideslip 90 sec	4 m slip	3,000
Sanriku, Japan	7.2	06/15/1896	Megathrust	25	26,000
Krakatoa, Indonesia	?	08/26/1883	Volcanic	40	36,000+
Indonesia	8.7	1833	Megathrust	unknown	unknown
Lisbon, Portugal	9.0	11/01/1775	Megathrust	25 estimate	100,000+
Cascadia, Pacific North West	9.0	01/26/1700	Megathrust	25 estimate	unknown

California tsunamis registering 3.0+ meters in Alaska — 1812, 1873, 1878, 1927, 1930
Sumatra 8+ - 1797, 1833 (8.7), 1861

TSUNAMI DYNAMICS

Earthquakes move in four basic ways — lateral slip, vertical slip, separation, and subduction. Only Subducting Submarine Earthquakes of 7.0 or greater generate Tsunamis. Even then, conditions must be "perfect" to create a Tsunami.

In subduction, one plate slides under the other. The leading edge of the top plate "bonds" against the lower plate from the massive pressure of continental drift, bending the leading edge of the top plate like a spring.

When the pressure builds to the breaking point, the top plate springs up like a high dive board activated by a dancing hippopotamus. If the slippage is shallow, a giant bubble of water is uplifted to the ocean surface. On December 26, the volume of that bubble was a wedge 11 meters high, 100 kilometers wide and 1,200 kilometers long, that took several minutes to slip in two complicated sections.

Earthquakes transfer fault line stress to either end of the rupture. The Southern End west of Sumatra is a complex fault in constant action. There will be more quakes and Tsunamis in that region, but with epicenters migrating south, there is no Tsunami risk to Thailand. The Northern End (Andaman Islands to Bangladesh) is fairly stable after June's 7.2 Andaman Islands quake. Aftershocks continue, and will for years to come. They gradually settle the confused geology along the fault line and lessen the chances of another great quake. Fault movement suggests it is at least 400 years until next the next "great" earthquake (magnitude 9,0 or greater).

The bubble spikes at the epicenter, defocusing in widening concentric rings capable of traveling thousands of kilometers in deep oceans with unusually low release of energy. Speeds reach almost 1,000/kph.

When the shallow wave nears shore, it slows to under 100kph, but the energy remains constant, so following waters back up, creating a rising tide. Tsunami's are usually rapidly rising floods and bores, but rarely crest like surf. A bore is a low-faced thick wall of white water. Tsunami formation develops from magnitude, size and style of the seabed displacement; ocean depth; fault depth; fetch; on-shore seabed shape and depth; and coastline/backshore shape and slope. A steep-sloping beach creates a dramatic cresting wave with short run-up and a narrow strip of damage, while a mud-flat beach backed by floodplains accepts run-ups up to 3 kilometers inland.

At Khao Lak, the first wave was a bore, followed by rapidly rising incessant floodwaters up to 11.6 meters. The waters flooded inland to that elevation.

Patong has a deep bay and flat sand beach, perfect conditions for a visually dramatic collapsing peak with a 2-meter run-up that only went 200 meters up the Soi's. One of the biggest names in beaches suffered some fatalities, but what really made Patong so famous was that people with video cameras actually survived.

TSUNAMI ACTION PLAN

Seismology is a fast-growing highly technical yet inexact science. Fault line and tectonic plates are precisely mapped, speed and direction of movement is observed, and general trends and patterns can be predicted, yet we have no way of predicting the exact time and location of Earthquakes and Tsunamis.

Not all submarine earthquakes of 7.0 or greater generate Tsunamis, making the big waves even more unpredictable. However, until the instillation of Tsunami Warning Buoys, "Shake Reports" from seismographs around the world provide immediate and accurate measurements of location and magnitude. The December 26 Sumatra quake United States Geological Service "Shake Report: was on-line within 10 minutes of the quake.

What the Indian Ocean region lacked was Tsunami Awareness and an Action Plan.

Tsunami awareness is no longer an issue. Mention the word and people start running for the hills. Thanks to Thailand's Tsunami Early Warning Program led by Dr, Smith Dharmasaroja, a Tsunami Action Plan is already in place, with upgrade coming once Tsunami buoys are operational. Shake reports are accurate and immediate, but without detailed data, false alarms are common, leading to expensive but unnecessary evacuations and developing public complacency to warnings. Buoys considerable reduce false alarms.

