TsuInfo Alert

prepared by the Washington State Department of Natural Resources on behalf of the
National Tsunami Hazard Mitigation Program
a state/federal partnership funded through the National Oceanic and Atmospheric Administration (NOAA)

Contents **Volume 11, Number 6 December 2009**

SAMOA EARTHQUAKE/TSUNAMI

TSUNAMI BULLETIN NUMBER 001
PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS
ISSUED AT 1804Z **29 SEP 2009**

THIS BULLETIN APPLIES TO AREAS WITHIN AND BORDERING THE PACIFIC OCEAN AND ADJACENT SEAS...EXCEPT ALASKA...BRITISH COLUMBIA...WASHINGTON...OREGON AND CALIFORNIA.

... A TSUNAMI WARNING AND WATCH ARE IN EFFECT ...

A TSUNAMI WARNING IS IN EFFECT FOR

AMERICAN SAMOA / SAMOA / NIUE / WALLIS-FUTUNA / TOKELAU /COOK ISLANDS / TONGA / TUVALU / KIRIBATI / KERMADEC IS / FIJI / HOWLAND-BAKER / JARVIS IS. / NEW ZEALAND / FR. POLYNESIA / PALMYRA IS.

A TSUNAMI WATCH IS IN EFFECT FOR

VANUATU / NAURU / MARSHALL IS. / SOLOMON IS. / JOHNSTON IS. / NEW CALEDONIA / KOSRAE / PAPUA NEW GUINEA / HAWAII /POHNPEI / WAKE IS./ PITCAIRN / MIDWAY IS.

FOR ALL OTHER AREAS COVERED BY THIS BULLETIN... IT IS FOR INFORMATION ONLY AT THIS TIME.

THIS BULLETIN IS ISSUED AS ADVICE TO GOVERNMENT AGENCIES. ONLY NATIONAL AND LOCAL GOVERNMENT AGENCIES HAVE THE AUTHORITY TO MAKE DECISIONS REGARDING THE OFFICIAL STATE OF ALERT IN THEIR AREA AND ANY ACTIONS TO BE TAKEN IN RESPONSE.

AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS:
ORIGIN TIME - 1748Z 29 SEP 2009
COORDINATES - 15.3 SOUTH 171.0 WEST
DEPTH - SHALLOWER THAN 100 KM
LOCATION - SAMOA ISLANDS REGION
MAGNITUDE - 7.9 [LATER UPGRADED TO 8.3] *continued on page 3*

TsuInfo Alert

is prepared by the Washington State Department of Natural Resources
on behalf of the National Tsunami Hazard Mitigation Program,
a State/Federal Partnership funded through the National Oceanic and Atmospheric Administration (NOAA).

It is assembled by
Lee Walkling, Librarian,
and is published bi-monthly by the
Washington Department of Natural Resources, Division of Geology and Earth Resources.

This publication is free upon request and is available in print (by surface mail), and at
http://www.dnr.wa.gov/ResearchScience/Topics/GeologyPublicationsLibrary/Pages/tsuinfo.aspx
Participants in the TsuInfo program can request copies of reports listed in this issue from:
Washington Geology Library
Washington Department of Natural Resources
Division of Geology and Earth Resources
1111 Washington Street SE, MS 47007
Olympia, WA 98504-7007
360/902-1473
fax: 360/902-1785
e-mail: lee.walkling@dnr.wa.gov

ISSN 1938-5064

(*continued from page 1*)
EVALUATION

IT IS NOT KNOWN THAT A TSUNAMI WAS GENERATED. THIS WARNING IS BASED ONLY ON THE EARTHQUAKE EVALUATION. AN EARTHQUAKE OF THIS SIZE HAS THE POTENTIAL TO GENERATE A DESTRUCTIVE TSUNAMI THAT CAN STRIKE COASTLINES NEAR THE EPICENTER WITHIN MINUTES AND MORE DISTANT COASTLINES WITHIN HOURS. AUTHORITIES SHOULD TAKE APPROPRIATE ACTION IN RESPONSE TO THIS POSSIBILITY. THIS CENTER WILL MONITOR SEA LEVEL DATA FROM GAUGES NEAR THE EARTHQUAKE TO DETERMINE IF A TSUNAMI WAS GENERATED AND ESTIMATE THE SEVERITY OF THE THREAT.

ESTIMATED INITIAL TSUNAMI WAVE ARRIVAL TIMES AT FORECAST POINTS WITHIN THE WARNING AND WATCH AREAS ARE GIVEN BELOW. ACTUAL ARRIVAL TIMES MAY DIFFER AND THE INITIAL WAVE MAY NOT BE THE LARGEST. A TSUNAMI IS A SERIES OF WAVES AND THE TIME BETWEEN SUCCESSIVE WAVES CAN BE FIVE MINUTES TO ONE HOUR.

LOCATION	FORECAST POINT	COORDINATES	ARRIVAL TIME
AMERICAN SAMOA	PAGO PAGO	14.3S 170.7W	1759Z 29 SEP
SAMOA	APIA	13.8S 171.8W	1810Z 29 SEP
NIUE	NIUE IS.	19.0S 170.0W	1822Z 29 SEP
WALLIS-FUTUNA	WALLIS IS.	13.2S 176.2W	1835Z 29 SEP
TOKELAU	NUKUNONU IS.	9.2S 171.8W	1844Z 29 SEP
COOK ISLANDS	PUKAPUKA IS.	10.8S 165.9W	1846Z 29 SEP
	RAROTONGA	21.2S 159.8W	1929Z 29 SEP
	PENRYN IS.	8.9S 157.8W	1954Z 29 SEP
TONGA	NUKUALOFA	1.0S 175.2W	1851Z 29 SEP
TUVALU	FUNAFUTI IS.	7.9S 178.5E	1932Z 29 SEP
KIRIBATI	KANTON IS.	2.8S 171.7W	1935Z 29 SEP
	FLINT IS.	11.4S 151.8W	2025Z 29 SEP
	MALDEN IS.	3.9S 154.9W	2037Z 29 SEP
	CHRISTMAS IS.	2.0N 157.5W	2100Z 29 SEP
	TARAWA IS.	1.5N 173.0E	2104Z 29 SEP
KERMADEC IS	RAOUL IS.	29.2S 177.9W	1938Z 29 SEP
FIJI	SUVA	18.1S 178.4E	2003Z 29 SEP
HOWLAND-BAKER	HOWLAND IS.	0.6N 176.6W	2008Z 29 SEP
JARVIS IS.	JARVIS IS.	0.4S 160.1W	2028Z 29 SEP
NEW ZEALAND	EAST CAPE	37.7S 178.5E	2044Z 29 SEP
	GISBORNE	38.7S 178.0E	2100Z 29 SEP
	NORTH CAPE	34.4S 173.3E	2112Z 29 SEP
	NAPIER	39.5S 176.9E	2140Z 29 SEP
	WELLINGTON	41.3S 174.8E	2150Z 29 SEP
	AUCKLAND(E)	36.7S 175.0E	2212Z 29 SEP
	AUCKLAND(W)	37.1S 174.2E	2239Z 29 SEP
	LYTTELTON	43.6S 172.7E	2255Z 29 SEP
	NEW PLYMOUTH	39.1S 174.1E	2317Z 29 SEP
	NELSON	41.3S 173.3E	2323Z 29 SEP
	DUNEDIN	45.9S 170.5E	2331Z 29 SEP
	MILFORD SOUND	44.6S 167.9E	2358Z 29 SEP
	WESTPORT	41.8S 171.6E	2359Z 29 SEP
FR. POLYNESIA	PAPEETE	17.5S 149.6W	2045Z 29 SEP
	HIVA OA	10.0S 139.0W	2214Z 29 SEP
	RIKITEA	23.1S 135.0W	2247Z 29 SEP
PALMYRA IS.	PALMYRA IS.	6.3N 162.4W	2102Z 29 SEP
VANUATU	ANATOM IS.	20.2S 169.9E	2117Z 29 SEP
	ESPERITU SANTO	15.1S 167.3E	2123Z 29 SEP

NAURU	NAURU	0.5S 166.9E	2138Z 29 SEP
MARSHALL IS.	MAJURO	7.1N 171.4E	2147Z 29 SEP
	KWAJALEIN	8.7N 167.7E	2220Z 29 SEP
	ENIWETOK	11.4N 162.3E	2309Z 29 SEP
SOLOMON IS.	KIRAKIRA	10.4S 161.9E	2155Z 29 SEP
	GHATERE	7.8S 159.2E	2227Z 29 SEP
	AUKI	8.8S 160.6E	2244Z 29 SEP
	HONIARA	9.3S 160.0E	2244Z 29 SEP
	PANGGOE	6.9S 157.2E	2245Z 29 SEP
	MUNDA	8.4S 157.2E	2248Z 29 SEP
	FALAMAE	7.4S 155.6E	2304Z 29 SEP
JOHNSTON IS.	JOHNSTON IS.	16.7N 169.5W	2212Z 29 SEP
NEW CALEDONIA	NOUMEA	22.3S 166.5E	2216Z 29 SEP
KOSRAE	KOSRAE IS.	5.5N 163.0E	2233Z 29 SEP
PAPUA NEW GUINE	KIETA	6.1S 155.6E	2303Z 29 SEP
	AMUN	6.0S 154.7E	2323Z 29 SEP
	RABAUL	4.2S 152.3E	2349Z 29 SEP
HAWAII	NAWILIWILI	22.0N 159.4W	2311Z 29 SEP
	HILO	19.7N 155.1W	2314Z 29 SEP
	HONOLULU	21.3N 157.9W	2315Z 29 SEP
POHNPEI	POHNPEI IS.	7.0N 158.2E	2318Z 29 SEP
WAKE IS.	WAKE IS.	19.3N 166.6E	2322Z 29 SEP
PITCAIRN	PITCAIRN IS.	25.1S 130.1W	2329Z 29 SEP
MIDWAY IS.	MIDWAY IS.	28.2N 177.4W	2349Z 29 SEP

BULLETINS WILL BE ISSUED HOURLY OR SOONER IF CONDITIONS WARRANT. THE TSUNAMI WARNING AND WATCH WILL REMAIN IN EFFECT UNTIL FURTHER NOTICE.

THE WEST COAST/ALASKA TSUNAMI WARNING CENTER WILL ISSUE PRODUCTS FOR ALASKA...BRITISH COLUMBIA...WASHINGTON...OREGON...CALIFORNIA.

[NOTE: for the complete set of Samoa tsunami warning bulletins: http://www.prh.noaa.gov/ptwc/messages/pacific/2009/]

This is an (e-mail) account of the Samoa tsunami from a NOAA employee on the ground:

Good Evening,

At approximately 0645 (Sept. 30) Samoa local time there was an 8 magnitude earthquake south of American Samoa. That earthquake generated a tsunami that struck the Samoan islands. At the time I was driving into work in Tula. My wife, Ester, called and warned me of the earthquake. I asked her to gather up our daughter and head for high ground.

A very short time after, as I was driving through a small village named Fongaitua, I noticed that the sea quickly receded back past the breakers. I slowed to a stop to watch this and saw a wave come ashore and wash out the road. Choosing the better part of valour I high tailed it in reverse to a somewhat higher, sheltered place between a hollow-block house on the ocean side, and a large concrete terrace on the mountain side of the road.

The second wave came in and flooded the village. The third wave battered down walls and carried away buildings.

From the cab of my vehicle I watched the fourth wave crest over the hood of my truck. It floated the front of the truck up and spun me around in a number of 360 degree turns, finally depositing me up against the concrete terrace that I sheltered against.

Once the ocean receded, I waded through the village helping. Once I had done what I could, I replaced a flat tire and proceeded on to the observatory.

On the drive I saw that most of the coastal villages were washed away or severely damaged. I stopped several times and helped people clear trees, boulders, vehicles, and dead animals out of the road.

It took nearly two hours to travel less than 5 miles. Upon arrival in the village of Tula I noticed that fully 75% of the fales in the village were collapsed. I spent some time helping the cleaning efforts in Tula, until there was a path large enough to drive through.

I made my way up to the observatory, performed a quick damage assessment. Then I shut down the observatory. After that, I went back down into the village and started ferrying people up to the observatory.

We have about 100 displaced people camping under our car port now. I have provided them with access to the observatory facilities and locked the equipment spaces. Potable water, electricity to cook with, washing water, and air conditioning for the infirm will be in short supply.

At the observatory, I treated injuries as best as I could. Brian ...thanks for the RMI kit. It was a Godsend.

Once we got word that the roads were passable I ferried people down to the village rally point where civil support services were just setting up. Then I proceeded back to Tafuna to check on my family and house. We are all fine.

Driving through Pago Pago was surreal. It was like a bomb went off. Big fishing boats washed ashore, drainage canals full of vehicles, businesses collapsed. The cemetery was breached and flooded. We have disinterred caskets floating around.

Radio stations are off-line, but rumour has it that 19 are dead. The generator plant in Satala was flooded so the entire eastern end of the island is without power. The potable water system is corrupted now. We will be under "boil orders" for a long time. Telephone services are down. The harbor is blocked with shifted sand bars and foundering tuna boats.

I have no news of the condition of the airport but I suspect that it may have been wave washed which would foul the runway with FOD. That will have to be cleaned up before flights can land. Hopefully looting will be at a minimum tonight.

It is now 1720 local time, I am in Tafuna and heading back to assist in any way I can.

[From: Mark C. Cunningham, NOAA Earth System Research Laboratory] Reprinted with permission

The day of the tsunami
Pavaiai, American Samoa
By SIA FIGIEL
New York Times
October 1, 2009
Reprinted with permission

We awoke on Tuesday morning to the house shaking. Earthquakes in this part of the world usually last for a minute or two. But this time the house shook for five minutes. The children and I left our beds and ran outside to the clearing in front of our house, where our neighbors had already gathered. Then just as suddenly as it had started, everything became quiet, and we went back inside.

I packed up my three boys and drove them to school. Just after I'd dropped them at the gate and was heading to my office, I turned on the radio. The announcer was talking about cars floating like toys in the parking lot of the Pago Plaza shopping center and warned that the tsunami¹s second and third waves were expected to hit us on Tutuila Island in less than an hour's time. Instinctively, I swung the car back toward the school. I just wanted to get to my children.

