

Animals in Disasters

# A Thousand Dogs Barking

*An invited comment  
by Leslie Irvine*

**T**WO IMAGES FROM HURRICANE KATRINA made a profound impact on me. The first is the sound of a thousand dogs barking.

I was one of several hundred volunteers who helped in the effort to care for dogs, cats, and other pets rescued from New Orleans (Irvine 2009). I worked at Lamar-Dixon Expo Center in Gonzalez, Louisiana, which was temporarily the site of the largest animal shelter in the nation, perhaps in the world. During September and October 2005, over 6,000 animals, mostly dogs, were cared for at Lamar-Dixon.

The dogs were not only the most numerous residents we had, but also the noisiest. Canines of every size and shape filled the rows of Lamar-Dixon's horse barns. Each stall held as many donated wire kennels and airline carriers as would fit. In early September, when I arrived, the dog population was at its peak. State authorities were not yet allowing animals to be transferred to shelters out of the region. Kennels were stacked on top of each other. Dogs were everywhere you looked.

It was hard to get away from the barking, as long as you were on the Expo Center grounds. It rose as we volunteers fed the dogs, row by row. Those waiting for food called out to be next. It sounded in waves through the night, when teams of rescuers brought in truckloads of dogs found in the streets and houses of New Orleans. Although many of the sweet, sad canine faces that I encoun-

THIS IS NOTHING.  
THE DOGS, PIGS,  
AND CHICKENS  
ARE OUTSIDE.



tered there have faded from my memory, I will never forget that sound.

### Field of Cotton

THE OTHER IMAGE CAME TO ME SECONDHAND, from the reports of rescuers working to save chickens at poultry facilities in rural Mississippi. Rescuers from Farm Sanctuary, Animal Place, and the Humane Society of the United States

*(Please see "Animals," page twelve)*

### SUBSCRIBER NOTICE

Budget constraints are requiring us to suspend the *Observer's* print version for the next three issues. The May, July, and September 2010 issues will be available online at [www.colorado.edu/hazards/o](http://www.colorado.edu/hazards/o). Please take a minute to update your email address and preferences at [www.colorado.edu/hazards/o](http://www.colorado.edu/hazards/o) to receive *Observer* issues and notices electronically. We expect the *Observer* to be back in its print version for the November 2010 issue.

### INSIDE ...

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## Pollution-Driven Heat Pumps Himalayan Glaciers

The vast glaciers of the Himalayan Plateau are not in imminent danger of melting, but they are seeing an increase of pollution from soot and carbon, as well as being subjected to increased heat being pumped up the face of the mountains from the plain of the Ganges River below.

"The Tibetan Plateau Himalaya region is usually called the 'rooftop of the world,'" says William Lau of NASA's Goddard Space Flight Center. "In this particular context, we can call it the water tower of Asia." The glaciers supply fresh water for seven major rivers on the continent.

"Over areas of the Himalayas, the rate of warming is more than five times faster than warming globally," Lau said. "Based on the differences, it's not difficult to conclude that greenhouse gases are not the sole agents of change in this region. There's a localized phenomenon at play." An increase in atmospheric aerosols in the region is causing a local feedback process of an "elevated heat pump" which may accelerate glacier melt.

A layer of atmospheric soot has accumulated over India's Gangetic Plain up against the foothills of the Himalayas. Along the foothills, the atmosphere draws heat from the surface upward. This heat rises up the face of the foothills hitting the upper glacial surface, melting them.

In addition, there has been a threefold increase in black carbon concentrations on the Himalayas snowfields in the period since 1970, compared to the period from 1890 to 1970, according to Susan Kaspari, assistant professor at Central Washington University. "Black carbon on the surface can contribute to melt," Kaspari says.

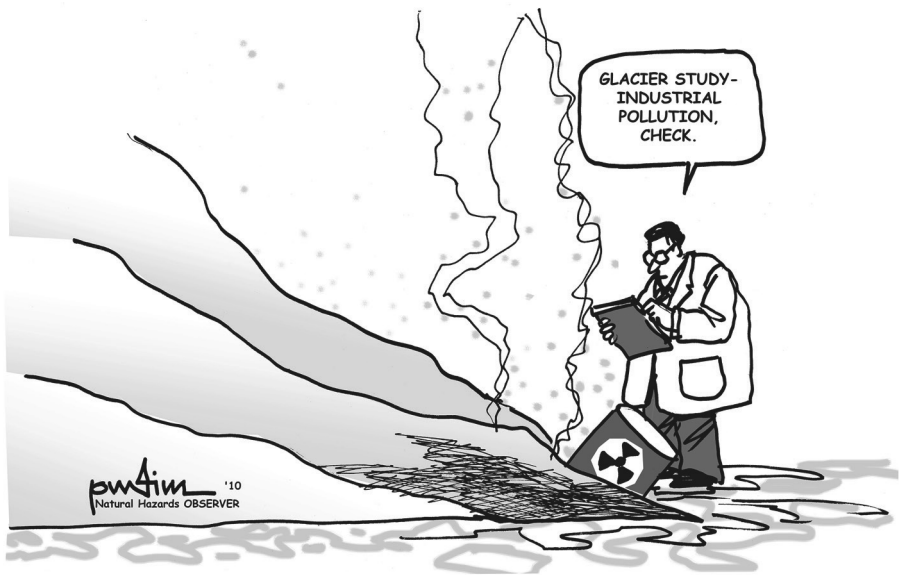
While these developments are worrying, they have not reached crisis proportion. A mistake in the fourth assessment report by the Intergovernmental Panel on Climate Change said Himalayan glaciers would disappear by 2035—a considerable error, since the actual date was 2350. This was, says Brent Holben of the Goddard Space Flight Center, "a great embarrassment."

But says University of Arizona glaciologist Jeffrey Kargil, "There is no evidence that Himalayan glaciers are retreating anomalously quickly. They are typical of what's going on in other areas."

"It takes a long time to melt the big glaciers," Holben says. But this pollution load may add another concern to the future of water supplies in the region.

The IPCC error on the Himalayan glaciers became something of a *cause célèbre* among climate science skeptics. The newspaper *The Australian* called it "another humiliating blow to [the IPCC's] credibility." ([www.theaustralian.com.au/news/united-nations-blunder-on-glaciers-exposed/story-e6frg6n6-1225820614171](http://www.theaustralian.com.au/news/united-nations-blunder-on-glaciers-exposed/story-e6frg6n6-1225820614171).)

An article in the journal *Science* in November 2009 cited



an Indian geologist, Vijay Raina, who found "'many' Himalayan glaciers are stable or have advanced and that the rate of retreat for 'many others' has slowed." This prompted in turn a letter to *Science* from several researchers who said that the incident "highlights how inadequately reviewed material makes its way into the public consciousness."

Lau, Kaspari, Holben, and Kargil all spoke at the American Geophysical Union fall meeting in San Francisco held Dec. 14-18, 2009.

## Next Thing You Know, There'll Be a Geologists' Recruiting Scandal

Paddy Power, self-described as Ireland's largest bookmaker, is now taking bets on which volcano will be the next to erupt with a Volcanic Explosivity Index of three or greater.

Paddy Power said in a release, "It's amazing what punters will bet on and this particular betting market had our odds compilers literally outside their comfort zone. Suffice to say it's a lot easier to figure out the odds on a football match than on a volcano erupting, but definitely not as much fun!"

The Irish odds on the next volcano to erupt are:

- 3:1—Mt. Unzen (Japan)
- 9:1—Mauna Loa (United States)
- 10:1—Ulawun (Papua New Guinea)
- 10:1—Merapi (Indonesia)
- 10:1—Santorini (Greece)
- 11:1—Colima (Mexico)
- 11:1—Rainier (United States)

- 11:1—Taal (Philippines)
- 11:1—Teide (Canary Islands)
- 12:1—Mt. Nyiragongo (Congo)
- 12:1—Popocatepetl (Mexico)
- 14:1—Sakurajima (Japan)
- 16:1—Stromboli (Italy)
- 22:1—Avachinsky (Russia)
- 22:1—Galeras (Colombia)
- 28:1—Mt. Vesuvius (Italy)
- 28:1—Chaiten (Chile)
- 28:1—Etna (Italy)
- 33:1—Santa Maria: Santiaguito (Guatemala)
- 33:1—Yellowstone (United States)

The prices, like the volcanoes, may still erupt. The most recent example of a volcanic eruption with

a VEI of three was Mount Etna in 2002-2003. The eruption threw up a column of ash that fell to earth again as far away as 600 kilometers (360 miles) from the mountain.

## Just Use the Force, Obi-Wan

Congress has instructed the National Aeronautics and Space Administration to find in space all near Earth objects larger than 140 meters in diameter, but has failed to provide any additional funding, making the task impossible by the 2020 deadline, according to a new report from the National Research Council of the National Academies.

In the final report *Defending Planet Earth: Near-Earth Object Surveys and Hazard Mitigation Strategies*, the NRC review committee wrote, "The administration has not requested and Congress has not appropriated new funds to meet this

*(Continued on page four)*

## They Said It ...

...Via the Natural Hazards Center Twitter feed (and a few other places):

### A much-retweeted bad idea

"I felt the huge earthquake here in Eureka. I saw my TV swaying. Luck[i]ly it didn[']t fall. I tried to catch it in case."—*from Twitter after the Mw 6.5 earthquake near Ferndale California on January 10, 2010.*

"Is this the end of the world? No. Does it mean there's a premium on reducing the level of greenhouse gases as fast as reasonably possible? Yes."—*Princeton University geosciences and international affairs professor Michael Oppenheimer on his Nature paper predicting a 20- to 30-foot long-term rise in global mean sea level, quoted by the Washington Post.*

"If you are an 18- to 28-year-old Muslim man, then you should be strip-searched. And if we don't do that, there's a very high probability we're going to lose an airliner."—*retired U.S. Air Force Gen. Tom McInerney on Fox News, January 4, 2010.*

"I think one main thing would be to—just himself to use the word 'terrorism' more often."—*Homeland Security Committee member Rep. Peter King (R-N.Y.), responding to a question about how President Obama could improve counterterrorism efforts.*

"Right now Bangkok is sinking. And with sea level rise, these two factors are affecting flooding in Bangkok

and they are not going to be ordinary floods."—*Bichit Rattakul, executive director of the Bangkok-based Asian Disaster Preparedness Centre, quoted by AlertNet.*

"To see the images coming out of Haiti is like seeing the scene of an accident caused by a drunk driver you have tried repeatedly to stop drinking and driving. The suffering of innocents is terrible to witness. But almost as terrible is the fear that government authorities will not learn and take corrective actions to keep this from happening in the future, elsewhere."—*Brian Tucker in the Guardian.*

"The world is going through a real pandemic. The description of it as a fake is both wrong and irresponsible. WHO has been balanced and truthful in the information it has provided to the public. It has not underplayed and not overplayed the risk it poses to the public."—*Keiji Fukuda, special adviser to the WHO director general on pandemic influenza, quoted in the New York Times.*

"Since the disaster, everyone here has had nothing. No one is here to help us, so we are organizing ourselves."—*Innocent Wilson, one of the Leogane, Haiti, camp spokespersons, quoted in Slate.*

"It is mind-boggling. All the attention to earthquakes right now, in six months, is going to dim. I am practicing now in a field where the cure

is known. It is not rocket science, but people go back to building the buildings that killed people."—*Farzad Naeim, president of the board of directors of the Earthquake Engineering Research Institute, quoted by McClatchy Newspapers.*





objective ... The current near-Earth object surveys cannot meet the goals of the 2005 George E. Brown, Jr. Near-Earth Object Survey Act directing NASA to discover 90 percent of all near-Earth objects 140 meters in diameter or greater by 2020."