Buoy or Shake Report, the alarm sounds in Thailand's newly created National Disaster Emergency Center. An Alert is immediately transmitted to a network of police, government, and travel industry officials. In Q3, 2005, satellite dishes will be placed on all lodging facilities in Tsunami Evacuation Zones. Hotels will be evacuated using existing fire evacuation plans located on every room door. All Phuket hotel staff have already rehearsed Tsunami evacuation routes to take guests, staff, and local residents to high ground.

Although buoys and satellite dishes are not in place, a 7.2 Andaman Islands earthquake created a July - false alarm that activated the existing plan. Although it was around Midnight, the evacuation plan produced excellent results until authorities canceled the alert within an hour.

Dr. Smith took the responsible position, saying, "Although this quake didn't appear to be a Tsunami source, we must issue a warning on every Andaman Sea earthquake of 7.0 or greater. When we are certain a quake did not create a Tsunami, we will cancel the warning."

Although seismologists say it's another 250-600 years until the region's next Great Quake, Smith believes "Better safe than sorry".

TSUNAMI AWARENESS

More important than any advanced technology, human awareness is the most important survival factor in any Tsunami. Since great quakes like December 26 have a frequency of several centuries, nobody in the region expected a Tsunami, understood danger signals. Knowledge of how to react was non-existent.

When one Phuket resident felt the quake and found the online USGS shake report at 8:14AM, he commented to his staff, "Poor folks in Aceh, as soon as the last brick stops falling, the Tsunami will hit, and that's about one minute from now." Obviously, all Aceh residents felt the quake, but few if any understood a Tsunami would accompany such a great quake. Their only hope was to start running for high ground immediately.

Aceh is so close to the epicenter there was no warning, but South Thailand was 1,000 kilometers away, and the primary wave had to "wrap" 70 degrees around Banda Aceh, slowing down the arrival to just short of two hours. Away from the epicenter, waters recede from the shoreline several minutes before the arrival of Tsunamis.

At Khao Lak, the "tide" went out for at least 20 minutes before returning as a rapidly rising flood. Unaware people ran to the exposed seabed to collect fish the easy way. They won't be doing that again. Today, we have "Tsunami Awareness", perhaps even a bit too much. For months after the Tsunami, many people ran for the hills with every aftershock announcement. Generally, aftershocks are a good thing because they settle the fault lime and release the pressures of plate movements.

Feeling the shake before the Tsunami is rare. Only a few aware people in Phuket felt or understood the faint low frequency rumblings of the 9.3 Great Earthquake. The first most people know of a Tsunami is from Early Warning or receding seawater. Tsunami's can occur on any seacoast in the World at any time, but with minimal Tsunami awareness, survival is not an issue.

1. Anytime you vacation on a seacoast, visualize and rehearse a Tsunami evacuation. This rehearsal also works for cyclones, hurricanes, and floods.
2. At the first sign of a Tsunami, via either alert or receding waters, immediately evacuate to high ground.
3. Stay "high" until you are certain the Tsunami is finished. There can be several waves over a two or three hour period.
4. Do not be deceived by "False Alarms". There are about 50 false alarms for every Tsunami. Many Tsunamis are so small they are noticeable only by scientific instruments. False alarms are good — they prove systems work, officials are diligent and taking no chances. Buoys decrease the number of false alarms.
5. Remember, Tsunamis can happen any time on any coastline in the World.

Finally, remember the Boxing Day Tsunami was the second largest earthquake in history. The 11-meter slip compares to the 1906 San Francisco quake, created by a 4-meter slippage. These events don't happen every day.

GOOD GHOST STORIES

Rational thinkers do not believe in ghosts, except in Polynesia-Melanesia where accounts of ghosts are common and accepted. Most ghosts are considered friendly and non-threatening, so here are some personal accounts the ease the minds of those who actually believe in ghosts.