The road was jammed with traffic and, at the school, frantic parents were calling out their children's names. Teachers urged us to remain calm. Mr. Moi, the principal, was also encouraging everyone not to panic. Our children, he said, had been evacuated to the highest point on the school grounds, and we could pick them up there.

On my way, I heard hymns. Some children were singing, while others were praying and crying. It was quite a sight. I saw one of my sons and told him to go look for his brothers while I did the same. After 15 minutes he ran to me and said everyone was at the car, and I quickly ran there, too.

My 10-year-old was in tears. "Mom, I don't want to die," was how he greeted me. My only thought was to drive to the highest accessible point on Tutuila, the village of Aoloau. The drive up, usually 5 minutes, took 20; it seemed everyone was heading there. We stayed in Aoloau for three hours, listening on the car radio to updates on the rising death toll. We heard reports from the neighboring nation of Samoa, the damage that the tsunami had done to the villages of Falelatai, Lalomanu and Aleipata. People had died. People were missing. Two radio stations had been lost. The only one still transmitting was the religious station. We listened to prayers as we watched waves gathering momentum below in the distance.

Meanwhile, people living across the street from where we and many others were gathered outside our cars brought coffee and bottled water, and soda for the children. At one point, we heard bells ringing from down the mountain. We didn¹t know what it meant, maybe another death.

I decided to return home. It was becoming too chaotic where we were, and the exhaust from cars and trucks climbing the hill was choking. We had to drive higher to turn the car around. As we climbed, I was amazed by the hundreds and hundreds of people atop Aoloau, this island's entire population of 62,000, it seemed. As we descended, a tremendous amount of traffic was still on its way up.

Our house is at least six miles from the coast, and I decided we would be safe there. We got home around 11 a.m. We ate breakfast, then took a nap; I wanted the children to be as calm as possible. When we woke at around 3, my sister had made lunch. She told us the death toll on our island had climbed to 14. Half an hour later, that number became 22. And many more were injured. The deaths were mostly in the coastal areas.

The photos posted online were overwhelming. Villages lay devastated. Cars had been washed into buildings, boats onto roads. And water was everywhere. On the main road in Fagatogo, the post office was flooded.

By 6 p.m., everything was still. No wind moved the trees. I responded to e-mail messages from friends in New Zealand, Los Angeles, Seattle, New York, Michigan--an outpouring of concern for our island. I heard the bells ring for evening prayer. Our prayer was one of gratitude that our family and neighbors were safe. But our hearts were with, are still with, those who cannot say the same, who would sleep for the first time that night without a son, a daughter, a

mother, a father, an uncle, an aunt, a cousin. Their loss is our loss.

My cousin named Samoa, in Modesto, Calif., contacted me on Facebook to ask if I would pick up Opi, his 64-year-old father, who lives on the mountain above the coastal village of Leone, and bring him to my house. So I loaded the children into the car and drove over there. But Opi could not think of leaving his beloved Leone. I listened intently as he told the story of his day.

Opi starts every morning by walking through the village. "The quake hit as I was stretching at the gas station," he said. "I warned Noelle to lock up and leave as soon as she could. I knew there would be big waves because the quake shook for a good five to six minutes." As he left Noelle's store, he waved to four old women weaving mats in a small fale (a Samoan thatched-roof shelter) across the street. "Go home!" he told them. "There¹s going to be a wave coming soon." But the old women just laughed and called out: "Have faith, Opi! God is good!"

When he got up to his house, he heard a crash, as if something had fallen from the sky. Looking down toward the village, he saw the gigantic wave advancing onto the land. He ran toward the fale to get to the four women. But as he passed the dispensary, he realized how strong the wave was, and knew that no matter how fast he ran, they would not be there.

"Still, I couldn't stop running," Opi said. "I just wanted to see them one more time. These women are always there at the fale. Every morning I do my rounds of the village, they are always there. Waving at me and I wave back at them."

Before he even reached the village, the water was already up to his waist. "I knew the fate of those women," he said. "I just wish I could have done something more. I could have gone over to them and taken them away from the fale with me in the first place. But the waves hit so fast. One minute I was waving at those old women and the next minute, they were gone."

I asked Opi if he wanted to come with us. "No, this is where I belong," he said. "I need to be here. There's so much to do down here tomorrow."

Opi then hugged us all and told us to return home. But the boys wanted to see Leone. So we took a drive down to the village. The first thing that hit us was the stench of mud. Then, we could see the devastation: cars stuffed in houses, buildings broken in half and filled with debris. The post office there was in ruins. All the houses along the coast were flattened by debris. "And I saw a shoe that must have belonged to a baby, Mom," said one of my sons.

We noticed people from the Department of Public Works and the American Samoa Power Authority working to fix the bridge connecting Leone to the villages on the western side of Tutuila. They waved at us and told us to drive carefully. We waved back and thanked them for working so late.

On the radio, we heard one public service announcement after another. All schools were closed till further notice. Electricity was out for the night in some villages. Meetings were canceled.

We got home at 9 p.m. By 11, the children were all asleep. The neighbors' lights were out. The dogs were quiet. The land was quiet. The trees breathed peace into our dreams.

Sia Figiel, the author of the novel *Where We Once Belonged*, is an educational officer for the Congressional delegate from American Samoa.

'ALIVE!': Pacific Grove High School grad recounts tsunami experience

The Monterey County Herald,
http://www.montereyherald.com/
Updated:10/20/2009 09:01:21 AM PDT
http://www.montereyherald.com/living/ci_13599778?nclick_check=1# Reprinted with permission

I am so tired. This is the second try at writing my experience. Today is Friday morning (Oct. 2). Tuesday we had a tsunami. I had gone running. I did my tempo workout early that day. I had finished and was running home. About half a mile away from Coconuts (Beach Club and Resort), my vision seemed blurry and I thought I was faint, but oddly I felt fine. Then I noticed the ground ripple in front of me. I stopped running and put my hand to my head. When I looked up to the power lines I saw them swaying and immediately decided to move to the other side of the road.

Then I heard the rustle of leaves shaking on trees, but there was no wind. We were having an earthquake. From the ripple I saw pass before my eyes and the duration of the shaking, it was pretty big. I kept walking toward home and saw a large tree stump still shaking. I knew it was a big, long earthquake. I started running for home.

Jeff soon came driving up the road in a car to check on me. I told him I was fine. We both agreed that it was an enormous earthquake. We spoke for a few minutes and then he drove home and I ran back.

We met at the front door of our room and I suggested that he go to the office and check for a tsunami warning online. I ripped off my running clothes and took a really quick shower. As I was stepping out of the shower, the tsunami warning sirens started wailing. My heart sank. Jeff ran to the front door and yelled that we have to go, a tsunami is coming. He said he was going down to the resort to warn the guests. I grabbed a pair of pants and wrestled them onto my wet body. I grabbed a bra and a shirt. I put the bra on. I was shaking so hard I couldn't close the clasp. I slipped my feet into flip-flops and ran out the door with a shirt in my hand. I was topless but I didn't care. I could hear the roar of the approaching wave.

I ran as fast as I could up the hill. The kitchen staff was moving up the hill as well. They were beginning to tire and slow down. I kept screaming at them to run. I knew we had to get as far and high as we could. I had recently read that a tsunami could go up to a mile inland and we still weren't on

very high ground yet. I ran for my life. Yes, I ran for my life and everyone else around me did too.

Sometimes you have dreams where you are running and not really moving. I had always wondered if given the situation where my life depended on my ability to move if fear would paralyze me. It didn't, I was able to get away. I was full of fear and adrenaline. Running for my life ...

After the first wave hit, I knew that Jeff was still down at the resort. I ran back down. I could only make it to the entrance. Everything was destroyed. I was screaming Jeff's name, praying for a response. There was none. Some of the villagers were down there with me. They mentioned broken electrical lines and I waded out of the knee-deep water. They pointed to the ocean and we all saw the next wave coming. A wall of black water. I ran for my life again. I ran up the hill filled with fear and despair. I turned around and saw the water coming. I waited at the top of a smaller hill, not as far away.

Sirens announce third wave As I saw the water recede I started to head back down and look for Jeff. By then people were beginning to emerge from the resort. I studied them, hunting for my husband. Bob had already gone back down to help with guests. I was walking down with Lina. I told her that I couldn't find Jeff and I was afraid that he was gone. I told her that the resort was completely destroyed. She looked at me with disbelief. I went back to the entrance and started calling for Jeff again. My wailing "Jeff, Jeff, Jeff," met no response. By that time I had lost one of my shoes and had taken the other one off. I was barefoot.

Then the sirens started going off again. The third [sic] wave was coming in. I turned up the hill again and ran, ran for my life. Joe came driving up and suggested that I get in the car. I did but the others came up as well. So I climbed in the trunk of the SUV. We started driving up the hill. I was desperate to find Jeff but the resort was under water. I feared that he was swept out to sea.

As we were making our way up the hill I saw a wet man with a familiar Kid Rock T-shirt on. I didn't recognize his shorts but I was pretty sure that it was Jeff. As soon as we stopped the car I got out and ran back down the hill. It was him! He had a bed sheet wrapped around his head and an unknown pair of swim trunks on but he was alive. ALIVE! He had a huge gash in his knee, he was coughing up water, he could barely walk. I asked him to stop and lay down but he was deathly afraid of the next wave. He wanted to get far away from the ocean. He was starting to go into shock. We got him to the top of the hill and laid him down. His shirt came off and we got him some warm clothes. He was shaking, getting pale, clam-my and crying out in pain. He had cuts everywhere. I tied the bedsheet around his leg to stop the bleeding and applied pressure to the wound on his knee.

People started organizing the injured and we hired two taxis to take them to the hospital. Jeff and I were in the front taxi and the rest of the guests were in the taxi van in back. We raced up the hill with the horns blaring. People were lining the sides of the road all the way up the hill — children in school uniforms, mothers carrying their babies, tourists with glazed eyes. We got stuck behind a slow-moving truck, and then our taxi stalled. On the side of the mountain, Jeff and I quickly moved into the taxi bus and kept going. Jeff could barely stand. I suggested we go to the private hospital, not the public one.

On the way to the hospital Jeff told me his story. He had been down by the beach yelling at guests to run. It was good that he did because later a guest would confide that Jeff had saved the lives of his wife and two kids. As Jeff saw the wave coming he started to run to the entrance of the resort. The water got up to his waist so he started to climb a coconut tree. He got to the top of the rock wall at the spa — about 12 feet high. He held on desperately to the coconut tree as the wave washed over his head. He realized that if he continued to hold on he would drown. He made the decision to let go and take his chances floating.

While floating he saw a boat go floating by and thought about getting in it but decided he was better off floating. He washed down almost 100 yards and swam into to the Treehouse Room 3. He thought he should get on the land side of the building. He found himself floating against the ceiling on a mattress. He heard voices on the second floor of the building. He punched a hole through the wall and called out for help. He had lost his pants and asked for a replacement. They gave him shorts and then tied bed sheets together to pull him up. They threw the sheets out to him and said that the second wave was coming. As he grabbed the sheets they came untied. He screamed, "Please don't let me die."

He was still floating and somehow got himself over to one of the posts of the treehouse. He pulled himself up to the second story as the second wave hit. They all sat there. They wanted to escape as the water receded but someone said that there would be a third wave, so they waited. Once the third wave happened they made their way down and ran off the property, up the hill. Jeff couldn't run but he hobbled his way out. He is still haunted by the decision he had to make. Do you hold onto the safety of the tree, not get washed out to sea and possibly drown, or do you take your chances and float in a tsunami?

At the hospital all of the guests were put in different rooms. The nurse and I cut off all of Jeff's clothes. We put two sheets over him but he was still shaking pretty badly. I stayed with him while the doctor stitched up his knee. The nurse left me with a cup of iodine and a few cotton swabs so that I could clean off the rest of his cuts. The doctor just thought his ribs were bruised — no problem. They hooked him up to an IV.

I started to go around the hospital and locate the rest of the Coconuts guests. There were nine in total. They were all bruised, battered and shocked. One gentleman, John, was still missing his wife. They had come out of the room and started to run when they heard the siren. Then she fell. He picked her up and started to carry her because she thought she had broken her leg. As he carried her the wave came. He can't swim.

He held on to her as long as he could, but she slipped away. That was the last time he saw her alive.

Other guests had serious lacerations. One man explained how his wife had a stick protruding from her cheek and he had to pull it out. That was the same father who had thanked Jeff for saving his family. They were staying in one of the beach fales (houses). **As most guests, they had heard the sirens but didn't know what they meant.** [Editor's emphasis] They were standing on the beach, dazed after the earthquake. They thought the siren was just another earthquake warning. When they heard Jeff yelling they started to run into the woods. As the water came he got his family up in a tree and he started to climb up as well. He saw a car come floating straight toward him. The car hit him and pinned him against a tree. He grabbed for his son as the water got higher. He held on tight and his family survived.

The feeling at the hospital was an overwhelming sense of gratitude to be alive. Everyone there was beaten and battered, but alive, except John. Part of him died. Later in the afternoon he was taken to the morgue to identify Maree's body. He came back to the hospital and resumed his vigil in bed. I had asked that he be moved in the room with Jeff so that at least he wasn't alone, which was OK until Jeff checked himself out of the hospital.

When we got to the resort I went straight to our fale. It used to be parallel to the ocean, but it was now perpendicular. It had been lifted off the foundation and floated down with the wave. The front room was gone completely. There were still some clothes left but I could tell that the place had been looted. I could tell what area had remained dry and knew that our computer, wallets, passports, etc had survived the waves but were gone. I took what dirty, wet clothes I could find and wearily put them into dirty, wet suitcases. I commented to Jeff that all his clothes in the closet were gone, yet the hangars were still hanging. We were going to start seeing people in the village wearing his shirts. We carried out and secured our suitcases in a car. Later we found out that one of our co-workers, Bob, had gone into our room and grabbed anything he thought was valuable. We are grateful to Bob for saving our most important belongings.

Then we began to walk the property. The utter destruction was unbelievable and still is. The over-the-water fales were completely gone. Yesterday they were found in Mulavai — a mile down the beach. The restaurant was tilted, the furniture was gone. Nothing was left of the bar but the floor. Fale Afa was in pieces where the gift shop used to be. The gift shop was was 100 yards away. There was a 20-foot fishing boat on top of the whole mess. The office was completely gone. The beach fales were standing but windows and walls were blown out. Beds were standing against walls. Barry and Jennifer's fale now leaned to the west. We saw police officers looting the weight room.