The U.S. currently spends about \$4 million annually to search for near-Earth objects which, as the extinction of the dinosaurs has demonstrated, can pose a substantial threat to life on the planet if they collide with us.

Furthermore, the report says, it may be necessary for safety's sake to find NEOs even smaller—perhaps 30 to 50 meters across. Object of this size "are also capable of causing significant damage to Earth," NRC says.

"The most well-known case from recent history is the 1908 impact of an object at Tunguska in the Siberian wilderness that devastated more than 2,000 square kilometers of forest," the report says. "Previous estimates of the size of this object were on the order of approximately 70 meters in diameter. Recent research indicates that the object could have been substantially smaller (30 to 50 meters in diameter), with much of the damage it caused due to shock waves from the explosion of the object in Earth's atmosphere. The committee strongly stresses that this new conclusion is preliminary and must be independently validated. Since smaller objects are more numerous than larger ones, however, this new result, if correct, implies an increase in the frequency of such events to approximately once per three centuries."

The report offered very rough cost estimates for achieving the NEO discovery goals Congress outlined, ranging from \$90 million to \$1.5 billion for a space-based infrared telescope. A nuclear deflector to try to prevent an object from hitting earth would cost about \$3.5 billion, and a gravity tractor to change an NEO's arrival time at a potential impact point would be about \$1.6 billion.

In the November, 2009 *Natural Hazards Observer*, Uni-

versity of California-Berkeley professor Karlene Roberts wrote, "We know the NEO hazard is a potentially lethal but solvable problem. Failure to address it seems criminal in light of the degree of potential catastrophe and the solution's relatively modest cost. A deflection mission might cost less than \$500 million, while it is estimated that an impact by a NEO such as Apophis would result in more than \$400 billion in damage. As we know from other catastrophes the cost of prevention is always lower than the cost of cleanup."

Climate

## Decisions, Decisions

Climate models are becoming more precise as more complete observations constrain them, but uncertainty will still exist and policy makers will have to make decisions in the face of it. "Observations are putting real constraints on models," says National Center for Atmospheric Research scientist Warren Washington. "The next IPCC [Intergovernmental Panel on Climate Change] report will have more sensitive models, but biases will still exist and climate sensitivity will still be uncertain."

"Climate sensitivity" is a measure of how much temperature will increase if there is doubling of CO<sub>2</sub> in the atmosphere. The current estimate is between 2.5 degrees Celsius and 4.0 degrees C, with a most likely value of 3.0 degrees.

It may be possible to limit mean global temperature increases to two degrees from 1870 to 2100, Washington says, if conservation, renewables, solar, wind, and nuclear power are all deployed aggressively. "You can stabilize atmospheric CO<sub>2</sub> at a level of 450 parts per million if you cut emissions by 70 percent," he says.

"While we wait for the world to decide on emissions cuts, the residents of the Carteret Islands may become the "first climate change refugees," according to Columbia University climate scientist Mark Cane. Cane says that it originally struck him as unlikely that there would be enough mean sea level rise to force the residents off of their atoll. But sea levels in the western Pacific Ocean are rising three times faster than the mean, he says.

Inez Fung of the University of California-Berkeley says



that the ocean is taking up less carbon as a result of increasing sea surface temperatures.

One of the potential benefits from increasing carbon dioxide in the atmosphere is a potential boost in plant growth. But Fung says the research shows considerable uncertainty on this. "We're all over the map on the response to CO2 fertilization," Fung says.

All three scientists spoke at the American Geophysical Union fall meeting in San Francisco held Dec. 14-18, 2009.

Tsunami

## 'No Messenger Is More Credible ...'

Tsunami warnings have improved dramatically over the past 20 years, thanks in large part to the advancement of technology. But recent experiences with the tsunami that hit Samoa on September 29, 2009 demonstrates that a lot of old-fashioned communication and emergency management response is still needed to save lives.

"People want to know what to do," says Walter Dudley, chair of the Pacific Tsunami Museum's Scientific Advisory Council. "No messenger is more credible than a tsunami survivor."

Dudley interviewed survivors of the September 29, 2009 Samoan tsunami shortly after the disaster occurred. One of his interviewees, Peter Gurr of Malota, told him, "Homeland security training actually saved my life. The training educated me about tsunami."

Gurr said children at the school had received tsunami training the Friday before the tsunami. When the teachers felt the quake, they led the children out the back of the school and up the hill. "It saved the school," Gurr said in a video interview with Dudley. "Thank God those teachers



knew what they were doing."

The low tech approach of training and running uphill is aided by the newly completed tsunami warning system with 39 detection buoys placed in the Atlantic, Pacific, and Indian oceans. "Over the past 25 years, NOAA [the U.S. National Oceanic and Atmospheric Administration] has developed a real-time forecasting capability with an accuracy of 80 percent," says Eddie Bernard of NOAA's Pacific Marine Environmental Laboratory.

Paul Whitmore, director of NOAA's West Coast and Alaska Tsunami Warning Center, says that once the tragic 2004 Indian Ocean tsunami occurred, "Things became apparent ... Everywhere on the coast ought to be covered by a tsunami warning system." Within about two weeks after the 2004 tsunami, a rudimentary warning system was set up on the U.S. East Coast where none had existed before.

Other changes in the early warning system include an increase in NOAA staffing levels to provide round-the-clock coverage, the installation of 39 buoys for tsunami warning—up from seven before 2004—development of a forecast system, upgrading of the Hawaii seismic network, funding for the TsunamiReady program, and installation of a Caribbean seismic network.

In 2004, the tsunami warning system detected about 35 percent of all the seismic events in the Pacific, but by 2008, that had increased to 95 percent. Response times decreased from seven minutes to three minutes between 2004 and 2008.

Curiously, the strength of an earthquake does not help to predict whether a tsunami will be triggered. Small quakes can trigger large tsunamis, and large quakes may trigger small ones, or perhaps none at all.

The tsunami research was presented at several sessions at the American Geophysical Union fall meeting in San Francisco on December 15 and 16, 2009.

Q&A with U.S. Geological Survey's Paul Earle

## TwitterQuakes

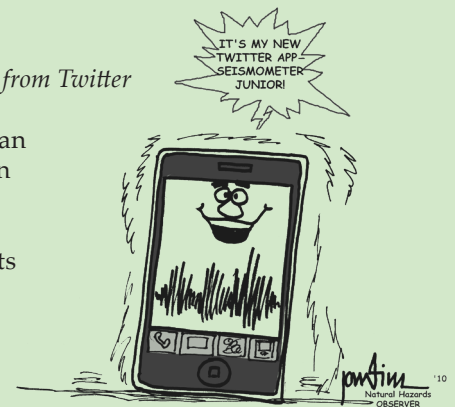
"Apparently there was an earthquake. I didn't feel it. Hubby did though."  
"My monitors were shaking like the water in Jurassic Park, kinda awesome."

—two earthquake tweets from Twitter

So who to believe? An earthquake to make those toaster fish wobble? Or an earthquake so weak it is noticeable only by the sensitive spouse? Are they even talking about the same earthquake? The U.S. Geological Survey is working on a system that will assess "tweets" about quakes on the social networking site Twitter to augment earthquake information gathered more formally through its worldwide network of seismic monitoring stations.

In what might be considered incorporating high-tech "indigenous knowledge" into earthquake warnings, the USGS system is predicated on a simple truth: "People tweet after earthquakes."

In a paper presented at the American Geophysical Union's San Francisco meeting in December 2009, USGS geophysicist Paul Earle and



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## TwitterQuake

(Continued from page five)

colleagues wrote, "Twitter offers rapid access to very short, first-hand accounts of shaking. These accounts are often available at or before the time of the official location and magnitude release, filling in an information gap in the minutes between the time of the event and the time when quantitative ShakeMaps and detailed 'Did You Feel It' maps are available."

USGS produces these latter products through its PAGER (Prompt Assessment of Global Earthquakes for Response—[earthquake.usgs.gov/earthquakes/pager/](http://earthquake.usgs.gov/earthquakes/pager/)) effort. "Did You Feel It" is an online form people can fill out to provide their own experience of a quake to the agency.

"The major drawback of a Twitter-based post earthquake assessment is the lack of verified quantitative information," the authors wrote. "Quantitative data is needed to prioritize and enact response measures."

Essentially, the USGS monitors Twitter for tweets referring to earthquakes, checking key words in several languages—earthquake, quake, *gempa*, *seismo*, *temblor*, *terremoto*, tsunami. The tweets are geolocated as well as possible using information provided by the tweeter. "Inaccuracies in geolocations add significant noise to the data," the authors write. "In our processing, the majority of tweets are geolocated using the users 'location string' associated with their account. Even though the location of some tweets submitted on GPS enabled devices are highly accurate, currently the locations of many of the processed



Twitter can give us a heads up, faster, in sparsely instrumented regions. However, it doesn't give us an exact location, it doesn't give us a magnitude.