* * *

The monsoons dumped torrential rains in the mountains of Kokee, Kauai, Hawai'i on Halloween night, 1982. Everyone on the group opted to rent a cabin except one adventurous couple who braved the elements in their tent. Heavy rains pelted their tent, but the couple heard laughter and footsteps right outside their tent. With no raincoat, the man ventured into the downpour to investigate. Thinking his friends were playing a trick, he checked the cabin. Everybody was sleeping. More important, there were no wet footprints on the cabin floor — no tricks here. After each scouting trip, the man said he would not open the tent again, but the sounds were so obvious the man performed the exercise three times.

About 4AM, there was a tremendous noise. Two days later in Honolulu, newspapers reported the rains were so strong they triggered a one-cubic mile landslide in the next canyon, but the downpour was not strong enough to stop the "Nightwalkers" from holding a party around the tent.

* * *

Three backpackers hiked to the summit of Mount Waialeale, the wettest spot on earth with a 15-meter annual rainfall. On the return, they camped in the middle of an ancient Hawaiian village at the back of a remote side canyon near Kokee. The night was clear with a starry sky, and the Nightwalkers had a big party, so loud and noisy the campers could not sleep. They repeatedly got out of their tents and surveyed the area, but there were no life forms in sight, yet the party persisted.

At dawn, one hiker packed his tent as was gone at daybreak. The other two spent two more nights, partying away with the nightwalkers. Everybody had a great time.

* * *

On Vanua Balavu, Fiji, a documentary maker hiked across the island each night to recharge his video batteries. On clear nights, he walked the footpath without using his light. One night, he saw a faint glow in the middle of the path. Fifteen meters away, he stopped, took a good look, and turned on his torch to solve the sighting. Nothing showed in the light. The man turned off his light, took a minute to adjust to the darkness, and again saw the faint glow. He walked up to and right through the glow. Expecting warmth, he felt a strange chill. After walking through the Nightwalker, the man turned around and the glow remained.

When the man returned to the village chief's house, he asked why he felt chill instead of warmth. His host knew right away that the glow was the deceased chief from the next district. When the chief died, his son was in Suva so a rival clan elected their own son chief. The living chief explained that while most nightwalkers are friendly, the angry chief stood vigil at that spot to protest the injustice done to his son.

INTERNET RESOURCES

USGS Earthquake Section
http://earthquake.usgs.gov/

USGS Asian Shake reports
http://earthquake.usgs.gov/recenteqsww/Maps/region/Asia.html

USGS Sumatra Tsunami Animation
http://walrus.wr.usgs.gov/tsunami/sumatraEQ/SumatraNW1pic.html

USGS — Earthquakes Since 1900 with 1,000 or more fatalities
http://neic.usgs.gov/neis/eqlists/eqsmajr.html

University of Washington Tsunami Program
http://www.ess.washington.edu/tsunami/index.html

Tsunami visualizations page
http://serc.carleton.edu/NAGTWorkshops/visualization/collections/tsunami.html

University of Southern California Tsunami Center
http://cwis.usc.edu/dept/tsunamis/2005/2005/index.html

NOAA Pacific Marine Environmental Laboratory
http://www.pmel.noaa.gov/tsunami/research.html

National University of Singapore Tsunami page
http://www.crisp.nus.edu.sg/tsunami/tsunami.html

MSNBC — USA coasts Vulnerable to Tsunami
http://www.msnbc.msn.com/id/6935693/

Asia's Deadly Waves — NY Times Graphics
http://www.nytimes.com/packages/khtml/2004/12/31/international/20041231_TIMELINE_FEATURE.html

Nova On Air
http://www.pbs.org/wgbh/nova/tsunami/ask-050331.html

Live Science — March 28, 2005 Aftershock
http://www.livescience.com/forcesofnature/050328_quake_science.html

Giant Megathrust Earthquakes Along Canada's West Coast — Canada Geological Survey Agency
http://www.pgc.nrcan.gc.ca/seismo/hist/megapap.htm

British Columbia Provincial Emergency program — Cascadia Anniversary
http://www.pep.bc.ca/cascadia_1700/cascadia_1700.html

Ron Romanosky Photography — The Wedge
http://romanosky.wedge.org/

More Tsunami Links
http://www.shoa.cl/oceano/itic/tsu_links.html

PBS Online — Savage Seas Wave machine
http://www.pbs.org/wnet/savageseas/multimedia/wavemachine.html