As we walked along, a police office came up to us and said that another tsunami was coming and to get off the beach. We ran for our lives again. This time it was harder. Jeff was slower, we had to dodge debris, dead fish. There was an eel slowly dying in his new hole on a sand walkway, 30 feet from the ocean. We ran across barbed wire and wood, torn plant life and soiled machines. But we ran.

Lina took us up to the village and told Jeff to rest. He laid down. We saw Mika for the first time. Rob and Katie invited us to their house. Seeing as we were homeless and they had hot showers, we took them up on the offer. That night I showered with Jeff, grateful to have him breathing and standing with me. I washed the sand out of his cuts and then bathed him in hydrogen peroxide. Everywhere I looked he had a scratch, scrape or abrasion. We enjoyed wine and cheese appetizers — the last thing I ever thought I would see again. We petted cats and dogs then laid down to dream of tsunamis and the events of the day.

That night as we slept a cat came to share our bed. As she started to take a bath Jeff thought the shaking bed was another earthquake. He laughed when he realized that it was actually a rather rotund cat, bathing. We are still very jumpy from all of the aftershocks.

It was completely unreal. Almost like a movie. We both barely slept that night.

The next day we went back to Coconuts. I stopped by the hospital and visited with the injured guests. They were doing OK. They were all hoping to be medivaced soon. I spoke to my mom that morning, grateful to hear her voice. I told her we had been in touch with the U.S. Embassy. I said we would call when we can. Waiting was difficult.

Rob and Katie buried their wonderful Auntie, Tui Anandale. She was one of the owners of the neighboring resort, Sinalei. They had tried to drive away but the wave caught their car and flipped it like a toy. She was thrown from the back seat and ended up in the top of a 50-foot coconut tree. Her husband had to cut down the tree to rescue his dead wife. I never met Tui, but I understand I missed out on meeting a truly beautiful lady.

That afternoon Lina, Jeff, Bob and I met at the treehouse. We figured out a plan for day-to-day progress. Barry wants to rebuild.

The next day we each had our crew of eight workers. My crew was all females and we had to go out in the debris field and find tools. We were also looking for anything that we could find to rebuild Coconuts. As I stood out in the field and looked through the trees I could see the beautiful aqua blue of the ocean. I was frightened by the roar of the waves. Every few minutes I would look up to make sure that the roar wasn't coming in my direction. I was comforted by the fact that I was working at the high-water mark. All I had to do was scramble up a hill and I would be safe. I was a quarter mile away from the ocean. I was still pretty jumpy.

About 3 p.m. we got a call that there had been another earthquake. We stationed someone on the beach and someone at the corner where we were working. They were watching for another tsunami. One never came that day, thank God.

Today we went back down to work. A group of Australian doctors and EMTs came walking through the property. They started talking to me and asked if there were any

injured people. I took them to Jeff. He was supposed to go back and see the doctor tomorrow but after they examined him they said he should go back to the hospital today. He has two cracked ribs. They removed the stitches in his knee, saying that stitches shouldn't be put into tsunami victims right away. You are essentially stitching in disease. You have to let the wound flush out. They suggested the removal of his toenail but said that they didn't have enough painkillers for him to do it there, hence the trip to the hospital.

Today the emotions are beginning to emerge. When Jeff and I drove over the hill to Coconuts we each began to cry as we saw the ocean. It is so beautiful, that drive over the hill. The ocean is such a rich, beautiful, aqua color. It looks so inviting coming down the hill, but it is so deadly. If it wants you it will take you. I am only so grateful that it wanted us to live.

Words cannot describe the utter terror and devastation of the situation. Driven by a primal fear for survival I ran faster than I knew possible in a pair of flip-flops. Knowing that my husband had gotten washed away in a tsunami I desperately called for him. Seeing buildings flattened, torn from their foundations, flipped over, I knew his chances of survival were slim to none. His own primal will for survival led to the ultimate decision. Fortunately, the risk was worth the reward. We felt despair at the realization that everything we owned was gone — if not washed away by a tsunami, then stolen by the villagers.

Yet I cannot describe the overwhelming sense of gratitude I feel. People are stepping up to help those in need. I am grateful to Phillip, who we barely knew, who brought me shoes and Jeff clothes at the hospital and then gave us a ride back to our destroyed home. I am grateful to the owner of the Spa, who saw us at Myna's and was concerned about how we looked, and encouraged us to come see them for some TLC — physically and mentally. I am grateful for the Australian "team." From the people who work at the High Commission who offered us support and encouragement at the hospital that day, to all of the doctors, nurses and EMTs who are seeing both the physical and mental effects of this disaster. They are executing their mission in an efficient, effective, yet compassionate manner. They are an amazing group of countrymen. I have yet to meet a single aid worker or journalist from my own country.

I am grateful to Rob and Katie Wetzell. The night of the disaster they took four of us Coconuts staff members home with them. They have set up a posh refugee camp that serves wine, cheese, beer, and fabulous dinners. They have seven cats and a dog to offer comfort, companionship and laughter. They have laundered all of the dirty, sandy, fishy clothes that I pulled from the rubble. Every time I go back to the resort I find another article of my clothing emerging from the sandy mess. They have listened to us tell our stories as they have their own losses to deal with. They have been extremely generous not only to us but to the the community as well, donating food to aid in the relief efforts. Their food distribution business is going to suffer immensely. Many of their best customers, the resorts on the south side of the island, cease to exist. Yet Rob and Katie still persevere, as we all do, with a smile on our face, a tear in our eye and a memory that will last a lifetime. As we all contemplate the utter horror of the event, we share a common sense of the beauty and fragility of life. No one can walk away from this event without being reminded of how grateful we all are to be breathing fresh air, not salt water.

As I write this I am grateful to reach over and touch the warm body of my husband. We sit in a hospital room in Samoa for the second time in a week. I am grateful for the opportunity to sit with him. He has a black eye, scrapes all over his body, two cracked ribs, a puncture wound in his knee, a broken toe, and an empty spot where pliers just removed his toenail. But he is here.

We moved to Samoa to be together every day. We were hoping to simplify our lives. I am grateful for the opportunity to joke with him about how the tsunami simplified it real quick. I am grateful for the opportunity to tell him I love him a hundred times a day, and I am utterly grateful to have him here to respond that he loves me back.
— Rachel McClintock Lynn ♦

No stone unturned--How an entire community got disaster-ready
By Raymond Riordan, Greg Gilbert and Danielle Bell
From: Continuity e-Guide #307, a Wednesday Update by DISASTER RESOURCE GUIDE, Oct. 21, 2009
http://disaster-resource.com/newsletter/2009/subpages/v307/meettheexperts.htm
Reprinted with permission

The following article is taken from the upcoming 14th Annual Disaster Resource GUIDE. The GUIDE is complimentary for professionals in business continuity, disaster or risk management, response and recovery. To sign up for the GUIDE, go to:http://disaster-resource.com/cgi-bin/freeguide.cgi

It started as an effort to tackle a common enemy: an earthquake fault in the San Ramon Valley. The fault is capable of a 6.8 Richter scale magnitude quake that splits the valley north to south. Compounded with other hazards (wildland vegetation that sweeps down from the open space into residential areas, creeks that meander through the valley with historical flooding impacts, and a major transportation route for hazardous materials that runs beside residential communities), a disaster could occur anytime.

The City of San Ramon, Town of Danville, San Ramon Valley Fire Protection District and San Ramon Valley Unified School District are separated by jurisdictional boundaries, elected councils and boards, budgets, daily priorities, and operational activities. But with a shared mission to prepare for emergencies, in June 2006, the four agencies signed a joint agreement to plan, train, and coordinate emergency preparedness activities and disaster response.

The cornerstone of the joint Citizen Corps Council agreement focused on creating and supporting a Community Emergency Response Team (CERT) program, managed by the fire district that would cover 155 square miles and 165,000 residents. Since June, 2006, elected officials from each of the four agencies met quarterly and assigned staff to coordinate efforts. Staff were tasked with looking at new ways to integrate trained volunteers into the local response plans and facilitate citizen preparedness and promote community readiness.

The results included over 650 trained CERT members, new CERT training modules (on communications, animal sheltering, and leadership), installation of amateur radio equipment at shelters, annual emergency fairs that reach over 4,000 residents, and a local readiness website, www.bereadysrv.org.

Most recently the focus turned to integrating CERT in collecting damage assessment information and reporting to the Emergency Operations Center during an emergency. The goal of the CERT damage assessment program has been to get as many eyes and ears out in the community to help identify where the critical emergencies are located, so that available emergency response resources can be focused on the highest priorities. Using trained CERT volunteers has provided responders with information that otherwise may not get to the EOC and gives us a boost in understanding what has happened.

Identifying critical infrastructure

One of the first major accomplishments of the San Ramon Valley Emergency Preparedness Citizen Corps Council (sorry there is no cool acronym) demonstrated the value of the collaboration. The Pre-Incident Aerial Surveys (PIAS) started as a program to document school facilities for "intruder on campus" incidents. It expanded to include sites that were considered critical to the community at large, which met the Department of Homeland Security's definition of critical infrastructure, and included sites that would impact normal community activities, such as churches, parks and gathering locations, if the site were damaged or destroyed. In the 18 months of the project over 299 sites have been identified and documented in the valley.

The concept of documenting information on floor-plans, facility layouts and noting them in plans has been around for quite some time. The PIAS addressed the problems of outdated layouts, faded blueprints and sometimes inaccessible data, and made it accessible to the firefighter on the rig and the officer on the beat.

The PIAS used high-resolution aerial photographs (not available on the internet), and overlaid detailed, consistent, and "ground-truthed" data. Input on each site plan came from multiple disciplines (private sector, schools, fire, law, public works, parks, planning, and community development). The information per site highlighted identifiable hazards and systems in place to protect the facility. With the aerial photo on the right side of the bound volume, a map of the surrounding area provided a valuable tool to identify potential impacts of one facility on another. The PIAS provided invaluable information that could be evaluated while responding to the scene. It has been tested in eight real responses, including the following:

- * Following a bank robbery report, the officer on the beat contacted the sergeant in command, who had access to the PIAS map and quickly determined two possible directions of escape: down a creek bed, or in a back street area. Thanks to the aerial survey, cops caught their robber.
- * When a patient at the local medical center was experiencing heart failure, the donor heart was air-lifted from San Francisco Airport to downtown San Ramon. Because the PIAS identified helicopter landing sites in the area, authorities were able to alert the pilot as to where to safely land in the vicinity of the medical center. The patient received the heart transplant in good time.
- * And when a cougar had been spotted on the grounds of the local middle school – likely eyeing its next meal -- police determined the cougar's most likely path and gave animal control authorities the survey information that led to the cougar's capture.

Creating a damage assessment tool

Now that we knew what our critical sites were, we realized that with so many sites, we did not have sufficient public agency resources to conduct a windshield survey for all sites at the same time. We needed to prioritize the sites and identify who would or could provide an initial assessment of each site following a catastrophic event. This required bringing together fire, police, public services and building inspection staff to determine an appropriate method to rate the sites and identify which sites to survey first, second or third priority.

The group reviewed six Vulnerability Rating (VR) systems, and determined that most were too complex to meet our needs. We didn't need to know whether a building would survive a hazard, but what sites should be given a higher level of attention after an incident. Following two three-hour meetings, representatives of each jurisdiction:

- inventoried the general types of facilities within the jurisdictions,
- ranked them according to use, proximity to hazard zones and average daily population,
- provided each with a designated color to indicate high (red), medium (yellow) and low (green) response priority.

In general high priority sites included:

- Schools
- Day care centers
- Convalescent centers
- Hospitals
- Government facilities
- Potential shelters

In general medium priority sites included:

- Churches

- Business centers
- Hotels
- Large retail businesses
- Businesses with hazardous materials

The lowest priority sites included all remaining locations, such as parks without facilities and newly constructed buildings deemed non-critical.

Creating a guide

As a subset of the PIAS, we developed a damage assessment guide by reorganizing the sites by priority and removing all the detailed photos. The result included a high priority map, a medium priority map and a low priority map. Since the fire department would be a responder to the high priority sites, the high and medium sites were further organized around the ten fire stations across the district. With a map and a list of priority sites, the last two pieces to complete the guide were directions to each site that would direct responders in the most efficient means from each fire station, and a reporting form. In the end the guide included:

- List of high and medium priority sites,
- Map and turn by turn directions from a fire station to each nearby high priority site,
- Map and turn by turn directions from a fire station to each nearby medium priority site, and
- FEMA standardized reporting sheet.

Response actions

Fire district personnel respond and conduct a "windshield survey" of each high priority site. Once fire personnel complete the initial round of all high priority sites in their "area", the resources will return to a site that has major or catastrophic damage and provide needed aid. If the high priority sites are clear, then the fire personnel survey the medium priorities.

After checking their personal safety and the needs of the designated neighborhood, Community Emergency Response Teams will respond to medium and low priority sites utilizing the directions and listed sites. Both fire and Community Emergency Response Team personnel will document their visual assessment on the FEMA forms provided in the guide and report it into the central point of contact.

Information tracking

Fire dispatch personnel will report the information into the City of San Ramon or Town of Danville Emergency Operations Center via phone or fire radio. Community Emergency Response Team personnel gather information at the designated CERT Incident Command Post and report into the amateur radio station located at the San Ramon Valley Fire Protection District Administration building which houses both the City of San Ramon and Town of Danville Emergency Operations Centers. An amateur radio operator at the San Ramon Valley Fire Protection District Administration building will conduct routine "nets" to collect the information from the field CERT teams and document information on an Excel spreadsheet. The information will be either transmitted electronically or printed and provided to the Damage Inspection unit in the Emergency Operations Center for data collection and action.

Training

CERT volunteers are trained to prepare and protect themselves, identify hazards, and report to the team, without putting themselves in harm's way. The CERT teams already inspect their residential areas for damages, manage what they can, and report the information. As we tracked the high and medium priorities, they were located either within the residential area already patrolled by CERT or very nearby. Using CERT teams made sense as a support to the emergency response.