**NHO:** *How did this come up in the first place? Was it an organic process, or did you decide, "Hey, maybe this might work?"*

**Earle:** It was something that kept coming up. It wasn't like a genius idea on our part to look into this. After the Szechuan earthquake, there was a debate on whether Twitter was faster than the USGS. It was actually a good debate. People were critical of us, but it was good debate in that it allows us to explain the difference between just

tweets are suspect. Twitter has recently implemented geolocation tags, so tweet spatial locations will likely improve with time."

There are other sources of potential error. "Some people tweet about having just finished eating a Dairy Queen 'Oreo Brownie Earthquake' or a satisfying session of the video game 'Quake.'"

The *Natural Hazards Observer* caught up with Paul Earle at his Golden, Colorado, office to explore the future of social networking as an earthquake assessment and warning tool.

knowing an earthquake occurred and knowing some scientific information about that earthquake.

It was interesting to see how that argument evolved on the Internet. It first started out with critical statements. Then other people chimed in saying they understood the difference between something very rapid but less accurate, and something more accurate that you could take some quantifiable information that you could actually take action upon, versus, "Hey, there was an earthquake in China." China's a big place. That earthquake was felt from Szechuan where it happened to Beijing.

The first tweets originated in Beijing. In an earthquake that size, it's hard to localize where it happened. You know the event happened, but you have these tweets coming from Beijing, a long ways away. It's hard to figure out where an event like that occurred, unless you have the scientific information to tell you exactly where it was.

**NHO:** *This debate played out on Twitter?*

**Earle:** Yes, and without a lot of input from the USGS ... Then I came in one night and was talking to an analyst, there was a small earthquake, I forget where. It was kind of under the radar for our global detecting system, but was still felt by a lot of people. So we got tweets from that, whereas our system could not nucleate a solution for it. With our global monitoring system, we have a rapid response threshold of about Mw 5.5 anywhere on the planet, and Mw 3.5 are felt with in the United States.

At that level, our instrumentation can tell us within 20 minutes, and we can get a location. And Mw 5.5 is really a threshold for where you get an earthquake that really can cause widespread damage. You can have smaller earthquakes that do cause casualties and deaths, but they're generally localized.

But earthquakes below these levels—at least for rapid response—can sometimes fall in the holes. And Twitter told us that, hey, this earthquake was felt by a lot of people. And when you see that, you say, "Oh, maybe we should take a look at it."

So this is kind of a subtle point to get across. The basic idea is that our main mission, the instrumentation we have is sufficient for telling the world about these earthquakes that potentially cause widespread damage. Twitter has the potential of informing us that maybe we should take a look at one of these smaller earthquakes because people are interested in it.

**NHO:** *What kind of information do you get out of it?*

**Earle:** There's a couple things you get out of it. First, it can tell you that an earthquake happened rapidly in these regions of sparse instrumentation. For example, an earthquake in Reykjavik, people started tweeting about it within a minute after the earthquake. But, since globally our stations are sparse, we have to get a few stations that actually see it before we can locate it. That can take another 20 minutes. So Twitter can give us a heads up, faster, in sparsely instrumented regions. However, it doesn't give us an exact location, it doesn't give us a magnitude.

You also get these little first hand accounts of the

earthquake. It also gives us very short, personal accounts of what happened at the same time. We previously only would have had location and magnitude.

**NHO:** *How useful is this?*

**Earle:** That's really what we're into now. It augments—but does not replace—what we're doing. It's the "fast" versus "accurate." We get these little snippets in very quickly in the minutes after an earthquake. But in the tens of minutes, we have people coming in and filling out the "Did You Feel Its." Those are very key questions that we're able to turn into the intensity of the ground shaking.

With the Twitter messages, it's harder. You can get an idea, but you can't turn it into an actual estimate of the groundshaking.

**NHO:** *Can you geolocate on Twitter?*

**Earle:** That's our biggest problem right now. You can, but again it's one of those accuracy versus time things. I wrote my thesis ... I was looking at seismic waves that had signals-to-noise so small that you had to put all these different processing things at it. Geophysicists are good at separating noise from signal. There's a lot of noise. But you can, if you look at it, separate some of the noise from some of the signal. You certainly have contamination, you certainly have noise, but there is signal in there that you can see.

I entered this as a skeptic of Twitter, and that's probably why it took me so long before I started the project. But it just kept knocking on the door, so I figured I'd look at it, and at least I'd be able to argue people's points that they were bringing it up. What we're really trying to do is figure out if it is useful and how to use it. I'm not one who hugs it and thinks it's going to change the world, though I'm more of a backer now than I was. It's a way that people communicate. You've got 20 million people communicating in this thing.

**NHO:** *What's the current status of the program?*

**Earle:** The system now is running in-house. Basically, we built the system as a kind of first cut to see how it would work. Then we'll iterate on that to see what we eventually distribute publicly. Before we distribute things publicly, there's lots of things we have to address like privacy issues and how to present the texts of the tweets. Every fifth tweet has a swear word in it—so how do we present that?

The system is completely internal. It's not public yet. We're still evaluating it. The future directions are distributing our information on Twitter, and then potentially detecting and characterizing earthquakes from that information.

We also are exploring ways to distribute information derived from Twitter publicly, but we've got some work to do on that front. Right now, we're tweeting occasionally about the project—which is @USGSted on Twitter—and after an earthquake I'll occasionally manually put up one of these maps or one of the histograms of tweets.

But it is not an alert system. Eventually when we do start issuing alerts through Twitter, we're probably going to do it through a couple of channels, a couple of

user names. So we'll probably tweet everything over Mw 5.5, and then maybe these earthquake solutions above a certain magnitude threshold or if they generated a lot of tweets.

**NHO:** *I'm curious, for you personally ... you said you came into this as a skeptic about Twitter, and I'm curious about how your thinking about this technology has evolved as a result of getting involved in this?*

**Earle:** One, I'd say that I think the average user of Twitter is over thirty. It's not a bunch of teenagers. There's a lot of fairly mature conversations going on. All the information in these conversations is not contained in 140 characters. Usually it will be 140 characters with a link to a more exhaustive article. So people will tweet about an interesting article that they read. So it's more mature than I naively thought.

The idea of publicly broadcast messages I find intriguing. I think its full potential hasn't been figured out yet. We certainly haven't figured out its full potential for earthquakes. How it will evolve will be interesting.

I don't know if Twitter will be around forever, but I think the concept of publicly searchable succinct messages will be. I think it's a useful way of communicating. Not that my opinion on this matters—I'm a seismologist.

Another important point is, it's very cheap to do this. They supply all the application program interface—it's a way the computer can search and download the tweets—they have all these APIs written. Our whole system was built by one student who was full-time in the summer and part-time during the school year. And that's less money than it costs to install a single seismometer, of which we have thousands around the world. So for less than the price of single seismometer we can build this system that augments the information we have, for very little input. It's a potential way to reach more people and educate them about earthquakes.

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*In an email to the Observer after the January 12, 2010 Haiti earthquake, Earle wrote:*

We only received one geocoded "earthquake" tweet from Haiti in the first 15 minutes after the earthquake, but we were not collecting tweets in French or Creole. We received numerous tweets from the Dominican Republic and Jamaica in this time period. The lack of immediate tweets from Haiti could be due to the language, people being more concerned with life safety measures than tweeting, communications infrastructure being damaged, or a lack of people using Twitter in Haiti. At this point I don't know which of these was the largest factor.



I entered this as a skeptic of Twitter, and that's probably why it took me so long before I started the project. But it just kept knocking on the door, so I figured I'd look at it, and at least I'd be able to argue people's points that they were bringing it up.

# Haiti in the Long-Term

By Dan Whipple



**T**HE EMPHASIS IN HAITI AFTER THE EARTHQUAKE will turn to the long-term recovery of the country. Helen Clark, administrator of the United Nations Development Programme, told the January Montreal Ministerial Conference, “We need to plan carefully, but expeditiously, a sequence of essential steps involved in developing the earthquake recovery program in Haiti. For any such large-scale recovery program to succeed, it will take the sustained and enduring commitment of the international community as a whole to support the government and people of Haiti, over a realistic time frame that will stretch well beyond the next three or four years.”

A magnitude 7.0 quake struck Haiti on January 12, 2010, killing an estimated 230,000 people.

The question now is what long-term planning and assistance will consist of. There’s no question a lot is needed. One of the world’s poorest people, Haitians have been failed by their government and the economy as well as their geology and their buildings. Fifty-five percent of Haitian live on less than \$1.25 a day. Fifty-eight percent are undernourished. The gross domestic product of the country shrank at an annual rate of 2.1 percent between 1990 and 2007, according to UNICEF statistics.

“I think that the challenge with Haiti is that it is going to be a very poor and vulnerable country for a long, long time,” says Dan Erikson, director of Caribbean programs at Inter-American Dialogue, a research and policy group on western hemisphere issues. “Any notion of thoroughly revising building codes or urban planning or installing early warning systems in Haiti probably aren’t realistic. This is a country with a very limited infrastructure and highly overpopulated urban areas.

“The international community and the Haitian government need to look at relatively low-cost, short-term

fixes, because those are the changes that are most likely to be achieved,” Erikson says.

## A Long List

The list of things that Haiti needs is long. Erikson says that priorities should go into reducing crowding in Port-au-Prince, and improving communications. “Other big issues have been food and water. They could safeguard the central drinking water system of Port Au Prince to make it more hurricane and earthquake proof,” he says.

“They have to focus on the four or five or six things that necessary to resist a national disaster—water, a food supply, electricity, and access to the outside world. The airport is overburdened. The port was barely functional even before the earthquake, and now that’s been damaged further. There should be multiple airports and multiple ports so you don’t have this problem.

The failure of Haiti’s government has been as obvious as the failure of the infrastructure. “The Haitian national police need a better way to remain organized in an emergency. Clearly you need to have a way to clear the streets and deal with waste disposal,” Erikson says. “In the broader sense of looking at the social safety net, you need to think in terms of education and health care. They should make sure that they have a system developed where they can set up emergency medical clinics.

“Even though this quake was of tremendous magnitude, the government gives the impression of having no emergency plan. Given the fact that it’s in a known hurricane corridor, it seems like that would be appropriate,” Erikson says.

“The biggest challenge in this disaster was the preexisting situation in Haiti. The capacity of government there was very low,” says Tom Birkland, public policy



professor at North Carolina State University. “Haiti is a very poor country. The GDP is four to eight times less than its neighbor, the Dominican Republic. So Haiti was already in very poor shape.”