Communications training is the key to the success. To communicate with our Emergency Operations Centers, we train CERT on the use of FRS/GRMS radios to centralize information to a CERT Incident Command Post. From the ICP we use amateur radio to transmit data to the EOC. We optimize the opportunity of using the Amateur Radio Emergency Services (ARES) annual Simulated Exercise Test (SET) to prepare the CERT teams. Recently we used the September 26, 2009, SET to test the ability for amateur radio transmissions to capture the necessary information.

After a disaster strikes, timing is of the essence. Having these prepared strategies allows first responders, workplace employees, neighborhoods, faith-based organizations and schools to use their resources efficiently.

About the Author
Raymond Riordan is the Emergency Preparedness Manager for the City of San Ramon. Greg Gilbert is the Emergency Preparedness Manager for the Town of Danville. Danielle Bell is the Emergency Coordinator for the San Ramon Valley Fire Protection District who manages the CERT program.

The electronic *Continuity e-GUIDE* as well as the printed *Disaster Resource GUIDE* is free to professionals in the industry. The link to sign up for E-GUIDE or the PRINTED GUIDE: http://disaster-resource.com/cgi-bin/freeguide.cgi ♦

New project seeks to extend resilience framework

A newly-funded project will expand MCEER's disaster resilience framework to the community level. "A Framework for Defining and Measuring Disaster Resilience at the Community Scale," funded by the National Institute of Standards and Technology (NIST), will build on previous MCEER research linking the four resilience properties (robustness, redundancy, resourcefulness, and rapidity) and resilience dimensions (technical, organizational, societal and economic). The project will develop quantitative and qualitative models to measure the disaster resilience of communities in terms of capital assets such as hospital and asset classes such as health care facilities. Over the longer term, these models will enable the development of decision-support software tools to help planners, key decision makers and stakeholders enhance the disaster resilience of their communities.

The research effort has three main tasks:
1) Conduct a literature survey analyzing asset-based approaches for defining and measuring disaster resilience;
2) Identify gaps between asset-based approaches and community scale approaches and develop a conceptual approach to define and measure disaster resilience at the community scale; and
3) Publish a technical report that synthesizes findings from the research effort to set the stage for further developments.

Andrei Reinhorn, Department of Civil, Structural and Environmental Engineering (CSEE),University at Buffalo (UB), is the principal investigator of the project. More information on MCEER's resilience research can be found at http://mceer.buffalo.edu/research/resilience/default.asp

From: MCEER Bulletin, v. 23, no. 1, p. 3. ♦

'Map your neighborhood' event Tuesday, Yelm, Washington

From: The Olympian, 16 November 2009

Thurston County residents can take part in a "Map Your Neighborhood" disaster-prevention training from 6:30 to 8:30 p.m. Tuesday (Nov. 17) at the Yelm Police Department, 206 McKenzie Avenue.

Participants will learn the nine steps to take immediately following a disaster; review the skills and equipment inventory neighbors have that are useful in disaster response; and create a map identifying locations of natural gas and propane tanks and identifying neighbors with specific needs.

The class is offered through the Thurston County Emergency Management Office and is open to all county residents. For more information, call 360 786-5243 or go to www.co.thurston.wa.us/em. ♦

DHS needs outreach program for emergency responders, survey concludes

CDW-G says coordination would help fulfill National Emergency Communications Plan

By Rutrell Yasin

From: http://gcn.com/articles/2009/10/27/dhs-needs-outreach-program-for-emergency-responders.aspx?s=SL_051109

Reprinted with permission from **Government Computer News**

The Homeland Security Department should launch an outreach initiative to ensure that state and local agencies are working toward the emergency management communications goals the agency outlined in the *National Emergency Communications Plan*, according to a report issued by CDW Government.

The *2009 Emergency Communications Report: Awareness and Progress toward the National Emergency Communications Plan* benchmarks progress toward meeting DHS goals and identifies challenges/lessons learned to date.

The NECP, published in July 2008, recommends a multi-faceted approach to strengthening emergency communications capabilities nationwide, focusing on technology, coordination, governance, planning and training at all levels of government.

Just half of the 210 public-safety communications professionals responding to the CDW-G survey were aware of the NECP, but after being briefed about the plan, almost all thought it could address their communications challenges, said Houston Thomas, CDW-G's public safety manager.

Significant progress has been made toward improving public safety communications since terrorism and natural disasters of the past eight years made it a higher priority, but there is still a lot of ground to cover, government and industry officials agree. Emergency communications improvement is imperative: 28 percent said they experienced a communications challenge in the last year that hampered a response effort, and 61 percent said the ability to achieve and sustain seamless communications across jurisdictions and agencies is their top challenge to providing timely and effective emergency services, the report states.

After being briefed on NECP goals, most respondents think they will meet target timelines for significant incidents. For example, 53 percent anticipate meeting, or said they already have met, the NECP goal to achieve multi-jurisdiction response-level emergency communications for routine events within one hour. The deadline under the NECP is 2010 for high-risk urban areas and 2011 for low-risk areas. Seventy-four percent have met or anticipate meeting response-level emergency communications for significant incidents within three hours, which the plan requires by 2013.

However, 55 percent of the respondents said it will be somewhat difficult to meet the NECP goals, and another 21 percent said it would be very difficult. Training programs, improved network infrastructure and more collaboration hardware and software are needed for public safety agencies to meet their goals, they said.

Although the majority of the respondents are allocating staff and funds to improve emergency communications, half do not yet have a written plan to meet the NECP goals. CDW-G recommends that state and local agencies establish a written plan, including timeline and budget, to achieve NECP goals.

In addition, agencies should identify overlapping requirements, if possible, and share expenses with other local jurisdictions; identify the leader responsible for implementing a jurisdiction's plan; and install the right equipment coupled with trained personnel and effective command chain processes. Also, they should establish multi-agency, multi-jurisdiction drills and institute statewide meetings to discuss lessons learned.

They need to also identify grants and stimulus funding, Thomas said. "It's going to take training, investment in hardware and software and procedural development, and in some cases, spiritual development," Thomas said.

Some of the investment can come from the funding sources listed in the report, he said, such as Operation Stonegarden Grant Program, Interoperable Emergency Communications Grant Program, State Homeland Security Program and Metropolitan Medical Response System. "IT has to be in the center of everything here. It is really the highway that serves as the infrastructure for interoperability," Thomas said.

And the focus can't be just on achieving radio interoperability. "In the 21st century threat environment, data and video information transfer is just as challenging between agencies and just as important," Thomas said. CDW-G`s national online survey, conducted during August 2009, collected responses from 210 state and local emergency communications professionals in 41 states.

For a copy of the complete CDW-G Emergency Communications Report, visit http://www.cdwg.com/emergency.

About the Author: Rutrell Yasin is senior technology editor for *Government Computer News* magazine. ♦

STATE EMERGENCY MANAGEMENT OFFICES
updated 3-31-2006

Alaska Dept of Military & Veteran Affairs
Division of Homeland Security &Emergency Mgmt.
PO Box 5750
Fort Richardson, AK 99505-5750
(907) 428-7000; toll-free 800-478-2337
Fax (907) 428-7009
http://www.ak-prepared.com/

California Office of Emergency Services
3650 Schriever Ave.
Mather, CA 95655
(916) 845-8510; Fax (916) 845-8910
http://www.oes.ca.gov/

Hawaii State Civil Defense, Dept. of Defense
3949 Diamond Head Road
Honolulu, HI 96816-4495
(808) 733-4300; Fax (808) 733-4287
http://www.scd.state.hi.us

Oregon Division of Emergency Management
PO Box 14370
Salem, OR 97309-50620
(503) 378-2911; Fax (503) 373-7833
http://www.oregon.gov/OOHS/OEM/

Washington State Military Dept.
Emergency Management Division
Camp Murray, WA 98430-5122
(253) 512-7067; Fax (253) 512-7207
http://emd.wa.gov

Provincial Emergency Program
455 Boleskin Road
Victoria, BC V8Z 1E7 Canada
(250) 952-4913; Fax (250) 952-4888
http://www.pep.bc.ca/

American Samoa Territorial Emergency Management Coordination (TEMCO); American Samoa Government
P.O. Box 1086
Pago Pago, American Samoa 96799
(011)(684) 699-6415; (011)(684) 699-6414 FAX

Office of Civil Defense, Government of Guam
P.O. Box 2877
Hagatna, Guam 96932
(011)(671) 475-9600; (011)(671) 477-3727 FAX
http://ns.gov.gu/

Guam Homeland Security/Office of Civil Defense
221B Chalan Palasyo
Agana Heights, Guam 96910
Tel:(671)475-9600; Fax:(671)477-3727
www.guamhs.org

CNMI Emergency Management Office
Office of the Governor
Commonwealth of the Northern Mariana Islands
P.O. Box 10007
Saipan, Mariana Islands 96950
(670) 322-9529; (670) 322-7743 FAX
www.cnmiemo.gov.mp

National Disaster Management Office
Office of the Chief Secretary
P.O. Box 15
Majuro, Republic of the Marshall Islands 96960-0015
(011)(692) 625-5181; (011)(692) 625-6896 FAX

National Disaster Control Officer
Federated States of Micronesia
P.O. Box PS-53
Kolonia, Pohnpei - Micronesia 96941
(011)(691) 320-8815; (001)(691) 320-2785 FAX

Palau NEMO Coordinator, Office of the President
P.O. Box 100
Koror, Republic of Palau 96940
(011)(680) 488-2422; (011)(680) 488-3312

Puerto Rico Emergency Management Agency
P.O. Box 966597
San Juan, Puerto Rico 00906-6597
(787) 724-0124; (787) 725-4244 FAX

Virgin Islands Territorial Emergency Management - VITEMA
2-C Contant, A-Q Building,
Virgin Islands 00820
(340) 774-2244; (340) 774-1491 ♦

NEWS

Flurry of far-flung disasters thwart aid agencies

Last week's barrage of disasters in Southeast Asia and Samoa have proven especially difficult for aid workers, who are striving to provide manpower, materials, and funds to a throng of struggling nations.

The host of disasters began September 26, when Typhoon Ketsana struck the Philippines, causing widespread flooding and landslides. On September 29, underwater earthquakes sent a series of tsunamis crashing into Samoa and Tonga, followed the next day by a 7.6 earthquake in Sumatra, which killed more than 1,000 people. Aftershocks continued to rock the area, new tsunami alerts have terrorized Tonga, and two other typhoons—Melor and Parma—have wreaked lesser but still substantial havoc from the Philippines to Japan.

Added to the sheer need for aid, there are access issues. American Samoa, while receiving the full benefit of disaster relief from the Federal Emergency Management Agency, is 4,500 miles from the West Coast and 2,300 miles from Hawaii, according to a *Washington Post* article.

"This will not be a short-term response based on reports of damage," FEMA Administrator Craig Fugate said in a press briefing on Oct. 1. "Our focus is on life safety, life sustainment and getting resources in there to support the governor and his team."

While miles separate Samoa from its disaster resources, in Indonesia much shorter but equally frustrating gaps left by crumbled roads and broken bridges kept aid away—including much-needed earth moving equipment that could have freed survivors. As of Tuesday, human rescuers were sent home and heavy machines were limited to knocking down unstable buildings and extracting bodies from the rubble, according to an article in the *New York Times*.

The double whammy of distance coupled with a barrage of disasters has made responding to countries in need more difficult than ever.

"It's very hard to make decisions and commitments about your level of response without really knowing the level of the need," Chris Webster of World Vision told *AlertNet*.

"When you've got multiple disasters and unclear information it's very difficult. We would love to over-respond rather than under-respond but we have finite resources so that information is vital."

From: Disaster Research 533, Oct. 8, 2009

Getting it together: NGO-government collaborations beginning to flourish

Past U.S. disasters have left little doubt that when calamity strikes, government response and recovery is far from the only aid game in town. Although faith- and community-based organizations play an important role in cleaning up catastrophes, little has been done to assure these nongovernmental organizations are coordinated or equipped to roll up their sleeves and join forces with officials.

That trend is beginning to change, however, as state and local governments form coalitions that guide organizations providing emergency response. Missouri is the latest state—joining Florida, Texas, and a few others—in forming an alliance between emergency managers and NGOs, according to a recent article in the *St. Louis Post-Dispatch*.

The Missouri Governor's Faith-Based and Community Service Partnership for Disaster Recovery, created by executive order last month, joins 16 state departments with groups ranging from the Missouri Voluntary Organizations Active in Disaster to the Missouri Catholic Conference in an attempt to more effectively respond to emergencies. The director of the Department of Homeland Security's Center for Faith-Based and Community Initiatives—a federal group similar to the Missouri partnership—called the plan a model for other states, according to the *Post-Dispatch* article.

"Missouri has a long history focusing on liaisons with faith-based and community organizations specifically dedicated to disaster," David Myers told the *Post-Dispatch*. "Missouri's footprint on this is visionary."It's a vision, though, not shared by all. Although it's hard to argue against better-prepared volunteers, many are worried about how the separation of church and state are handled in such alliances.

The concern of discrimination on religious grounds has been around since George Bush created his faith-based social initiative early in the decade. Although some have called for the initiative to be revamped so that religious organizations that receive federal money cannot

hire or fire based on religion, that gap has yet to be closed.

In Missouri, where organizations won't be funded by the state, the worry is that those stricken by disaster might endure unwanted religious enlistment—and while officials claim churches operate by a "gentleman's agreement" not to preach to the disaster weary, they themselves suggest it.

"Send a youth group from your church out into the local community to hand out information," the *Post-Dispatch* quoted Jackson County Emergency Management Director Mike Curry as telling a group of church and government officials gathered at a Missouri State Emergency Management Meeting. "They'll appreciate it, and we're all interested in church growth."

Religious issues aside, NGOs can often bring more to the human side of disaster recovery than government response, and a recent report, *The Role of Nongovernmental Organizations in Long-Term Human Recovery after Disaster: Reflections from Louisiana Four Years After Hurricane Katrina*, found that deploying them early could speed community recovery.

"Human recovery includes things like rebuilding people's social routines and a community's support networks—actions that help restore a community's physical and mental health," said behavioral scientist and lead author Anita Chandra in a press release. "This is the kind of work nongovernmental organizations can do so well."

From: Disaster Research 534, Oct. 22, 2009

New initiatives aim to ramp up response, rebuilding

A flurry of efforts aimed at getting disaster-affected areas back on their feet faster emerged in October, including an opinion-gathering Web site, stakeholder forums, and a new report on transportation systems recovery.

At least some of the activities are in direct response to President Barack Obama's September charge to the DHS's Security and Housing and Urban Development to improve disaster recovery efforts nationwide. That initiative, expected to take about six months, involves reviewing past disaster response for lessons learned, finding opportunities for collaboration with state and local government, and gauging the efficiency of existing programs.

The measure, headed by DHS Secretary Janet Napolitano and HUD Secretary Shaun Donovan, kicked off in October with a planned two months of information gathering. Web site, DisasterRecoveryWorkingGroup.gov has been created to allow citizens, officials, volunteer organizations, and businesses to weigh in on the future of long-term recovery planning. At the site, interested parties can fill out a 16-question survey and keep tabs on the progress of the working group, which is made up of more than 20 federal departments.

From: Disaster Research 535, Nov. 5, 2009

PUBLICATIONS

Disaster Research

Readers see mention of *Disaster Research* in every issue of *TsuInfo Alert*. To subscribe to this very useful e-mail newsletter: http://www.colorado.edu/hazards/dr/ or e-mail jolie.breeden@colorado.edu. *TsuInfo Alert* reprints information about programs, websites and publications, but the *Disaster Research* also contains listing for jobs and calls for papers and participation in various studies and surveys.

A Guide to Enhance Grassroots Risk Communication Among Low-Income Populations

By Randy Rowell, Payam Sheikhattari, Tanyka M. Barber and Myrtle Evans-Holland. 2009. Morgan State University School of Public Health and Policy. 42 pp. Free download at www.diversitypreparedness.org/Topic/Subtopic/Record-Detail/18/resourceId__18423.

Low income and minority populations often don't have as many tools as wealthier residents to deal with hazards. The *Guide to Enhance Grassroots Risk Communication Among Low-Income Populations* says, "These groups most often have fewer resources, lower literacy levels, and less communication with response groups before and during a disaster. Current risk communication materials may be written at a literacy level above that for many low income people, thus it may be difficult for some of them to understand. Poverty, as the root cause of numerous other problems, may influence the low-income populations' perception of the risk, trust in the system, and personal motivation to obtain information."

The authors offer a system for developing a grassroots disaster communications program, which they define as enabling "public health and emergency preparedness practitioners to involve grassroots organizations such as faith-based, community-based, and business organizations serving low-income populations, in risk communication activities during imminent danger (warning), response, and recovery phases of disaster." Like most disaster preparedness efforts, it isn't something that can be done at the last minute, but must be undertaken as a priority by emergency response organizations.

This groundwork is often not done. The guide offers, for instance, these discouraging statistics: "In a study of low-income African Americans in Maryland, when asked if the system would do a good job in protecting the public's health, 50 percent of respondents reported that they were 'not too confident' or 'not at all confident' and 32 percent were 'very confident' … Consistent with these findings was a study of low-income Spanish-speaking Latinos in Baltimore, Maryland where 53 percent were 'not too confident' or 'not at all confident' and 32 percent were 'confident' of fair treatment." Grassroots communication efforts attempt to overcome this lack of trust by going through faith- and community-based organizations early

in the planning process. The guide includes a "Swine Flu Scenario" showing how this can be done.

From: Natural Hazards Observer, v. 34, no. 2, p. 21.

Filling the ark: Animal welfare in disasters

By Leslie Irvine. 2009. ISBN: 978-1-59213-834-0. 166 pp. $24.50 (hardcover). Temple University Press. www.temple.edu/tempress.

If we're faced with an oncoming disaster—like the landfall of Hurricane Katrina, to take a not-very-random example—nearly all of us will want to save our pets. The Katrina experience taught that this may not be a simple matter. Leslie Irvine reports, among many others, the story of Carlos and Dale Menendez, who stayed home with their German Shepherd Lily. Eventually they were flooded and had to evacuate. They ended up with Lily at the Convention Center, but when that facility was evacuated, the National Guard refused to take Lily. The dog was released to run, alone and confused, while her critically ill owners were evacuated. Many dogs and cats were killed. About 33 were shot execution style at P.G. T. Beauregard Middle School.

But the fate of companion animals in disasters is only a small part of a large story that Irvine examines. Millions of farm animals, trapped in cages or otherwise unable to escape, die in disaster. "Although we have the closest bonds with companion animals, they constitute only about two percent of the animals living in the United States," Irvine writes. "The other 98 percent are the cattle, sheep, hogs, and poultry raised for food."

Irvine uses natural disasters as a springboard for discussion of the ethics of our relationships with animals.

Most people probably call themselves "animal lovers" and, when it comes to our companion animals, we certainly are. But, Irvine writes, "As rescuers roamed the streets of New Orleans, breaking into homes to rescue dogs, cats, birds, and other companion animals, millions of farm animals died because of Katrina. Most were chickens. Those who did not starve or die of thirst and exposure were bulldozed alive into dumpsters. Over eight million birds died in just one producer's facility. The media reports these, and the deaths of other animals used for food, as 'losses' for the producers. Their lives are not noted."

This is a deeply felt and carefully thought out book, which will be of interest to anyone interested in animals and disasters, either together or separately.

From: Natural Hazards Observer, v. 34, no. 2, p. 21.

Personal preparedness in America: Findings from the Citizens Corps survey of four urban areas

By the Federal Emergency Management Agency. 2009. 69 pp. Free download at www.citizencorps.gov/news/press/2009/personal_preparedness_research_jun09.shtm.

The Lord, it is rumored, helps those who help themselves. But He hasn't been very busy if the data from this FEMA survey of New York, San Francisco, Houston, and Indianapolis is to be relied upon. People in those cities don't think that disasters of any type are likely to occur there, so they have taken few steps to prepare for them.

"Residents in the four surveyed urban areas who perceived they were more vulnerable to a natural disaster were more likely to have disaster supplies set aside in their homes than respondents nationwide, but the specific supplies were still inadequate."

FEMA director Craig Fugate has said, "You can't look at the public as a liability, you have to look at them as a resource. The survivors are the ones we have to empower." This report indicates there is still a way to go in empowering the public as "first responders" in a disaster.

From: Natural Hazards Observer, v. 34, no. 2, p. 21-22.

Older persons in emergencies: An active ageing perspective

By the World Health Organization. 2008. ISBN: 978-92-4-156364-2. 43 pp. $15 (softcover). Website: apps.who.int/bookorders.

By 2050, the number of people over the age of 60 will comprise 22 percent of the worldwide population—about two billion older folk—up from 11 percent in 2006. The population of people aged 80 and older is growing especially fast. This report looks at case studies of recent disasters and their impact on the older population—71 percent of the deaths in Hurricane Katrina were people over 60 years old; 50 percent of the casualties in the 1995 Kobe earthquake were older people.

But older people were not just victims of these disasters, they were also among first responders. In the British Columbia wildfires, for instance, older persons "formed the 'backbone' of community emergency response," this report says.

So while older people may need special consideration in emergencies, they are also a resource to be counted on. "Older people should be integrated into mainstream services and equity of service provision should be ensured in all sectors, including provision of basic necessities, health and psychological care, protection, and economic rehabilitation," the report says.

From: Natural Hazards Observer, v. 34, no. 2, p. 22.

Disaster Policy and Politics

By Richard Sylves. 2008. ISBN:978-0-87289-460-0. 285 pp. $54.95 (softcover). CQ Press. www.cqpress.com

Sylves, a professor of political science at the University of Delaware, puts disaster management in a broad political and policy framework. He examines, for instance, the different expectations and effects of Jeffersonian versus Hamiltonian management styles—democrats versus technocrats, to oversimplify a complex and

edifying discussion. *Disaster Policy and Politics* is a textbook-style presentation that benefits from a readable and accessible format. Key terms and concepts of the homeland security and emergency management worlds are clearly laid out, defined, and discussed.

From: Natural Hazards Observer, v. 34, no. 2, p. 22.

Managing crises: Responses to large-scale emergencies

By Arnold M. Howitt and Herman B. Leonard, editors. 2009. ISBN: 978-0-87289-570-6. 646 pp. $49.95 (softcover). CQ Press. www.cqpress.com.

This book offers a case-based examination of emergency management, attempting to provide "detailed cases about specific emergency events in the context of discussions about concepts, terminology, hypotheses, and theories about emergency management." It's designed as a university-level teaching tool. The chapters start out with discussion questions. It covers a wide variety of hazards, from the 1992 Los Angeles riots to the 2001 World Trade Center attacks to Hurricane Katrina to the 2004 Democratic Convention.

From: Natural Hazards Observer, v. 34, no. 2, p. 22.

Disaster recovery

By Brenda D. Phillips. 2009. ISBN: 978-1-4200-7420-8. 521 pp. $69.95 (hardcover). CRC Press. www.crcpress.com.

This textbook covers disaster recovery from theory to debris cleanup to economic recovery and financing. The book takes both an overview and case study approach to the issues, covering natural disaster, terrorism, environmental recovery, and many other topics. Each chapter concludes with a study guide, discussion questions, and a list of key terms.

From: Natural Hazards Observer, v. 34, no. 2, p. 22.

Communicating emergency preparedness: Strategies for creating a disaster resilient public

By Damon Coppola and Erin Maloney. 2009. ISBN: 978-1-4200-6510-7. 266 pp. $69.95 (hardcover). CRC Press. www.crcpress.com.

Intended as both an academic resource and a "how-to" guide, this book explores all the angles of informing the public about disaster preparedness. It is dedicated to helping the public be prepared to help itself through education.

But the authors emphasize that "education" is not just one thing. It requires a comprehensive understanding of the target audience. They take the reader through four steps: early planning; developing a campaign strategy; implementation and evaluation; and program support.

"Although there is no single recipe by which all public education campaigns are developed," the authors write, "there do exist ingredients without which success will range from difficult to nearly impossible. Perhaps the most obvious requirement is that of trust in the communicator. Recipients of risk information are unlikely to heed any instructions they hear or read if they cannot lend any credibility to the source of those instructions," they write.

From: Natural Hazards Observer, v. 34, no. 2, p. 22.

Disaster and recovery planning: A guide for facility managers

By Joseph F. Gustin. 2007. ISBN: 978-1-4200-5146-9. 422 pp. Price unavailable (hardcover). The Fairmont Press, Inc. www.fairmontpress.com.

The fourth edition of this handbook deals with the nuts and bolts building managers need to master as a result of hazards, natural and un-. For disaster planning, Gustin says, there are three major areas: occupant issues, building issues, and business issues. Mitigation requires planners to: Identify and organize resources; conduct a risk assessment; develop a mitigation plan; and implement the actions.

The book is well-organized, liberally sprinkled with bold-faced and bulleted headers, rapidly moving the reader from the general and theoretical to the specific.

From: Natural Hazards Observer, v. 34, no. 2, p. 22.

Building trust in diverse teams: The toolkit for emergency response

By the Emergency Capacity Building Project. 2007. ISBN: 978-0-85598-615-5. 135 pp. $24.65 (softcover). OxfamGB. www.oxfam.org.uk/publications.

This is, as advertised by the title, a step-by-step guide for assessing and improving the trust among team members during a disaster cycle. If nothing else, this book will give the reader a deeper appreciation of what trust is, and how it is built. It discusses "swift trust," which can be developed quickly based on perceptions of competence, integrity, sharing of information, and reciprocity. Over time team members can develop "deeper trust," based on compatibility, goodwill, predictability, well-being, inclusion, and accessibility.

From: Natural Hazards Observer, v. 34, no. 2, p. 22.

Evaluation of tsunami sources with the potential to impact the U.S. Atlantic and Gulf Coasts (An updated report to the Nuclear Regulatory Commission)

By the Atlantic and Gulf of Mexico Tsunami Hazard Assessment Group. 2009. 198 pages. Available online: http://www.nrc.gov/reading-rm/adams/web-based.html . Click on "Begin ADAMS Search". Click on "Advanced Search". Enter ML082960196 in the Accession Number field. Click Enter.

WEBSITES

http://www.prh.noaa.gov/ptwc/messages/pacific/

The PTWC archive of tsunami bulletins, warnings, watches.

http://coastalsmartgrowth.noaa.gov/

NOAA's Coastal and Waterfront SmartGrowth**.** Whether your community is down by the bay or at the river's edge, living near the water means you'll face a number of planning risks and challenges. This new National Oceanic and Atmospheric Administration Web site is a rich resource for communities seeking to capitalize on their location without compromising safety and growth opportunities. Resources, planning tools, and case studies round out this 10-step guide.

From Disaster Research 532, Sept. 24, 2009

https://www.apps.gov/cloud/advantage/main/start_page.do

Apps.Gov

We've all heard that emergency managers need to make the most of social media, stay on top of emerging technologies and be all-around computing gurus if they want to communicate with their tech-savvy public. Thankfully, there's an app for that—or rather there's a collection of apps for that, helpfully compiled by Uncle Sam.

Apps.Gov lists applications—many free and most under $200—that can boost productivity, enhance computing power, and improve communications.

From Disaster Research 532, Sept. 24, 2009

http://www.wi-bpdd.org/disasterpreperation/index.cfm

Disaster Preparedness Central

Because disasters don't discriminate, the Wisconsin Board for People with Developmental Disabilities has compiled nearly 100 useful emergency resources for those with special needs . The well-organized listings are searchable by disability, hazard, resource format, and audience.

From: Disaster Research 533, Oct. 8, 2009

http://hubmaps.cityofboston.gov/evacuation_planning/

Ready Boston Family Preparedness Planner

Regardless of where you live, the Ready Boston Family Preparedness Planner makes it easy to create a personal preparedness plan for everyone from kids to pets. The interactive planner lets you fill in information for each family member, set neighborhood and out-of-town meeting places, and offers suggestions for your family preparedness kit. When complete, print a copy for each family member and rest easy.

From: Disaster Research 533, Oct. 8, 2009

http://www.youtube.com/watch?v=UzR0Rt3i4kc&feature=player_embedded

Tsunamis: Know What to Do! (YouTube video)

Do tsunamis make you crabby? Then join this class of colorful crustaceans as they learn what causes tsunamis, how waves form, and what to do if one comes their way —and sum it all up with a song. Created for children by the San Diego County Office of Emergency Services, this five-minute film could teach adults a thing or two about the giant waves and how we watch for them.