He adds, “What does it mean to recover in Haiti? You don’t want to recover to the same level of vulnerability you had predisaster. But in Haiti, people were poor by any number of development standards. They have to recover to better than the status quo. That’s where the challenge is going to be.

“We need to supply food and water, obviously, basic medical care,” Birkland says. “There may be an opportunity to build a community with the kids, working with young people as volunteers. Half of Haiti’s population is below the age of 18.”

Birkland says the United States “probably needs to take the lead here, because we’re best equipped to do it.” But the history of U.S. intervention in the country is checkered at best, and many Haitians remain suspicious of U.S. motives, even in a crisis. While the United States has been in a position to offer long-term help in the past, it has failed to do so. In addition, if history is a guide, Haiti will have to install a government that the United States can trust before there is any surge in long-term assistance.

### A Constant Stream of Intervention

Stephen Majeski, a political science professor at the University of Washington, says, “Let’s go back historically, roll the tapes back to the early 1900s. Like many Central American and Caribbean countries, Haiti was ... a little tiny country which had a small economic base, largely extractive or agricultural, dependent upon expertise and foreign investment from the United States and European countries. Entrepreneurs moved in and invested money on agriculture and other extractive industries. United Fruit Company, for instance, emerged from this era.

“Most of the regimes were relatively incompetent. They lacked the ability to control their countries, lacked the technical expertise to run their economies. They were constantly in trouble economically and politically. This led to U.S. intervention in various forms. In 1915, the U.S. intervened in Haiti. The U.S. was fed up. They finally sent in the Marines. They established a new constitution. An admiral ran the country. Haitian regimes evolved into dictatorships. ... There’s been a constant stream of intervention from the U.S. So now some of the Haitians are going, ‘What are all these U.S. military doing in our country? We’ve seen this play before.’”

Majeski adds, “Haiti we know is one of the poorest countries, with limited infrastructure, an ecological disaster area. We know their economy is very primitive. Yet the amount of economic aid the U.S. has sent to Haiti is quite small relative to other Latin American and Caribbean countries. One reason for this is because U.S. policy makers have been dissatisfied with the political regimes and their ability to run things in Haiti.

“If you look at Haiti, it lacks natural resources ... It has no minerals. It has always had terrible educational levels. Developing human capital has always been problematic. Part of this is self-inflicted. There’s been tremendous

internal turmoil. Different factions have competed for control over the limited resources. They’ve never had a stable political regime, which have been extractive in themselves,” he says.

Long-term priorities for recovery should be raising education levels and restore the ecological infrastructure, he says. “You could build up the human capital, attempt ecological restoration. But one of the reasons Haiti has no trees is that people are poor—they took them for fuel.”

But the nation has to get a decent, non-extractive governmental structure, which may only come about through external coercion. “There has to be some sense that there’s a political structure that is stable and that can use the investment resources. There’s not been the will on the part of the U.S. and other in a quasi-coercive fashion to force the Haitians to settle long-term political differences. The UN has had a peacekeeping force there for six or seven years. They’ve been trying to create political stability and order, to create an environment in which you can move forward on other issues.”

### Housing

The most obvious problem from the quake was the collapse of buildings and houses. There has been comment that stricter housing codes are necessary. But without an effective government to enforce them, codes by themselves are unlikely to be effective. What will be necessary is a method of wedding local building customs to earthquake- and hurricane-resistant structural techniques.

Richard Clarke, a lecturer on structural engineering at the University of West Indies visited Haiti immediately after the quake to do a “preliminary survey” to assess buildings which had not collapsed as potential locations for temporary medical facilities. He sent a brief memo to the Earthquake Engineering Research Institute, in which he summarized his early findings.



“One big, big problem in Haiti is all of the slabs of the buildings are made by putting concrete blocks in the slabs to reduce the amount of concrete you would pour. These blocks are just hanging there and retained by the concrete around them. A little shaking and they will fall off. Just one will kill a person.”

—Architect Patrick Paultre

Clarke wrote, “Interestingly, in many instances of multi-story construction, flat-slab reinforced concrete is the gravity load system. It is also common to find that the floor slabs are of ‘concrete composite’ construction. That is, blocks are used as fillers and permanent formwork, but space is left on either side to facilitate the placement of the rebar. The concrete is then placed with a topping. I am not sure if fabric reinforcement is placed in the topping, or its thickness.”

Clarke says—and other experts confirm—that in multistory buildings the columns were probably too small to withstand the shaking they got from the quake. “It seems

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## Haiti...

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that collapse was frequently due to shear failure of these columns, which are generally quite small—no more than 10 inches by 10 inches. Punching shear failure of the floor due to inadequate rebar and/or shear strength of the flat-slab is also probably another failure mode.”

He said that there are structural engineers in Haiti capable of contributing to sound structures.

Patrick Paultre, a Haitian architect who teaches at Canada’s University of Sherbrooke, says, “The solution needs to take what is the traditional way of building and modify it a way that becomes safer. In the colonial time, things were done in masonry, which is not a good solution in earthquake regions. They started using wood as a material building for houses in Haiti maybe at the turn of the last century, until 1920-1930. These are what they call the ‘gingerbread buildings,’ they are very decorative with a lot of detail and very beautiful. But you need specialized manpower and we don’t have that anymore. They were rather good in terms of earthquake loading. They are light and have a lot of energy dissipation capacity. They use nails to connect the posts and beams. During a quake this moves and dissipates energy.”

But Paultre confirms that the concrete-blocks-as-filler

style of slab construction adopted as the nation got poorer probably was a major cause of fatalities in the earthquake. “One big, big problem in Haiti is all of the slabs of the buildings are made by putting concrete blocks in the slabs to reduce the amount of concrete you would pour,” he says. “These blocks are just hanging there and retained by the concrete around them. A little shaking and they will fall off. Just one will kill a person. You might have forty or fifty of them in a room. That’s a major problem. The way they make those slabs, they are very heavy. The columns are flimsy, they shear, the whole slab will collapse. The next floor below cannot take the weight, so it collapses, and so on.”

He adds that builders of multistory buildings in Haiti “need to do the inverse of what they are doing now. They should use big columns and small beams. The beams can be damaged, but they dissipate energy. Stop using those blocks in the slab. This is terrible. You have a sword above your head. Learn how to do slabs simpler, lighter. Use frames. I don’t think it would be very much more costly. There is a way to do it and do it right, it will take education, information, teaching and learning,” Paultre says.

NCSU’s Birkland adds, “We need to ask some architects and area experts to get together to build homes cheaply, but sturdily enough. But sometimes architects tend to look at these things as a clean slate. We learned in Katrina that having a bunch of out-of-town planners treating a city as a studio project doesn’t work for the local people.”

## U.S. Officials Encourage Haiti-Led Reconstruction Efforts

By Alexandra Jordan

Two days after a 7.0 earthquake hit the island nation of Haiti, President Obama took an aggressive stance, promising over \$100 million in initial aid along with thousands of American military troops to help coordinate relief operations. Despite increased efforts by the United States to deliver short-term sustenance and housing, debates rage over the long-term U.S. role in Haiti’s recovery and reconstruction.

Experts question whether the United States will maintain a central role once the media spotlight dims. Sarah Stephens, Director for the Center for Democracy in the Americas, told the *New York Times*, “The classic U.S. role in the whole hemisphere is either complete neglect, or we come in and run the show.”

At a January 28 Senate Foreign Relations Committee hearing and “in a separate teleconference by relief organizations,” officials reported three potential factors impeding the execution of international aid in Haiti: an incompetent Haitian government; lack of coordination by foreign aid organizations; and a history of failed U.S. foreign policy. Paul Farmer, the United Nations deputy special envoy to Haiti, said at the hearing that setbacks are rooted in years of corruption inside the Haitian government as well as the United State’s pattern of bypassing Haitian authority to carry out foreign policy. The United States is trying to avoid such strategies this time around.

In a speech the day after the earthquake, President Obama assured Haitians of “a friend and partner in the United States of America, today and going forward.” However, U.S. officials remain cautious with their promises. The increasing prominence of U.S. military troops and government aid inside Port-au-Prince has created high expectations from



the people. On January 31, the *Washington Post* reported Haitian public support for Americans to direct the rebuilding process. Administration officials, such as Secretary of State Hilary Clinton and Louis Lucke, the senior U.S. Agency for International Development official in Haiti, continue to emphasize that this is and will continue to be a Haitian-led process, despite evidence to the contrary.

U.S. officials are doing all they can to reestablish President René Préval and Prime Minister Jean-Max Bellerive as leaders

of the country. For Haiti to take control of reconstruction efforts, experts believe the most urgent priority is restoring national authority. Prime Minister Bellerive and international donors agreed at a January 25 conference in Montreal that it would take more than \$3 billion to rebuild the country's houses, schools, health care facilities, government ministries, and national infrastructure. The State Department called this estimate premature but U.S. representatives and others at the meeting suggested the Haitian government name an agency to manage reconstruction funding, a strategy designed to quell concerns over Haiti's history of fund mismanagement.

President René Préval sent aides to the palace grounds to start building temporary offices and shelter for him and other government officials. However, he had yet to formally address the nation three weeks after the earthquake. Préval's lack of involvement has led to public discontent. Some have called for the return of former President Jean-Bertrand Aristide. Although absent from the public eye, Préval insists that he has been working with ministry officials from the start, running the government out of a police station in Port-au-Prince since the quake.

Donor nations have called for an independent damage assessment. The *New York Times* quoted Clinton saying, "Sometimes people have pledging conferences and pledge money, and they don't have any idea what they're going to do with it. We actually think it's a novel idea to do the needs assessment first and then the planning and then the pledging." Assessment experts from the World Bank, the Inter-American

Development Bank and the United Nations Development Program were to begin in early February.

Maintaining that Haiti will manage and administer reconstruction funds, Clinton confirmed her responsibility to ensure that American taxpayer dollars be spent transparently and with long-term results on the ground. She has declined to say how much the United States will donate in the long term.

The 7.0 magnitude earthquake occurred on January 12, 2010, along the Enriquillo-Plantain Garden fault zone, devastating Haiti's capital city, Port-au-Prince, and other surrounding areas. As of mid-February, a government spokesman of the island nation confirmed 230,000 dead.