From: Disaster Research 533, Oct. 8, 2009 (See also article on page 22-23.)

http://www.dhs.gov/files/programs/critical.shtm

DHS Critical Infrastructure and Key Resources

Protecting the multitude of systems that make our daily life possible isn't easy—especially when they stretch across the public and private sectors. Now the Department of Homeland Security has a Web site that makes it easier to bridge the gap between preparedness efforts. With resources on protection programs and offices, publications, and online trainings, this site can help private and government managers keep their shows on the road.

From: Disaster Research 536, Nov. 19, 2009

http://www.alnap.org/

ALNAP

The Active Learning Network for Accountability and Performance in Humanitarian Action, or ALNAP, works to bring together those who respond to natural disasters and human conflicts. The site has a wealth of useful information on ALNAP network events and initiatives, forums, blogs, and reports based on the organization's "real-time evaluations."

From: Disaster Research 536, Nov. 19, 2009

http://www.1000fof.org/PUBS/disaster/mitigation.pdf

Disaster Mitigation for Historic Structures: Protection Strategies

The Florida Divisions of Historical Resources and Emergency Management and 1000 Friends of Florida have partnered to help owners of historic properties prepare for disasters. The guide offers mitigation measures that can be incorporated without compromising the historic integrity of buildings or neighborhoods, as well as resources for funding retrofits.

From: Disaster Research 536, Nov. 19, 2009

CONFERENCES

February 1-19, 2010

39th Regional Training on Disaster Management**.** Asian Disaster Preparedness Center, Bangkok, Thailand. Cost and Registration: $2,740, open until filled. This course addresses strategies and systems for disaster prevention, mitigation, response, and recovery, as well as

disaster management implementation issues and how to best use emergency coordination centers during disasters.

From: Disaster Research 534, Oct. 22, 2009

February 3-5, 2010

National Evacuation Conference. Stephenson Disaster Management Institute and the Gulf Coast Research Center for Evacuation and Transportation Resiliency, New Orleans, Louisiana. Cost and Registration: $350 before November 30, open until filled. This conference encourages an interdisciplinary exchange on a range of evacuation issues, including mass evacuations from disasters, challenges of special needs populations, evacuation planning and modeling improvements, and national policy development.

From: Disaster Research 534, Oct. 22, 2009

February 4-6, 2010

Ninth Annual New Partners for Smart Growth. Local Government Commission, U.S. Environmental Protection Agency, and others. Seattle, Washington**.** Cost and Registration: $359, open until filled. This conference examines the latest smart growth research, implementation, best practices, policies, and codes. Session topics include models for adapting to urban climate change impacts, recovery and resilience planning, stormwater management, and more.

From: Disaster Research 534, Oct. 22, 2009

March 24, 2010

NOAA and the NTHMP will support Pacific and Atlantic tsunami response exercises on March 24, 2010. This date was chosen to coincide with the national Tsunami Awareness Week (if approved), and end-to-end tsunami warning communications testing planned for Alaska and California. The event will be similar to last year's LANTEX Atlantic tsunami exercise. Warning response for hypothetical events south of the Alaska Peninsula (Pacific exercise) and off the New England coast (Atlantic exercise) will be summarized in handbooks and provided to participants prior to the event. The exercise will be started by a kick-off message (not a warning message) from the TWCs sent over normal communications channels. That will be the only TWC message issued live during the exercise. The handbooks will contain a series of messages which would be issued by the TWCs during an actual event. Participants can chose the level of their participation in the exercise.

From: Paul Whitmore, National Tsunami Hazard Mitigation Program Warning Coordination Subcommittee co-Chair, July 23, 2009

GRANTS

Tsunami generation by landslides: Integrating laboratory scale experiments, numerical models and natural scale applications

National Science Foundation award #0936603. 3 years. $804,923. Principal investigator Hermann Fritz, hermann.fritz@gtsav.gatech.edu.

This project's long-term goal is to transform assessment and mitigation of the landslide tsunami hazard through hybrid modeling of landslide tsunami evolution in real world scenarios, where the generation, propagation, and runup stages overlap. Rare field measurements are mostly limited to landslide scarp, deposit, tsunami runup, and eyewitness accounts, while critically important data related to the landslide motion and tsunami evolution is lacking. The goal of the research is to compensate for missing data by combined physical and numerical modeling of fully three-dimensional landslide tsunami scenarios.

From: Natural Hazards Observer, v. 34, no. 2, p. 24

Determining the added hazard potential of tsunamis by interaction with ocean swell and wind waves

National Science Foundation award #0936579. One year. $100,000. Principal investigator James Kaihatu, Texas. jkaihatu@civil.tamu.edu.

For all their differences in destructive power, size, and generation, tsunamis and swell waves (which are always present on the ocean surface) are both gravity waves, and follow many of the same physical laws. Additionally, gravity waves of different frequencies exchange energy, which affects the shape of the front face of the wave and, in turn, the destructive power, travel time, and damage potential (structural damage and erosion) of the tsunami.

Experiments will be conducted in the NEES Tsunami Wave Basin during summer 2010 to investigate this interaction. Both tsunamis and swell-band waves will be generated, in isolation and in combination, and their interaction determined by analysis of the measured velocities and free surface heights. Both standard (Fourierbased) and advanced (Hilbert-Huang transforms) methods will be used to determine the degree of the tsunami-swell interaction and the resulting changes on the evolution of the front face of the tsunami wave. These data will be used to determine the change in the tsunami front-face characteristics due to the interaction with swell waves and further deduce the effect to its destructiveness.

From: Natural Hazards Observer, v. 34, no. 2, p. 24-25

Effects of environmental cues and informal and official warnings on protective action decision making: A case study for earthquakes and tsunamis in the Indian Ocean.
National Science Foundation award #0900622. Two years.

$279,954. Principal investigator Christopher Gregg, East Tennessee State University, gregg@etsu.edu.

Very few social science studies had investigated human response to tsunamis' environmental cues and informal and official warnings before the 2004 Indian Ocean tsunami, but the largest and most comprehensive earlier study was conducted in Thailand in the months afterward. It showed that the high death toll from the 2004 tsunami was not due to a lack of warning, but to people's inability to accurately interpret and act on information that was available to them before the tsunami impacted the shore. For example, environmental cues and informal warnings provided enough forewarning for most people to survive in 2004, as some 74 percent of tsunami survivors in Thailand noticed the shoreline recession or unusual waves and currents up to 15 minutes before the first wave crest hit the shore. However, these cues did not trigger appropriate behavior, as 65 percent saw many people in the danger zone, watching the sea, when the first crest arrived. Similar behavior was recorded in nearly every tsunami-affected country. This project will study the current situation in Thailand and aspects of the 2004 and 2005 events there. First, the respondents will be reinterviewed to test whether the Protective Action Decision Model can predict response to environmental cues and warnings in 2010. A separate but parallel study focuses on understanding aspects of disaster memory in this population.

From: Natural Hazards Observer, v. 34, no. 2, p. 26

Developing and testing algorithms for generating leading tsunami waves

National Science Foundation award #0960512. One year. $50,020. Principal investigator Philip Liu, Cornell University, pll3@cornell.edu.

This research will use the newly installed wave makers with long strokes at Cornell University and the NEES tsunami facility at Oregon State University to test the hypothesis that the leading tsunami wave does not have sufficient time and distance to evolve into a solitary form, therefore challenging the currently used modeling approach for wave runup and other physical quantities based on the solitary wave. Since both wave makers are new, investments need to be made to develop algorithms for generating properly scaled leading tsunami waves.

From: Natural Hazards Observer, v. 34, no. 2, p. 24-25 ♦

Material added to the NTHMP Library,

November - December 2009

Note: These, and all our tsunami materials, are included in the online (searchable) catalog at http://www.dnr.wa.gov/ResearchScience/Topics/GeologyPublicationsLibrary/Pages/washbib.aspx. Click on SEARCH DATABASE, then type 'tsunamis' in the Subject field to get a full listing of all the tsunami reports and maps in the collection.

Ambraseys, Nickolas; Synolakis, Costas E., 2008, Tsunami catalogues for the eastern Mediterranean—Revisited [abstract]: Eos (American Geophysical Union Transactions), v. 89, no. 53, Suppl., p. F1757.

Arcas, Diego; Uslu, Burak; Titov, Vasily; Chamberlin, Chris, 2008, Tsunami hazard assessment in Guam [abstract]: Eos (American Geophysical Union Transactions), v. 89, no. 53, Suppl., p. F1725.

Arikawa, Taro, 2008, Behaviors of concrete walls under impulsive tsunami load [abstract]: Eos (American Geophysical Union Transactions), v. 89, no. 53, Suppl., p. F1735.

Atwater, Brian F.; Tuttle, Martitia, 2008, Geologic evidence northeast of Puerto Rico for an Atlantic tsunami in the last 500 years [abstract]: Eos (American Geo-physical Union Transactions), v. 89, no. 53, Suppl., p. F1766-F1767.

Austin-Giddings, Wendy D.; Tappin, David R.; McGuire, William J., 2008, Coarse-grained tsunami de-posits in the Canary Islands--Evidence of the tsunami-genic potential of volcanic flank failures [abstract]: Eos (American Geophysical Union Transactions), v. 89, no. 53, Suppl., p. F1764.

Baptista, Maria Ana; Miranda, Jorge Miguel, 2008, North east Atlantic tsunamis--Update of the Portuguese catalogue of tsunamis [abstract]: Eos (American Geophysical Union Transactions), v. 89, no. 53, Suppl., p. F1757.

Barberopoulou, Aggeliki; Legg, Mark; Uslu, Burak; Synolakis, Costas E., 2008, Tsunami hazards in San Diego Bay, California [abstract]: Eos (American Geophysical Union Transactions), v. 89, no. 53, Suppl., p. F1725.

Barkan, Roy; ten Brink, Uri S.; Lin, Jian, 2008, Trans-Atlantic tsunamis--Simulations of the 1755 Lisbon and of hypothetical Puerto Rico trench earthquake tsunamis [abstract]: Eos (American Geophysical Union Transactions), v. 89, no. 53, Suppl., p. F1766.

Barrientos, Sergio E.; Ward, Steven N., 2008, Tide gage records of two large XIX century tsunamis originated in South America [abstract]: Eos (American Geophysical Union Transactions), v. 89, no. 53, Suppl., p. F1737-F1738.

Behrens, Joern; Androsov, Alexey; Harig, Sven; Klaschka, Florian; Mentrup, Lars; Pranowo, Widodo Setiyo, 2008, The GITEWS tsunami simulation system based on multi-sensor inversion [abstract]: Eos (American

Geophysical Union Transactions), v. 89, no. 53, Suppl., p. F1734.

Bernard, Eddie N.; Robinson, Allan R., 2008, An educational tool for a new generation of tsunami scientists [abstract]: Eos (American Geophysical Union Trans-actions), v. 89, no. 53, Suppl., p. F1722-F1723.

Borrero, Jose C.; Fritz, Hermann M.; Kalligeris, Nikos; Broncano, Pablo; Ortega, Erick, 2008, Near source 2007 Peru tsunami runup observations and modeling [abstract]: Eos (American Geophysical Union Transactions), v. 89, no. 53, Suppl., p. F1737.

Branan, Nicole, 2009, Tracking tsunamis via satellites could save lives: Earth. v. 54, no. 10, p. 10.

Buckley, Mark L.; Jaffe, Bruce, 2008, Vertical grain size trends in suspended sediment deposits and application to the identification and interpretation of tsunami deposits [abstract]: Eos (American Geophysical Union Trans-actions), v. 89, no. 53, Suppl., p. F1762.

Campbell, Carl E.; Oboh-Ikuenobe, Francisca E.; Eifert, Tambra L., 2008, Megatsunami deposit in Cretaceous-Paleogene boundary interval of southeastern Missouri. IN Evans, Kevin R.; Horton, J. Wright, Jr.; King, David T., Jr.; Morrow, Jared R., editors, The sedimentary record of meteorite impacts: Geological Society of America Special Paper 437, p. 189-198.

Chaytor, Jason D.; ten Brink, Uri S.; Solow, Andrew R.; Andrews, Brian D., 2008, Size distribution of submarine landslides along the U.S. Atlantic margin and its implica-tion for tsunami hazard assessment [abstract]: Eos (Amer-ican Geophysical Union Transactions), v. 89, no. 53, Suppl., p. F1767.

Coisson, Pierdavide; Occhipinti, Giovanni; Roland, Lucie; Lognonne, Philippe, 2008, Can OTH radar help tsunami warning systems [abstract]: Eos (American Geo-physical Union Transactions), v. 89, no. 53, Suppl., p. F1736.

Cummins, Phil; Baba, Toshitaka; Thio, Hong-Kie, 2008, Finite-fault earthquake source inversion to support tsu-nami warning and hazard assessment [abstract]: Eos (American Geophysical Union Transactions), v. 89, no. 53, Suppl., p. F1736.

Darnell, Amii; Barclay, Jenni, 2009, Fostering interdisciplinary science to improve resilience to natural hazards--Characterization, communication, and mitigation of risks arising from multiple hazards, Norwich, UK, 7-8 May 2009: Eos (American Geophysical Union Trans-actions), v. 90, no. 37, p. 322.

Ebeling, Carl W.; Okal, Emile A., 2008, Reassessment of several historical Hellenic arc earthquakes within the context of regional tsunami risk [abstract]: Eos (American Geophysical Union Transactions), v. 89, no. 53, Suppl., p. F1765.

Elbeshausen, Dirk; Wunnermann, Kai; Weiss, Robert, 2008, Characteristics of oceanic waves caused by land-slides--Insights from 3D-hydrocode modeling [ab-stract]: Eos (American Geophysical Union Trans-actions), v. 89, no. 53, Suppl., p. F1767.

Flouri, Evangelia; Chrysoulakis, Nikos; Dougalis, Vassilios; Foteinis, Spyros; Synolakis, Costas E., 2008, Tsunami hazards in the eastern Mediterranean [ab-stract]: Eos (American Geophysical Union Trans-actions), v. 89, no. 53, Suppl., p. F1765.

Frohlich, Cliff; Hornbach, Matthew J.; Taylor, Frederick W.; Shen, Chuan-Chou; Moala, Apai; Morton, Allen E., 2008, Huge erratic boulders in Tonga deposited by a prehistoric tsunami [abstract]: Eos (American Geophysical Union Transactions), v. 89, no. 53, Suppl., p. F1764.