Also exceeding original approximations, the Red Cross suggested that nearly 3.5 million Haitians have been affected in one way or another by the quake. Although Rajiv Shah, the administrator of the U.S. Agency for International Development, reported efforts to coordinate temporary housing and emergency food supplies, only a quarter of the estimated 240,000-300,000 families left homeless were said to have received plastic sheeting or tents by early February. At that point, emergency food aid had reached approximately 800,000 Haitians inside the city and nearly 250,000 outside the capital.

*Alexandra Jordan is a research assistant at the Natural Hazards Center.*

Our Woman in Haiti

## Pulverized Buildings, Makeshift Tents, Long-term Commitments

*By Liesel Ritchie*

*"So, how was it?"*

Back in Boulder now just a few days after my return from Haiti, I am still trying to find the right words to articulate the experience. Things moved very quickly after the Natural Hazards Center was contacted not long after the earthquake by a New Orleans-based group headed to the devastated country. The group operating under the auspices of the Louisiana Disaster Recovery Foundation planned to provide assistance to Haitian communities that had reached out to them in the aftermath of Hurricane Katrina. After attending an initial meeting in New Orleans, I returned home to prepare for the trip that started at 3:00 a.m. the morning of January 30th. Our team of eight was made up of architects, planners, translators, logistics coordinators, construction experts, medical personnel, and me, a sociologist.

The week in country began with a 15-hour drive from Santo Domingo in the Dominican Republic to our ultimate destination in Cayes Jacmel south of Port-Au-Prince where we were based for the next several days.

We crossed the into Haiti via a small bus loaded with 44 large duffle bags and boxes of medical and other supplies. Our drive through Port-au-Prince showed the televised images of destruction presented an accurate picture of the horrible situation there. Although it was dark—4:00 a.m.—when we began our journey, we could see buildings pulverized by the earthquake. All along the drive, in the center of the streets, were makeshift tents of sheets and plastic filled with people either left homeless or afraid to sleep in their damaged homes.

Descriptions of the smells were not exaggerated, either. I've never been exposed to such a stench. We kept

the windows rolled up, the air vents closed, and to keep face masks and menthol rub to put underneath our noses handy. We passed through Leogane, the epicenter of the earthquake, where 95 percent of the buildings were flattened, and at least 30,000 people died.

The most profound aspects of my experience involve witnessing on such a large scale the things about which I have been studying and writing since 2001—social impacts of disasters, including issues associated with long-term recovery. Although my academic education and my applied work have served me very well in the past couple of weeks, the scope and magnitude of the impacts of the Haiti earthquake are clearly pushing the limits of the experience and knowledge of everyone involved. On a personal level, the meanings of concepts such as "resilience," "sustainability," and "recovery" are evolving in my own mind, as I participate both in meetings on the ground in Haiti and as I observe social, cultural, and political circumstances in various settings.

We left Jacmel for Santo Domingo by small plane late on the afternoon of February 5th. In some ways time passed very quickly. In other respects, it seemed weeks since I'd left Boulder. But as I prepare to return to Haiti later in February, I will be working with colleagues around the world to carefully consider the most appropriate ways to not only conduct research in Haiti, but also how best to support the efforts of the individuals, groups, and communities in Haiti as they attempt to rebuild and recover in the coming months and years.

*Liesel Ritchie is the assistant director for research at the Natural Hazards Center.*

## Animals...

(Continued from page one)

responded to a call from a resident saying her street was covered with “so many dead chickens, it looked like a field of cotton” (Allan 2005).

The Gulf region is one of several areas in the United States known for its production of broiler chickens. After Katrina, millions of chickens were stranded, starving and dehydrated, in demolished cages and sheds. Those who were not trapped in twisted wire and debris wandered away. Many succumbed to heat and thirst. Others were hit by cars when they reached the roads.

Upon learning of the situation, rescuers located the demolished facilities, which can only be called “farms” in the loosest sense of the word. In corporate poultry production, the people who do the day-to-day work of keeping the chickens do not own them. They could not authorize rescue. The birds were the property of the huge agribusinesses whose labels appear on the packages of chicken in grocery stores. The rescuers nevertheless managed to save over 1,000 chickens. They placed them in safe homes in sanctuaries.

For the poultry producers, the situation was not a rescue effort but a “disposal problem.” After several days, the chickens were a loss to them. They bulldozed surviving and dead birds alike into mass graves. The living birds who did not suffocate from the weight of others on top of them were eventually buried alive. The situation received none of the heartbreaking media attention given to the pet rescue operation. While doing research for a book on animals in disasters, a Lexis-Nexis search of national newspapers revealed over 500 articles on pets and Katrina, but only two related to farmed animals.

The canine chorus symbolizes a dramatic, heartbreaking, well-publicized, and costly rescue effort. The “field of cotton” symbolizes its polar opposite: the deaths of millions of birds received no mention. News of the rescue appeared only on the Web sites of the participating rescue groups.

### Zoological Scale

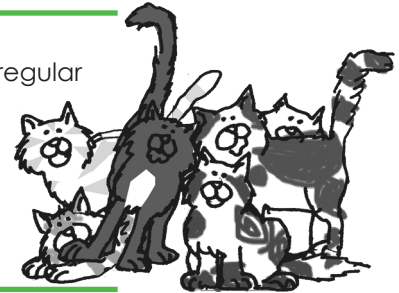
THE TWO SCENES VIVIDLY ILLUSTRATE OUR ambivalent attitudes toward animals. We consider some animals members of the family. We allow them to sleep on our beds, and we may even celebrate their birthdays. Others we consider dinner. Some are worth rescuing, while others are worthless unless they end up on a plate.

The two scenes have profound relevance for disaster planning and response. They highlight the value we place on certain kinds of animals. We congratulate ourselves for the rescue of dogs and cats, but the majority of animals who play other roles in society remain invisible to us. We have the closest bonds with dogs, cats, and the other animals we consider companions or pets. But these species constitute only about two percent of the animals currently living in the United States. The others are mostly livestock: the cattle, sheep, hogs, and poultry raised for food. The U.S. Department of Agriculture reports that ten billion such animals are raised for food annually (USDA 2005a, b). They live in conditions that we would consider inhumane for dogs and cats. These conditions pose serious environmental and public health risks under normal circumstances,

and they can easily escalate into catastrophes.

We human beings put everything in some sort of hierarchy. We rank the intensity of hurricanes and tornados, the quality of hotels, and the value of other people. We rank animals, too, using a hierarchy that sociologists Arnold Arluke and Clinton Sanders call the “sociozoologic scale” (1996:167-186). We place all animals below us, but we also make distinctions among the animals. These are not scientific distinctions, based on biological sophistication, intelligence, or some other objective measure. Pigs are considered more intelligent than dogs, yet we rank dogs above them. Rather, the distinctions are based on how well animals

We allow the “good” animals regular contact with us. For example, the animals we consider “pets” have a nearly human status on the scale.



fulfill the roles we have given them. We allow the “good” animals regular contact with us. For example, the animals we consider “pets” have a nearly human status on the scale. We allow them into our homes and consider them members of our families. But the pet must be tame and well behaved. Pets can keep their status so long as they comply with the code of conduct we establish for them. If a dog or cat does not follow the rules, if they, say, challenge us by exhibiting aggression at a level we deem inappropriate, we banish them. We even destroy them. They do not fit into their designated place as our subordinates.

Even wildlife must keep its place. We admire the bear or mountain lion as long as they remain at a distance. Once an animal intrudes into spaces we designate as ours, the “majestic” creature is transformed into a threat to be killed.

There is a place on the sociozoologic scale for the animals who are useful to us as “tools.” Some of these animals provide food. Others are useful because they provide scientific data. But when an animal becomes a “tool,” the animal nature must be disregarded or stripped away.

Just as pets must be so thoroughly domesticated that they allow us to treat them as infants, a tool must display few naturalistic “animal” elements. We do not allow them to feel emotions or think thoughts. We question whether they feel pain. They become objects whose existence is justified only by the products they provide.

We describe them using characteristics such as “high yielding carcasses” and “feed efficiencies.” The names we call them remove any hint of the existence of a sentient being. We call them “beef,” “pork,” “legs,” or “breasts.” We house them in ways that do not allow them to express their natural instincts, such as stretching a wing or turning around. They cannot establish a pecking order or take a dust bath. When their bodies do not meet the requirements we have constructed for them, we consider them worthless. Thus, the chicken who cannot be killed and butchered for meat is a “loss,” rather than an animal. In sum, the way we rank animals along the sociozoologic scale allows us to define, reinforce, and justify our interactions with them.

No disasters affect animals exclusively. Our lives are so closely intertwined with those of animals that any event that affects animals will also affect people. Nowhere is this more obvious than with the animals we raise in facilities known as “factory farms.” For example, many readers know that in September 1999, widespread flooding occurred in eastern North Carolina after Hurricane Floyd, which followed Hurricane Dennis by only ten days. The floods killed nearly three million animals. Most of these were hogs.

North Carolina is one of the top hog-producing states. Most of the animals were in “concentrated animal feeding operations.” In CAFOs, hogs are housed in rows of long, low barns or sheds. Each shed houses 1,200 to 2,500 hogs. A typical CAFO consists of numerous sheds. Hog CAFOs commonly store between three and twelve months’ worth of manure beneath the floors (Jones et al. 2003). CAFO operators transfer the accumulated manure into outdoor holding ponds called waste lagoons. These are essentially open

cesspools that pose significant environmental problems under normal operating conditions.

In September 1999, an estimated 237 hog CAFOs were on floodplains of eastern North Carolina (Mallin et al. 2002; Wing and Band 2002; Mallin and Corbett 2006). After Hurricane Floyd, tens of thousands of hogs drowned and their carcasses contaminated coastal rivers. Waste lagoons overflowed. Tons of manure washed into the Pamlico and Core Sounds. The waste caused a massive fish kill. The environmental and public health effects are still being studied.

There are many other examples of how events that affect animals have an impact on us. Some disasters we think of as affecting animals exclusively or primarily can have far-reaching consequences. For instance, large-scale livestock disease outbreaks have serious economic repercussions, but their impact extends well beyond the economy. The 2001 outbreak of foot and mouth disease in

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## Santa Clara County Builds an Animal Rescue Plan

The passage of the Pets Evacuation and Transportation Standards Act has emergency managers preparing new efforts to take care of companion animals in disaster. Several well-publicized, heartbreaking stories during Katrina got Congress interested enough to pass the legislation in 2005—technically an amendment to the Stafford Act—by a House vote of 349-29. It passed the Senate by unanimous consent.

Rep. Tom Lantos (D.-Calif.) said in the *Congressional Record*, “The scene from New Orleans of a 9-year-old little boy crying because he was not allowed to take his little white dog Snowball was too much to bear. Personally, I know I wouldn’t have been able to leave my little white dog Masko to a fate of almost certain death.”

Cindy Stewart, emergency planning coordinator for California’s Santa Clara County, says, “Animals are not considered property any more. We’re mandated to rescue them when we rescue people, and provide for them during a disaster.”

Santa Clara County is the residence of about 1.8 million people and includes the city of San Jose. No one’s done a pet census, but based on national averages, there would be an estimated 600,000 cats and dogs living with families. There are also the occasional birds, snakes, fish, feral animals, cat ladies, and animal breeders, probably bringing the total number of animals up considerably.

About three years ago, Stewart says, she pulled together the animal control agencies in the county, of which there were about seven. “We started looking at some of the issues around trying to shelter animals. The Red Cross started to back off their statement that they wouldn’t let animals near a people shelter. They made this chapter-specific. We agreed with our local Red Cross that we would stand up an animal shelter next to a people shelter so people could bring their animals to keep them next door. They’d be close.”

According to a Red Cross advisory, “Local and state health and safety regulations do not permit the Red Cross to allow pets in disaster shelters. Service animals which assist people with disabilities are the only animals allowed in Red Cross shelters. It may be difficult, if not

impossible, to find shelter for your animals in the midst of an evacuation, so plan ahead. Do not wait until disaster strikes!”

In order to put the animal shelter proposal into operation, Stewart says, “We needed several things. We needed a plan. Who would be in charge? What jurisdiction would take responsibility and how would we follow through? What happens if its injured, or an exotic? All we were going to do was cats and dogs. Everything else would be transported to permanent shelters.”

The county built four 15-foot trailers at a cost of about \$25,000 each. Each has shelving and boxes to make them “animal command posts.” They store the supplies necessary to put up an animal shelter. Each one can ideally house 30 to 40 animals—although they can keep up to 100 if necessary. “But we’re shooting for 30 to 40,” Stewart says.

The trailers have 800 Mhz radios to communicate with the emergency operations center. They have solar panels for power as well as battery power, as well as directional lights and flashers. “It’s a pretty cool trailer,” Stewart says. They still need to be outfitted with food and laptop computers to track the animals. “Our plan is still in draft form,” she says. “It has not been approved by our board of supervisors. One appendix of the plan has a resource guide for all of the suppliers and all of the partnerships. We got some grant funding to update that information.

“This year, it’s about training personnel to use the trailers. We’re going to exercise the trailers for the first time in March.”

Stewart stresses the necessity for practice and preparation. Last year, neighboring Santa Cruz County had some significant wildfires and asked Santa Clara animal control agencies for assistance in dealing with pets. “The first time we were called, they didn’t know any better. Our animal shelter people went over there without any paperwork. They put our animal control people in harm’s way, up in the hills with no radio, no maps, on two lane roads. We don’t want to do that anymore.”

—Dan Whipple

## Animals...

(Continued from page thirteen)

Britain paralyzed the agricultural infrastructure and cost the equivalent of \$12 billion. The response involved the “depopulation,” or killing, of over four million cows, pigs, and sheep. Most of these animals lived in affected areas but did not have the disease. The economic impact included direct costs such as lost animals, carcass disposal, and response effort itself. When beef production halted because of the outbreak, slaughterhouse workers lost their jobs. Livestock haulers and rendering facilities experienced a downturn.

The outbreak caused significant indirect costs to trade in Britain and Western Europe when travel was restricted to control the disease. Many pubs and inns in the affected areas closed down. The economic ripple effect was \$150 million per week. The outbreak also had non-monetary consequences. Farm families in stricken areas were ostracized. Some of the animals were “legacy” herds, raised by families for generations. For them, the loss of their animals meant the loss of a way of life. Over 80 suicides were reported among farmers and other animal stakeholders.

### What's the Answer?

THE SOLUTION TO DISASTERS INVOLVING FARMED ANIMALS does not involve rescuing as many as possible. Some situations may indeed call for rescue, but the solution lies in another direction. It involves rethinking our uses of animals. It involves reducing and eventually ending the industrial farming practices that make animals—and people—so vulnerable. This may seem far-fetched and outright radical. In fact, it is not as radical as it may initially seem, and reports from organizations such as the Pew Commission on Industrial Farm Animal Production (2008) and the Union of Concerned Scientists (Gurian-Sherman 2008) suggest that it is not at all far-fetched. These reports conclude that current practices not only pose harm to animals, but also to communities and public health. By recognizing and acknowledging the connections between animal welfare and human communities, the Pew and UCS recommendations can reduce the impact of disasters on animals and people.

Both reports promote more sustainable animal agriculture. The Pew report defines sustainability as a “balance between agricultural inputs and outputs and ecosystem health, given the human population and rate of consumption.” (2008:23). The Pew Commission recommends phasing out “the most intensive and inhumane production practices within a decade to reduce . . . risks to public health and improve animal well-being.” (2008:85). The practices considered inhumane include veal crates for calves, gestation and farrowing crates for pigs, and battery cages for chickens.

Eliminating these practices would mean that animals would still be confined, but they would have greater freedom of movement. This would greatly improve the odds for animals in a disaster. It would introduce the possibility of evacuation, or at least escape to “critter pads,” or elevated areas to which animals can move during flood. These have already saved cattle, chickens, and turkeys in Washington State (FEMA 2008). To encourage the phase-out of the “most intensive and inhumane” practices, the Pew Commission recommends tax incentives for regional and family operations. Phasing out inhumane farming practices while favoring family farms over corporate operations can make

animals and human communities less vulnerable.

Both the Pew Commission and the Union of Concerned Scientists make extensive recommendations that can provide a more humane environment for animals with far less toll on the environment. These changes will involve some costs. For example, improved housing for animals will require more land. Production could be less predictable than it is under the current, industrial conditions. Raising animals will involve more labor.

To conduct research that can help farmers incorporate profitable, sustainable practices, both the UCS and the Pew Commission call for reform in the funding of agricultural research. Companies involved in industrial farming currently fund much of this research. Consequently, research often recommends implementing products and practices developed by agribusiness. Decoupling research from agribusiness, and instead providing funding from the federal government, could reduce the bias that currently exists.

These recommendations mean little unless we address the issue of meat eating. At our current rates of consumption, factory farms are unavoidable. Our consumption of chicken has risen 150 percent in the last 80 years. If we continue to demand cheap meat at every meal, we will have to live with the consequences of factory farms, for animals as well as humans. But if we reduce our consumption of meat and support sustainable practices when we do consume it, we can make a difference. The current system makes all of us victims of the disaster known as factory farming.

The position of animals on the sociozoologic scale justifies our treatment of them. It also determines how we make decisions about animals' fates. Because we consider farmed animals as “tools,” we have for too long been interested mainly in what they can do for us. Our treatment of them creates vulnerability in disasters—for them, and for us. In the context of disaster planning and response, rethinking our treatment of farm animals is simply good policy.

*Leslie Irvine is an associate professor in the sociology department at the University of Colorado at Boulder. She's the author of **Filling the Ark: Animal Welfare in Disasters**, published by Temple University Press in 2009.*

### REFERENCES

Allan, Carrie. 2005. So many dead chickens, it looks like a field of cotton. Humane Society of the United States press release. [www.hsus.org/farm/news/ournews/farm\\_animals\\_after\\_katrina.html](http://www.hsus.org/farm/news/ournews/farm_animals_after_katrina.html)

Arluke, Arnold, and Clinton R. Sanders. 1996. *Regarding Animals*. Philadelphia: Temple University Press.

Federal Emergency Management Agency. 2008. *Moo-ving on up: Critter pads keep farm animals safe from floods*. [www.fema.gov/mitigationbp/bestPracticeDetail.do?mitssId=5446](http://www.fema.gov/mitigationbp/bestPracticeDetail.do?mitssId=5446)

Gurian-Sherman, Doug. 2008. *CAFOs Uncovered: The Untold Cost of Confined Animal Feeding Operations*. Cambridge, MA: Union of Concerned Scientists. [www.ucsusa.org/assets/documents/food\\_and\\_environment/CAFOs-Uncovered.pdf](http://www.ucsusa.org/assets/documents/food_and_environment/CAFOs-Uncovered.pdf)

Irvine, Leslie. 2009. *Filling the Ark: Animal Welfare in Disasters*. Philadelphia: Temple University Press.

Jones, Don, Glenn Carpenter, Karl VanDevender, and Peter Wright. 2003. CAFO requirements for large swine operations. *Fact Sheet #13B*. Livestock and Poultry Environ-

mental Stewardship Curriculum. Ames, IA: Iowa State University. [www.lpes.org/cfo/13bFS\\_Swine.pdf](http://www.lpes.org/cfo/13bFS_Swine.pdf)

Mallin, Michael A., M. H. Posey, M. R. McIver, D. C. Parsons, S. H. Ensign, and T. D. Alphin. 2002. Impacts and recovery from multiple hurricanes in a Piedmont-coastal plain river system. *BioScience* 52: 999–1010.

Mallin, Michael A., and Catherine A. Corbett. 2006. How hurricane attributes determine the extent of environmental effects: Multiple hurricanes and different coastal systems. *Estuaries and Coasts* 29: 1046–1061.

Pew Commission on Industrial Farm Animal Production. 2008. *Putting Meat on the Table: Industrial Farm Animal Production in America*. [www.ncifap.org/\\_images/PCIFAPFin.pdf](http://www.ncifap.org/_images/PCIFAPFin.pdf)

United States Department of Agriculture National Agricultural Statistics Service. 2005a. Poultry Slaughter: 2004 Annual Summary. [usda.mannlib.cornell.edu/reports/nassr/poultry/ppy-bban/pslaan05.pdf](http://usda.mannlib.cornell.edu/reports/nassr/poultry/ppy-bban/pslaan05.pdf)

United States Department of Agriculture National Agricultural Statistics Service. 2005b. *Livestock Slaughter: 2004 Annual Summary*. [usda.mannlib.cornell.edu/reports/nassr/livestock/pls-bban/lsan0305.pdf](http://usda.mannlib.cornell.edu/reports/nassr/livestock/pls-bban/lsan0305.pdf)

Wing, S., S. Freedman, and L. Band. 2002. The potential impact of flooding on confined animal feeding operations in eastern North Carolina. *Environmental Health Perspectives* 110: 387–391.