Fujino, Shigehiro; Nishimura, Yuichi; Putra, Purna Sulastya; Supriatna, Nandang, 2008, Facies variation of terrestrial tsunami deposit due to sediment source [ab-stract]: Eos (American Geophysical Union Trans-actions), v. 89, no. 53, Suppl., p. F1764.

Garside, Ruth; Johnston, David; Saunders, Wendy; Leonard, Graham, 2009, Planning for tsunami evacu-ations--The case of the Marine Education Centre, Wellington, New Zealand: Australian Journal of Emergency Management, v. 24, no. 3, p. 28-31.

Geist, Eric L.; Parson, Tom; ten Brink, Uri S.; Lee, Homa J., 2008, Empirical and computational tsunami probability [abstract]: Eos (American Geophysical Union Transactions), v. 89, no. 53, Suppl., p. F1723.

Gica, Edison; Spillane, Michael C.; Titov, Vasily V., 2008, Complex patterns in coastal tsunami impact associated with continental shelf topography [abstract]: Eos (American Geophysical Union Transactions), v. 89, no. 53, Suppl., p. F1757.

Gisler, Galen R., 2008, Generation of non-earthquake tsunamis [abstract]: Eos (American Geophysical Union Transactions), v. 89, no. 53, Suppl., p. F1723.

Gisler, Galen R., 2008, Generation scenarios for Atlantic-region tsunamis--Landslides and volcanoes [abstract]: Eos (American Geophysical Union Transactions), v. 89, no. 53, Suppl., p. F1756-F1757.

Marchuk, Andrei G., 2009, Tsunami wave propagation along waveguides: Science of Tsunami Hazards, v. 28, no. 5, p. 283-302.
(*continued on page 27*)

Tsunami video for kids

County uses 3-D animated short to educate kids about tsunamis—Animated crab teaches students valuable tsunami preparedness information
County of San Diego News Release, February 4, 2009; Office of Emergency Services

Is a tsunami possible for San Diego County? Historically speaking, tsunamis are rare in the county, but offshore faults and offshore landslides are capable of generating locally-damaging tsunamis.

For this reason, it is important that locals and tourists know how to recognize a tsusnami and can respond appropriately. What better place to start that lesson than in our schools?

On Thursday, February 5, at 10 a.m. at Del Mar Heights Elementary, students will view and dance along to the video premiere of "*Tsunamis: Know What to Do*,' an innovative, educational six-minute animated short film produced by the County Office of Emergency Services (OES). The County received a $30,000 grant from the National Oceanic and Atmospheric Administration (NOAA) and the California Emergency Management Agency (CalEMA) to produce the video. OES staff developed the storyline and music and character animation was created by Absolute Zero, an Encinitas-based company.

"The best part about this video is that it can be used nationwide to teach our children about how to recognize a tsunami. This information is important even to children in our land-locked states because they might vacation or visit beaches in the United States or abroad. The same safety principles would apply," said Ron Lane, Director of the County Office of Emergency Services."

"NOAA is very pleased to have partnered in the making of this fun and educational video," said Jim Purpura, meteorologist in charge of the National Weather Service (NWS) forecast office in San Diego. "The potentially life-saving information in the tsunami video will teach children about how to recognize a tsunami and instill in them the urgency of moving to higher ground."

An amazing illustration of tsunami education was demonstrated by a 10-year-old British girl, Tilly Smith, who was vacationing with her family in Thailand in 2004 and recognized the ocean's warning signs from a geography lesson. She was able to warn her family and at least 100 people on the beach to evacuate before three deadly tsunami waves came ashore.

The 3-D animated short is available for viewing on www.ReadySanDiego.org, on the San Diego County Office of Emergency Services' main page and under the "kids menu."

Tsunami preparedness video award

On June 19, [2009] the *Tsunamis: Know What to Do* animated video, produced by the San Diego County Office of Emergency Services, was recognized with a bronze Telly Award in three different categories: Use of Animation, Safety, and Government Relations. The Telly Awards honor the very best local, regional, and cable televison commercials and programs, as well as the finest video and film productions, and work created for the Web. While the animated video is mainly targeted toward school-age children, adults can also learn the basics of what causes a tsunami and how to respond. For additional information, contact Yvette Urrea-Moe at yvette.urreamoe@sdcounty.ca.gov or (858) 565-5592.

Office of Emergency Services wins international award

At the 57th annual International Association of Emergency Managers (IAEM) conference, held November 3 in Orlando, Florida, the Office of Emergency Services was presented with a first place award in the IAEM's Public Awareness Award contest. OES nominated its *Tsunamis: Know What to Do!* 3-D animated video, which teaches children and adults about tsunamis, including recognizing a tsunami and the appropriate response of moving to higher ground. The video is being used nationwide.

San Diego woman wins emergency management award
California Emergency Services Association press release, October 20, 2009

Susan Asturias, a Senior Emergency Services Coordinator with the San Diego County Office of Emergency Services is the 2009 recipient of the Platinum Award from the California Emergency Services Association. The award was conferred at the Association's annual conference in South Lake Tahoe on October 7, 2009. The Platinum Award is, according to the Association's web site, "presented to an organization or individual for outstanding service in the field of emergency management. This award is the highest level of recognition from the organization. Only one award is given annually."

Ms. Asturias was nominated for the award for producing an animated children's tsunami safety video entitled "*Tsunamis: Know What to Do*!" In presenting the award, Roland De Rocili, the Association's Southern Chapter president said, "Susan Asturias has produced a compelling and creative animated video that teaches childrenhow to recognize and response effectively to a dangerous tsunami through characters that are both engaging and endearing." The setting for the video is a classroom on a beach where Mr.King, a science teacher and his students are negated in a discussion of tsunamis.

Both Mr. King and his students are crabs and following the lesson, they all break into song, a song written by Susan Asturias and performed in the video by her sister Rowanne Karapogosian. The voices of the student crabs were those of local children and that of Mr. King was provided by actor David Leisure.

The video is targeted for the kindergarten through high school levels and is 8 minutes in duration. The video has been distributed to all cities and schools within San Diego County as well as to each country emergency services agency statewide. The California Emergency Management Agency and the NOAA's National Weather Service, which funded production of the video, plan a nationwide distribution of the film and will have it translated into other languages. Copies of the video can be obtained at several web-sites including: http://ReadySanDiego.org; http://www.tsunami.noaa.gov; http://wcatw.arh.noaa.gov/; http://nthmp.tsunami.gov/.

[Note: see Website list for YouTube website of this video. The NTHMP library now has two copies of this DVD for loan.]♦

CDEMA's new name matches a new approach

As of September 2009, the Caribbean Disaster Emergency Response Agency (CDERA) has changed its name to the Caribbean Disaster Emergency Management Agency (CDEMA). The change represents an organizational transition and a new approach based on comprehensive disaster management.

The agency's structure and mandate have been expanded to include reducing losses resulting from disasters and adopting disaster mitigation policies and practices at national and regional levels. In addition, cooperative arrangements and mechanisms have been made to develop a culture of disaster loss reduction.

Under the new structure, CDEMA will work with 18 countries, including Haiti and Suriname, who recently signed agreements to join the organization. According to the Executive Director of CDEMA, participating countries are ready to embrace policies and programs that reflect new challenges and hazards, which range from climate change to cross-border hazards such as pandemics. You can get more information by contacting zaccarem@cpc.paho.org

From: Disasters Newsletter (disasters@paho.org), Friday November 20,2009 ♦

Evaluating tsunami evacuation options in Padang, West Sumatra

E-mail from Brian Tucker, GeoHazards International, to Christa von Hillebrandt, Sept. 22, 2009

Beginning in January 2009, GHI and Stanford University's chapter of Engineers for a Sustainable World partnered with several Indonesian organizations to help reduce the tsunami risk in Padang, West Sumatra. Generous support from the Ishiyama Foundation and from Geoscientists without Borders made this work possible.

Padang has one of the highest tsunami risks in the world due to its offshore earthquake hazard, flat terrain and large population. Recent research indicates that there is a high probability that a 5-10 meter high tsunami wave will strike Padang in the next few decades. If that tsunami were to occur today, approximately 50,000 inhabitants would be unable to reach the safety of high ground.

Motivated by this stark reality, by the fact that effective mitigation strategies are quite affordable, and by the exciting prospect that we could help, GHI designed a program to evaluate Padang's evacuation options to prepare better for the expected tsunami. Those options include increasing the number of earthquke-resistant bridges and tsunami evacuation structures, such as buildings, soil berms and pedestrian overpasses. Tsunami evacuation structures must be strong enough to withstand the expected seismic and tsunami forces and must have a height that exceeds the height of tsunami waves.

Designing and implementing programs to save lives

Some of the world's leading earth scientists have studied and continue to study the tsunami hazard confronting Padang, but, by comparison, attention to designing and implementing programs to save lives has lagged. (KOGAMI, a local NGO, conducts awareness raising efforts and evacuation drills that offer an inspiring exception to this rule.) GHI therefore focused its efforts on life-saving activities.

First, GHI and Stanford University students developed a new, engineering-based survey form to evaluate the suitability of existing buildings to serve as evacuation structures and of existing bridges to serve as elements of evacuation routes. Next, the GHI-Stanford team, along with students from Padang's Andalas University, applied the form to survey Padang's bridges and tallest buildings.

Going forward, GHI is hoping to collaborate with U.S. and Indonesian engineers to develop designs of new tsunami evacuation structures and to provide training for Indonesian authorities in how to evaluate the potential of existing structures to serve as shelters. The results could be applied to other Indonesian communities.

Submitted by Christa von Hillebrandt ♦

***TsuInfo Alert* archives**

All back issues of *TsuInfo Alert* (1999-2009) are available online:
http://www.dnr.wa.gov/ResearchScience/Topics/GeologyPublicationsLibrary/Pages/tsuinfo.aspx
This collection of volumes covers a wide range of issues and information related to tsunamis and/or emergency management. Unfortunately, due to time constraints, there is no complete, detailed index, but a good browse through back issues can be helpful.

VIDEO-CD-DVD RESERVATIONS

To reserve tsunami videos, CDs or DVDs, contact Lee Walkling, Division of Geology and Earth Resources Library, 1111 Washington St. SE, MS 47007, Olympia, WA 98504-7007; or e-mail lee.walkling@dnr.wa.gov. **These programs are available to all NTHMP participants, with a 3-week loan period.**

Adventures of Disaster Dudes (14 min.). Preparedness for preteens. American Red Cross.

The Alaska Earthquake, 1964 (20 min.) Includes data on the tsunamis generated by that event.

Business Survival Kit for Earthquakes & Other Disasters; What every business should know before disaster strikes (27 min.). Global Net Productions for the Cascadia Regional Earthquake Workgroup, 2003. With CD disaster planning toolkit & other data.

Cannon Beach Fire District Community Warning System (COWS) (21 min.) Explains why Cannon Beach chose their particular warning system.

Cascadia: The Hidden Fire–An Earthquake Survival Guide (10 min.). Global Net Productions, 2001. A promo for a documentary about the Cascadia subduction zone and the preparedness its existence demands of Alaska, Oregon and Washington states. Includes mention of tsunamis.

Disasters are Preventable (22 min.) Ways to reduce losses from various kinds of disasters through preparedness and prevention.

Disaster Mitigation Campaign (15 min.). American Red Cross; 2000 TV spots. Hurricanes, high winds, floods, earthquakes.

Earthquake…Drop, Cover & Hold (5 min.). Washington Emergency Management Division. 1998.

Forum: Earthquakes & Tsunamis (2 hrs.). CVTV-23, Vancouver, WA (January 24, 2000). 2 lectures: Brian Atwater describes the detective work and sources of information about the Jan. 1700 Cascadia earthquake and tsunami; Walter C. Dudley talks about Hawaiian tsunamis and warning systems.

International Tsunami Information Centre, 2004, Tsunami warning evacuation news clips and video footage, UNESCO /IOC International Tsunami Information Centre, 1 **DVD**, 12 min.

Killer Wave: Power of the Tsunami (60 min.).National Geographic video.

Mitigation: Making Families and Communities Safer (13 min.) American Red Cross.

Not Business as Usual: Emergency Planning for Small Businesses, sponsored by CREW (Cascadia Regional Earthquake Workgroup) (10 min.), 2001. Discusses disaster preparedness and business continuity. Although it was made for Utah, the multi- hazard issues remain valid for everyone. Websites are included at the end of the video for further information and for the source of a manual for emergency preparedness for businesses.

Numerical Model Aonae Tsunami–7-12-93 (animation by Dr. Vasily Titov) and Tsunami Early Warning by Glenn Farley, KING 5 News (The Glenn Farley portion cannot be rebroadcast.)

Ocean Fury--Tsunamis in Alaska (25 min.) VHS and **DVD**. Produced by Moving Images for NOAA Sea Grant College Program, 2004.

The Prediction Problem (58 min.) Episode 3 of the PBS series "Fire on the Rim." Explores earthquakes and tsunamis around the Pacific Rim

Protecting Our Kids from Disasters (15 min.) Gives good instructions to help parents and volunteers make effective but low-cost, non-structural changes to child care facilities, in preparation for natural disasters. Accompanying booklet. Does NOT address problems specifically caused by tsunamis.

The Quake Hunters (45 min.) A good mystery story, explaining how a 300-year old Cascadia earthquake was finally dated by finding records in Japan about a rogue tsunami in January 1700

Raging Planet; Tidal Wave (50 min.) Produced for the Discovery Channel in 1997, this video shows a Japanese city that builds walls against tsunamis, talks with scientists about tsunami prediction, and has incredible survival stories.

Raging Sea: KGMB-TV Tsunami Special. (23.5 min.) Aired 4-17-99, tsunami preparedness in Hawaii.

The Restless Planet (60 min.) An episode of "Savage Earth" series. About earthquakes, with examples from Japan, Mexico, and the 1989 Loma Prieta earthquake.

Run to High Ground (14 min.). Produced by Global Net Productions for Washington Emergency Management Division and Provincial Emergency Program of British Columbia, 2004. Features storyteller Viola Riebe, Hoh Tribe. For K-6 grade levels. Have video and **DVD** versions.