## Animals in Disasters

# Training Veterinarians in All-Hazard Response



*An invited comment  
by Dianne Dunning*

**W**E LIVE IN A TIME CHARACTERIZED BY BEWILDERING social and scientific complexity (Eyre 1999; Baker et al. 2003; Eyre 2004). Climate change, bioterrorism, agro-terrorism, natural disasters, and an ever growing emergence of drug and multidrug resistant pathogens populate the list of concerns facing the United States and the world (Baker et al. 2003; Horney, Sollecito, and Alexander 2005; King et al. 2008). Solutions to modern complexity, particularly in public health and disaster preparedness, dictate multidisciplinary collaboration and a holistic analysis of issues.

Developing new partnerships among academia and public health agencies at the federal, state and local level will foster a new integrated multidisciplinary approach to community health. Currently, public health professionals receive their education and training in diverse disciplines and settings, including schools of medicine, nursing, den-

tistry, social work, allied health professions, pharmacy, law, public administration, veterinary medicine, engineering, environmental sciences, biology, microbiology, and journalism. A broad view across disciplines of public health practice is necessary in the development of curricular and training programs to ensure optimal communication, information transfer and collaboration (Committee on Assuring the Health of the Public in the 21st Century 2003). Although various federal, state, and local agencies make important contributions through training, research, and service, these functions are central to the mission of academia. Therefore, academia is the logical place for training programs and educational curricula that embrace a wide, cross-disciplinary mandate, addressing the needs of all—humans, animals, and the environment.

### Veterinary Role in Disaster Planning

VETERINARIANS PLAY A CRITICAL ROLE in caring for animals after natural and human-caused disasters. Hurricane  
*(Please see "Vets," page sixteen)*

## Vets ...

(Continued from page fifteen)

Katrina and the 2007 wildfires in California illustrate the necessity of including animals in disaster planning to avoid compounding the emotional and economic toll on individuals and communities (Kahler and Nolen 2005). Today, in light of the increasing importance of the human-animal bond, more emphasis is being placed on anticipating the needs of animals and preparing for a potential emergency or evacuation before a disaster strikes.

As a result of the Pets Evacuation and Transportation Standards Act of 2006, all states are required to incorporate the needs of animals and their owners in their disaster planning and preparation. This bill is an amendment to the Stafford Act, which provides a cost-sharing mechanism between the federal government and state or local governments during response to and recovery from major disasters. The PETS Act provides for expenses related to services for people with household pets and service animals. The law also allows the Federal Emergency Management Agency administrator to support animal-related state and local planning processes with grants (Wingfield and Palmer 2009).

Despite the obvious threat of disasters, U.S. veterinary colleges have not comprehensively incorporated disaster management education within their curricula (Heath and Linnabary 1993). Given the demands on an already broad curricular agenda, it is not surprising that colleges emphasize the traditional core clinical and didactic training in veterinary medicine. However, the effect of not incorporating key disaster preparedness and management skills needed to work in a multidisciplinary environment into the veterinary curriculum is cumulative. It may lead to a profession that is out of touch with society's needs, particularly in the public health and service sectors (Heath 2003; 2002).

Recent natural disasters, disease outbreaks, and terrorist events highlight the need for medical and veterinary professionals certified in emergency management and disaster preparedness. In the United States, health care workers are the second largest work force behind military professionals (Markenson, Dimaggio, and Redlener 2005). In 2003, there were nearly 2.43 million registered nurses, 700,000 physicians, 350,000 dentists, and 450,000 public health workers, as well as significant numbers of students enrolled in hundreds of different allied medical professional training programs. Approximately 2,800 new veterinarians are trained each year with about 80,000 licensed veterinarians in practice (American Veterinary Medical Association 2003). It is essential for these health professionals to be prepared to respond to public health and animal emergencies.

### Veterinary Credentialed Responder Training

IN THE FALL OF 2007, NORTH CAROLINA STATE UNIVERSITY'S College of Veterinary Medicine established a Veterinary Credentialed Response training program based upon core competencies adapted from the veterinary and human literature. This new program is part of an initiative to provide the training necessary for all veterinary students—beginning with the class of 2009—to achieve entry-level federal credentials in emergency response. This first of its kind in

the nation, it's a collaborative effort among CVM, the North Carolina Department of Agriculture and Consumer Services, the University of North Carolina-Chapel Hill's Gillings School of Global Public Health and the NC State Animal Response Team.

Training within the VCR program is multidisciplinary, focusing on skills and knowledge needed to respond to disasters holistically. As a part of the core curriculum, all professional veterinary students receive training to ensure the physical, mental, societal, economic, and emotional health for all animals (including humans) as well as an awareness of the importance of the ecosystems within which they reside (Conrad et al. 2009). All of our senior veterinary students and graduates will be able to assist emergency responders in the event of a disaster. Students are required to complete six hours of classroom training (euthanasia, psychological first aid, general principles and theory of emergency management, and Hazmat awareness), nine hours of online training, and an eight-hour scenario-based disaster and community response lab. The response lab includes material and training, scenario based disaster and community response exercises, and personal protective equipment training at the CVM Teaching Animal Unit, which is a dynamic teaching lab and farm where veterinary students learn husbandry, production management, and routine procedures used in livestock production.

This is the first cooperative program in emergency management and response at a U. S. veterinary institution that is also a part of the required core academic curriculum.



### Incident Command Training

AS PART OF THE COURSE REQUIREMENT, all students are required to complete IS-100a, IS-200a and IS-700a level courses through the self-directed, self-paced, on-line training programs provided by FEMA. This training prepares students to function as first-line supervisors, single resource leaders, field supervisors, or emergency management and response personnel. ICS-300 and 400 level training is not required, but it's encouraged if the individual wants to function in a command staff position.

Psychological first aid is the provision of mental and emotional support to disaster victims. It's the mental health equivalent of medical first aid. It is primarily focused on providing support to individuals affected in a disaster (Schoenfeldt 2008). It's designed to create and sustain an environment of safety, calm, connectedness to others, empowerment and hopefulness (Center for the Study of Traumatic Stress 2005).

In the immediate aftermath of a disaster, PFA is intended to reduce the initial distress for children, adolescents, and adults. It is thought to ameliorate long-term mental



# Survival of the Cutest

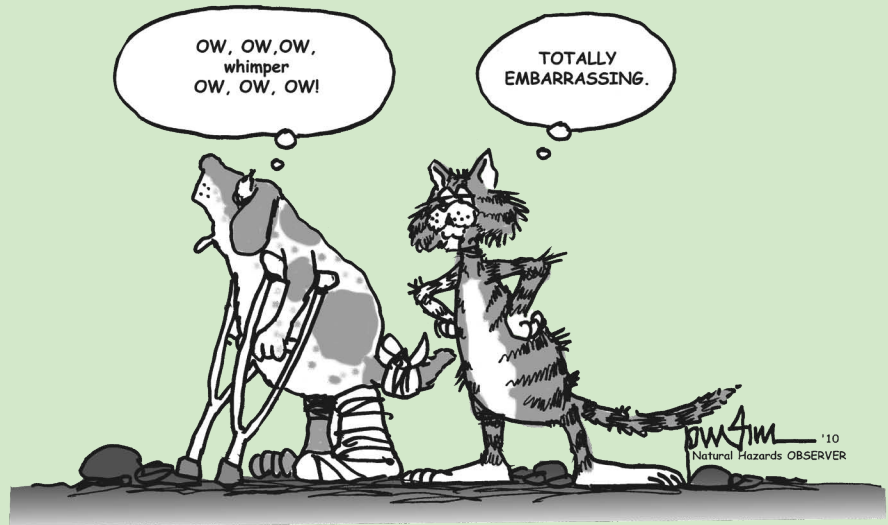
It will come as no surprise that the animal most likely to need assistance in a disaster will be a dog. According to an Associate Press-Petside.com poll conducted in October 2009, 74 percent of U.S. households have a dog, 47 percent have a cat. Only about two percent have horses.

The poll found that four percent of adults dislike dogs—two percent dislike them a little, two percent dislike them a lot. Cats inspire stronger feelings, with 26 percent of all adults saying they dislike cats either a little or a lot.

A study from *The American Naturalist* found dogs are popular because they've evolved to be. Calling it "survival of the cutest," biologists Chris Klingenberg, of the University of Manchester and Abby Drake, of the College of the Holy Cross looked at the shape of dogs' skulls, finding "the skull shapes of domestic dogs varied as much as those of the whole order Carnivora."

"This means, for instance, that a collie has a skull shape that is more different from that of a Pekingese than the skull shape of the cat is from that of a walrus," said a release.

Drake said, "We usually think of evolution as a slow and gradual process, but the incredible amount of diversity in domestic dogs has originated through selective breeding in just the last few hundred years, and particularly after the modern purebred dog breeds were established in the last 150 years."



health issues, but its skills can be applied to almost any situation. Understanding the manifestations and impacts of the human-animal bond, as they relate to an animal's function and utility—companion, agricultural commodity, or service role—has important implications for disaster management. Hurricane Katrina demonstrated that animal owners are willing to risk danger to themselves, sometimes refusing to evacuate disaster areas unless they are assured of their animals' well-being (Hall et al. 2004).

The 2007 California wildfires, outbreaks of natural pandemics of foreign animal disease, and agro-terrorist threats also indicate how large numbers of people can have their lives disrupted by events that injure or kill, destroy property, and cause emotional upheaval (Vernberg et al. 2008). The pain and anguish caused by trauma elicits a natural impulse to help and emphasizes the importance of integrating mental health into disaster preparedness and response (Haskett et al. 2008; Nusbaum, Wenzel, and Everly 2007; Peck et al. 2002).

The PFA training program includes a guided group discussion (or table top exercise) of a simulated disaster, where the emphasis is on a group problem solving processes. Once the disaster event is introduced and described, the students receive a 45-minute lecture on psychological first aid. Common stress factors affecting adults and children in disasters are discussed, along with the symptoms of compassion fatigue. In the second portion of the program, the students are asked to demonstrate active listening skills, prioritize and respond to human needs, recognize mild

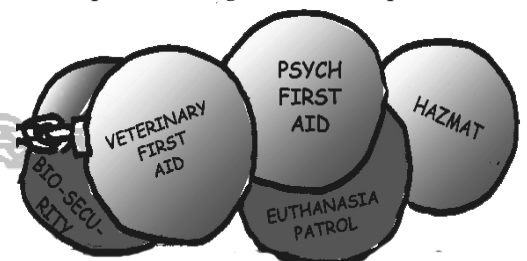
psychological and behavioral reactions, and recognize potentially incapacitating psychological and behavioral reactions. To complete the course, students participate in a role-playing exercise of a family being asked to evacuate their home due to an approaching hurricane.