Tsunami and Earthquake Video (60 min.). "Tsunami: How Occur, How Protect," "Learning from Earthquakes," "Computer modeling of alternative source scenarios."

Tsunami: Killer Wave, Born of Fire (10 min.). NOAA/ PMEL. Features tsunami destruction and fires on Okushiri Island, Japan; good graphics, explanations, and safety information. Narrated by Dr. Eddie Bernard, (with Japanese subtitles).

Tsunami: Surviving the Killer Waves (13 min.). 2 versions, one with breaks inserted for discussion time.

Tsunami Chasers (52 min.). Costas Synolakis leads a research team to Papua New Guinea to study submarine landslide-induced tsunamis. Beyond Productions for the Discovery Channel.

Tsunami Evacuation PSA (30 sec.). DIS Interactive Technologies for WA Emergency Management Division. 2000.

TsunamiReady Education CD, 2005, American Geological Institute Earth Science Week kit.

Understanding Volcanic Hazards (25 min.). Includes information about volcano-induced tsunamis and landslides.

UNESCO/IOC International Tsunami Information Centre, 2005, U.S. National Tsunami Hazard Mitigation Program public information products—B-roll footage, tsunami science, warnings, and preparedness: UNESCO/IOC International Tsunami Information Centre, 1 **DVD,** 57 min.

The Wave: a Japanese Folktale (9 min.) Animated film to start discussions of tsunami preparedness for children.

Waves of Destruction (60 min.) An episode of the "Savage Earth" series. Tsunamis around the Pacific Rim.

Who Wants to be Disaster Smart? (9 min.). Washington Military Department/Emergency Management Division. 2000. A game show format, along the lines of *Who Wants to be a Millionaire*?, for teens. Questions cover a range of different hazards.

The Wild Sea: Enjoy It...Safely (7 min.) Produced by the Ocean Shores Wash. Interpretive Center, this video deals with beach safety, including tsunamis. ♦

NEW! Tsunamis: Know What to Do! (8 min. DVD)

2009 (volume 11) INDEX

Planning Saved Lives in Samoan Tsunami
By Nancy Fullbright on November 4, 2009 7:55 AM
USC News—Global
http://uscnews.usc.edu/global/planning_saved_lives_in_samoan_tsunami.html

Berth and vessel damage at the Ronald Reagan Shipyard in Pago Pago Harbor, American Samoa
Photo/Hermann Fritz

Community-based education and awareness programs minimized the death toll from the recent Samoan tsunami, though there are still ways to improve the warning and evacuation process, according to a team of researchers that traveled to Samoa last month.

Professor Costas Synolakis of the USC Viterbi School of Engineering's Astani Department of Civil and Environmental Engineering was a principal investigator on the team that visited the devastated islands and probed the strengths and weaknesses of the emergency response.

The team, funded by a National Science Foundation grant, collected data Oct. 4-11 to document the impacts of the 8.1 earthquake and the ensuing tsunami that occurred on Sept. 29. They examined flow depths, run-up heights, inundation distances, sediment depositions and damage patterns at various scales.

Nearly 190 people were killed in the tsunami, with the majority of deaths reported in Samoa, a country governing the western part of the Samoan Islands in the South Pacific Ocean. The two main islands of Samoa are Upolu and Savai'i.

American Samoa, a territory of the United States southeast of the sovereign state of Samoa, is comprised of main island Tutuila, the Manu'a Islands, Rose Atoll and Swains Island. The Samoan government estimated the total damage from the tsunami at $147 million.

The team's survey data - especially critical in the immediate aftermath since perishable data would otherwise be lost forever - circled all of the main Samoan islands and spanned 350 kilometers from Ofu in the east to Savai'i in the west.

The team learned that the tsunami impact peaked at Poloa near Tutuila's western tip and Lepa at Upola's southeast coast. Maximum run-up heights reached 17 meters at Poloa, and inundation distances and damage were recorded at Pago Pago, more than 500 meters inland.

The harbor at Pago Pago, normally well-protected from ordinary storm waves, is a classic tsunami trap vulnerable to long-period tsunami waves.

In addition, researchers noticed a marked difference between the evacuation process in Samoa and American Samoa. While most villagers in Samoa knew to rapidly evacuate after experiencing an earthquake, only a month earlier they had been told that cars could help with evacuations, a deadly directive since most roads run parallel to the beach.

"Many perished trapped inside cars waiting in congested small roads or in long lines behind vehicles stopped by landslides or debris on the road," Synolakis said. "I have been on more than 20 tsunami field surveys, and in many ways, this was one of the most surprising in terms of how carnage varied over fairly short distances. This was also the first time we noted what we suspected: Misinformation kills."

Emile Okal, a seismologist and professor of earth and planetary sciences at Northwestern University, conducted approximately 120 interviews with tsunami survivors in 70 different locations around Tutuila and Upolu. He found that most people were educated about tsunamis and knew how to react because of community-based educational programs, not ancestral stories.

"The last significant tsunami in Samoa occurred in 1917 and was very similar in seismology to the Sept. 29 tsunami. Surprisingly, no one I interviewed said they knew of family members being in a similar situation," Okal said. "Since the 2004 Indian Ocean tsunami and the 2007 Solomon Islands tsunami, there has been a concerted effort on the part of the local government in American Samoa to post signs and conduct evacuation drills in some Samoan communities. Many villages were completely destroyed, so I am impressed that the death toll was not larger. The bottom line is education worked."

"In addition to timing - the fact that the tsunami struck in the daylight morning hours when most people were on their way to work or school - tsunami education, awareness and evacuation exercises really contained the death toll," noted Hermann Fritz, one of the principal investigators and an associate professor of civil and environmental engineering at the Georgia Institute of Technology. "The technical solution doesn't always work for coastlines near the epicenter with less than 30 minutes between earthquake and onslaught of the tsunami. Earthquakes with a duration of more than 30 seconds serve as a natural warning, resulting in a spontaneous self-evacuation."

While Synolakis agreed that the death toll was probably minimized due to educational efforts, he said there is still a lot of progress that can be made. While working in the field on Oct. 7, the team experienced a real tsunami

warning and witnessed firsthand the tremendous confusion and disorganization that followed.

"Although there are warning signs along the beaches in American Samoa, there is no information about where the evacuation routes are," he said. "It's also just as important to let people know when it's safe to come back as it is to warn them. We definitely have our work cut out for us."

The collected field data serves as benchmarking and validation of numerical tsunami models with wideranging applications that include forecasting, warning and sediment transport.

The researchers will present their findings at the American Geophysical Union meeting in San Francisco this December. Brief publications summarizing the immediate results will follow in research journals. This survey was partially supported by the Pacific Earthquake Research Center. ♦

Materials added to the NTHMP Library

(*continued from page 21*)

Godin, Oleg A.; Irisov, Vladimir G.; Leben, Robert L.; Hamlington, Benjamin D.; Wick, Gary A., 2008, Variations in the microwave backscatter from the ocean surface induced by the 2004 Sumatra-Andaman tsunami [abstract]: Eos (American Geophysical Union Transactions), v. 89, no. 53, Suppl., p. F1733.

Goodman-Tchernov, Beverly N.; Dey, Hendrik W.; Reinhardt, Eduard G.; McCoy, Floyd; Mart, Yossi, 2009, Tsunami waves generated by the Santorini eruption reached Eastern Mediterranean shores: Geology, v. 37, no. 10, p. 943-946.

Graehl, Nicholas; Dengler, Lori, 2008, Using a GIS to model tsunami evacuation times for the community of Fairhaven, California [abstract]: Eos (American Geophysical Union Transactions), v. 89, no. 53, Suppl., p. F1734.

Gramling, Carolyn, 2009, Model holds clues to better tsunami prediction: Earth, v. 54, no. 12, p. 14-15.

Gupta, Harsh, 2008, India's initiative in mitigating tsunami and storm surge hazard [abstract]: Eos (American Geophysical Union Transactions), v. 89, no. 53, Suppl., p. F1724.

Gusman, Aditya; Tanioka, Yuichiro, 2008, Source model of the 2007 Bengkulu earthquake determined from tsunami waveform analysis [abstract]: Eos (American Geophysical Union Transactions), v. 89, no. 53, Suppl., p. F1736.

Gutscher, Marc-Andre; Baptista, Maria-Ana; Miranda, Jorge Miguel; Omara, Rachid; Marcaillou, Boris, 2008, Long term hazard from Atlantic subduction zones (Antilles and Cadiz/Gibraltar) and the example of the Great Lisbon earthquake and tsunami of 1755 [abstract]: Eos (American Geophysical Union Transactions), v. 89, no. 53, Suppl., p. F1766.

Hebert, Helene; Boudin, Frederick; Bernard, Pascal; Peyrat, Sophie; Bejarpi, Marta, 2008, Tsunami modelling and source constraints from regional tide-gages and tilt measurements for the 2008 M=7.5, Tocopilla subduction earthquake [abstract]: Eos (American Geophysical Union Transactions), v. 89, no. 53, Suppl., p. F1736.

Huang, Paul Y.; Nyland, David; Medbery, Alec; Luckett, Richard; Whitmore, Paul, 2008, Earlybird seismic processing system recent upgrades [abstract]: Eos (American Geophysical Union Transactions), v. 89, no. 53, Suppl., p. F1735.

Ioki, Kei; Tanioka, Yuichiro, 2008, Tsunami waveform analyses of the 1963 Kurile Islands earthquake [abstract]: Eos (American Geophysical Union Transactions), v. 89, no. 53, Suppl., p. F1733.

Jackson, Kelly L.; Eberli, Gregor P.; Rankey, Eugene C.; Amelung, Falk; Moore, Andrew L., 2008, High recurrence rate of paleotsunamis in southeastern Sri Lanka [abstract]: Eos (American Geophysical Union Transactions), v. 89, no. 53, Suppl., p. F1759-F1760.

Jaffe, Bruce E.; Buckley, Mark; Richmond, Bruce M.; Morton, Robert A.; Moya, Juan C.; Gelfenbaum, Guy; Watt, Steve G., 2008, Evidence of tsunami in the coastal pond in NW Puerto Rico [abstract]: Eos (American Geophysical Union Transactions), v. 89, no. 53, Suppl., p. F1763.

Johnston, Patrick; Ely, Lisa; Achyuthan, H.; Srinivasalu, S., 2008, Geomorphic environments of tsunami deposits, southeastern India [abstract]: Eos (American Geophysical Union Transactions), v. 89, no. 53, Suppl., p. F1760.

Kalligeris, Nikos; Synolakis, Costas E.; Okal, Emile A., 2008, Simulations of tsunami hazard from regional sources in the South China and adjoining seas [abstract]: Eos (American Geophysical Union Transactions), v. 89, no. 53, Suppl., p. F1768.

Salem, El-Sayed Mohamed, 2009, Paleo-tsunami deposits on the Red Sea beach, Egypt: Arabian Journal of Geosciences, v. 2, no. 2, p. 185-197.

Titov, Vasily V., 2008, Progress in real-time tsunami forecast [abstract]: Eos (American Geophysical Union Transactions), v. 89, no. 53, Suppl., p. F1723. ♦

INFREQUENTLY ASKED QUESTIONS

Why did Hawaiian children run across the airport on November 2, 2009 ?

It was part of a tsunami evacuation drill. The exercise is on video, available for viewing at: http://www.bigislandvideonews.com/2009/11november/20091103drill.htm

For a full article: http://www.kitv.com/news/21505112/detail.html

How long IS *Tsunamis: Know What to Do!* video?

Each report of the video in this issue gives a different length from 5 to 8 minutes. The DVD itself says "approximately 7 minutes."

What crisis is following in the wake of Samoa's tsunami disaster ?

There is a medical crisis of super-resistant 'bugs' and tsunami-lungs. For more information: http://www.stuff.co.nz/world/south-pacific/3016640/Samoa-medical-crisis-looms

How will the Phuket, Thailand, National Disaster Warning Center 'celebrate' the fifth anniversary of the 2004 tsunami disaster ?

They will receive a new tsunami detection buoy which will be deployed so that the first buoy (donated to Thailand by the U.S.) can be brought to shore for maintenance. The full article is available at http://www.phuketgazette.net/articles/article8017.html

What is NEAMTWS and where is it ?

…the national tsunami warning system in Portugal.

After the Sumatra event in December 2004, the UNESCO, through its International Oceanographic Commission, recognized the need for an end to end global tsunami warning system and Internationa Coordination Groups have been established for different areas around the globe: Indian, Caribbean, Atlantic and Mediterranean ocean basins. This system is the natural response to the historical and recent instrumental events generated along the western segment of the Eurasia and Nubian plates, which eastern end corresponds to the Gulf of Cadiz. The TWA includes three main components: the seismic detection, the tsunami detection and the issue of warnings/alerts.

In Portugal the automatic earthquake processing is installed at IM (Instituto de Meteorologia) which is the only national institution operating on a 24x7 basis. This make IM the natural candidate to host the Portuguese tsunami warning system. The TWS under implementation has severalkey points: definition of the tsunami scenarios, tsunami detection, and tsunami protocol messages. The system will also be able to predict tsunami potential impact along the coast, wave heights and arrival times at pre-defined locations along the coast.

This work is a joint effort between Instituto de Meteorologia (Portugal), the Joint Research Center, JRC-ISPRA, Italy and the coordination of the Portuguese Group for the implementation of NEAMTWS in the area. This work has been financed by different European projects as NEAREST and TRANSFER, and also by the JRC, the IM and CGUL/IDL institutions.

Implementation of the NEAMTWS in Portugal [abstract], **b**y L. M. Matias, A. Annunziato, F. Carrilho, M.A. Baptista. From: Eos (American Geophysical Union Transactions), v. 89, no. 53, Suppl., p. 1765.

How is Oregon going to change their tsunami warning sirens ?

"Oregon is pushing its coastal counties to standardize the sound of the tsunami warning sirens. Washington state has already done so."

Althea Turner, "The goal is to have one signal up and down the coast so that anybody from Cannon Beach who knows their signal there, if they hear a siren in Seaside—or anywhere else on the coast—they know what it means."

From: KPLU 88.5, http://www.publicbroadcasting.net/kplu/news.newsmain/article/1/0/1578504/KPLU.Local.News/Tsunami.Warning.Siren.Hodgepodge.in.Oregon.To.Be.Standardized ♦