## Euthanasia

TAKING AN ANIMAL'S LIFE is one of the most challenging tasks a veterinarian faces, requiring the expert use of technical and interpersonal skills (Hart, Hart, and Mader 1990). Despite this, surveys of veterinarians and veterinary students reveal they have not received adequate training on this topic (Cohen-Salter et al. 2004).

According to the 2000 AVMA Guidelines on Euthanasia (2001), a good death is characterized by minimal pain and distress for the animal. As veterinarians, it is our responsibility to ensure that if an animal's life must be terminated, the procedure should be performed with the highest degree of respect, making the death as painless and distress-free as possible.

Ideally, it is the standard of practice that humane euthanasia should re-



(Please see "Vets," page eighteen)

sult in rapid loss of consciousness followed by cardiac or respiratory arrest and the ultimate loss of brain function. Ensuring that the animal loses consciousness prior to cessation of cardiac or respiratory function minimizes distress and anxiety experienced by the animal. However, it should be noted that a humane death cannot always be achieved during foreign animal disease outbreaks or disaster situations when large numbers of animals may need to be terminated in a short period of time.

The program's unit on euthanasia includes 3.5 hours of lecture. Topics are: the definition and physiology of death; methodologies and recommended guidelines of death for variety of species (companion animal, equine, food animal and wildlife); the emotional and psychological issues surrounding euthanasia; and an informal expert panel discussion with student questions. Discussions are devoted to ritual and traditional slaughter methodologies, legal issues dealing with carcass disposal, particularly pertaining to wildlife, and depopulation (mass euthanasia) techniques.

#### Biosecurity and Personal Protective Equipment

Biosecurity is the protection of the economy, environment, and health of living things from diseases, pests, and bioterrorism. In the field, it embodies all the cumulative measures that can or should be taken to keep disease—viruses, bacteria, fungi, protozoa, parasites—from a farm and to prevent the transmission by humans, insects, rodents, wild birds, and animals from an infected farm to neighboring farms (Hegngi 2004). In practice, it involves the same principles medical professionals employ every day in the operating room or at any medical facility. A key component of biosecurity includes personal protective equipment. It encompasses all clothing and other accessories—like goggles, hard hats, gloves, respirators and so on—designed to create a barrier against workplace hazards.

The two-hour unit on biosecurity and PPE starts with a lecture and video. The students then assemble their own protective kits, specific for visiting a farm with an infectious disease outbreak. The students are then taken to our Teaching Animal Unit for a simulated investigation of an infected farm. All students are expected to don PPE, handle and collect "infected" rubber chickens and then take it off without contaminating themselves. Ultraviolet detectable powder is used to "infect" the rubber chickens to provide an authentic learning experience and to simulate a disease outbreak. Students experience firsthand the importance and function of PPE.

A hazardous material is any biological, chemical, or physical agent which has the potential to cause harm to humans, animals, or the environment, either by itself or through interaction with other factors (Office of Hazardous Materials Initiative and Training 2008). The one-hour introductory lecture on hazmat awareness provides the class with an understanding of what hazardous materials are and the risks associated with them.

#### All Hazard Approach to Emergency Preparedness

THE STUDENTS PARTICIPATE IN FACILITATED GROUP discussions involving two simulated disaster events: an avian influenza outbreak and a hurricane. Both animal and hu-

man health issues are addressed during these two sessions. Students assume one of four different roles during the exercise—individual, private practitioner, county health professional, or state or public health professional. The exercise uses an "all hazards" approach, emphasizing personal and business continuity planning. Students complete both a personal and business continuity plan prior to the exercise. Both exercises explore the various possible responsibilities of a veterinarian during a disaster at the local, state, and national level.

The VCR program is a collaborative effort among multiple disciplines to train vets to protect health not only of the animals that are usually their patients, but of people and the environment they come in contact with in the course of a disaster. The training provides veterinary students with fundamental skills to be effective leaders in crisis situations. It also provides formal communication training and a working knowledge of the mental and emotional support needed by disaster victims.

Through two facilitated group discussions involving two simulated disaster events, students are exposed to the concepts of the importance of providing community leadership as veterinarians and also as health professionals.

Situating disaster training during the formative years of professional training will allow students to carefully and thoroughly consider the civic and professional responsibilities of their personal and professional lives, prepare leaders for the state, nation and the world, and quickly build capacity in disaster and emergency management.

If the VCR program is an effective model of "One Health" disaster and emergency management training, then capacity and leadership in preparedness will increase. While this will take years to evaluate, the VCR program has been successful at securing a position within the core curriculum of the professional program at the North Carolina State veterinary school. The lessons learned may be used by professional veterinary educators as a model for disaster training in an attempt to alter the paradigm in disaster preparedness and public health training within veterinary medicine by the broad distribution and application of the program; creating a new generation of veterinarians with these critical skill sets and knowledge.

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#### References

- American Veterinary Medical Association. 2001. 2000 Report of the AVMA Panel on Euthanasia. *Journal of the American Veterinary Medical Association* 218 (5): 669-696.
- Baker J., M. Blackwell, D. Buss, P. Eyre, et al. 2003. Strategies for educational action to meet veterinary medicine's role in biodefense and public health. *Journal of Veterinary Medical Education*, 30 (2): 164-172
- Center for the Study of Traumatic Stress. 2005. Psychological first aid: How you can support well-being in disaster victims. Disaster Response Education and Training Project. Bethesda. [www.centerforthestudyoftraumaticstress.org](http://www.centerforthestudyoftraumaticstress.org).
- Cohen-Salter, C., S. Folmer-Brown, K.M. Hogrefe, and M. Brosnahan. 2004. A model euthanasia workshop: One class's experience at Tufts University. *Journal of Veterinary Medical Education* 31:72-75.
- Conrad, Patricia A., Jonna A. Mazet, Deanna Clifford,

- Cheryl Scott, et al. 2009. Evolution of a transdisciplinary "One Medicine-One Health" approach to global health education at the University of California, Davis. *Preventive Veterinary Medicine* 92 (4): 268-274.
- Committee on Assuring the Health of the Public in the 21st Century. 2003. *Assuring America's Health, in The Future of the Public's Health in the 21st Century*, pp 19-45. Washington, DC: The National Academies Press.
- Evans, B. 2002. Emergency preparedness: a veterinary and animal health community challenge ..... and obligation. *Canadian Veterinary Journal* 43 (10): 797.
- Eyre, P. 1999. The R.G. Thomson lecture. Partnerships: An academic imperative. *Canadian Veterinary Journal*. 40 (5): 321-322.
- Eyre, P., N. Ole Nielsen, James E.C. Bellamy. 2004. Serving society first: A time for change in veterinary medicine. *Journal of the American Veterinary Medical Association*, 225 (1): 40-41.
- Hall, Molly, Anthony Ng, Robert Ursano, Harry Hollo-way, et al. 2004. Psychological impact of the animal-human bond in disaster preparedness and response. *Journal of Psychiatric Practice* 10 (6): 368-374.
- Hart, L.A., B.L. Hart, and B. Mader. 1990. Humane euthanasia and companion animal death: Caring for the animal, the client, and the veterinarian. *Journal of the American Veterinary Medical Association* 197 (10): 1292-1299.
- Haskett, Mary E., Susan Smith Scott, Kennard Nears, and Marc A. Grimmett. 2008. Lessons from Katrina: Disaster mental health service in the Gulf Coast Region. *Professional Psychology: Research & Practice* 39 (1): 93-99.
- Heath, S.E., R. Linnabary. 1993. Potential roles of veterinary schools in emergency and disaster management. *Journal of the American Veterinary Medical Association* 203 (7): 953-956.
- Heath, S.E., R. Dorn, R.D. Linnabary, J. Casper, et al. 1997. Integration of veterinarians into the official response to disasters. *Journal of the American Veterinary Medical Association* 210 (3): 349-352.
- Heath, S.E., R. Dorn, R.D. Linnabary, J. Casper, et al. 1997. An overview of disaster preparedness for veterinarians. *Journal of the American Veterinary Medical Association* 210 (3): 345-348.
- Heath, S.E., J. Hooks, K. Marshall, R. Dorn, et al. 1997. Participation of veterinarians in disaster management. *Journal of the American Veterinary Medical Association* 210 (3): 325-328.
- Heath, S.E. 2003. Education in disaster management at U.S. veterinary schools and colleges. *Journal of Veterinary Medical Education* 30: 157-160.
- Hegngi, Fidelis. 2004. *Overview of Biosecurity and Avian Influenza*. Centers for Disease Control and Prevention. [www.cdc.gov/flu/pp/biosecurity\\_on\\_farm\\_11\\_2004.pdf](http://www.cdc.gov/flu/pp/biosecurity_on_farm_11_2004.pdf).
- Horney, Jennifer.A., William Sollecito, and Lorraine K. Alexander. 2005. Competency-based preparedness training for public health practitioners. *Journal of Public Health Management & Practice* 11 (6): S147-S149.
- Kahler, S.C., and R.S. Nolen. 2005. AVMA mounts preparedness, response to Katrina. *Journal of the American Veterinary Medical Association* 227 (6): 1041-1042 and 1045-1046.
- King, Lonnie J., Larry R. Anderson, Carina G. Blackmore, Michael J. Blackwell, et al. 2008. Executive summary of the AVMA One Health Initiative Task Force report. *Journal of the American Veterinary Medical Association* 233 (2): 259-261.
- Markenson D., C. DiMaggio, and I. Redlener. 2005. Preparing health professions students for terrorism, disaster, and public health emergencies: core competencies. *Academic Medicine*. 80 (6): 517-526.
- Nusbaum, Kenneth E., James G.W. Wenzel, and George S. Everly. 2007. Psychologic first aid and veterinarians in rural communities undergoing livestock depopulation. *Journal of the American Veterinary Medical Association* 231 (5): 692-694.
- Office of Hazardous Materials Initiative and Training. 2008. *Emergency Response Guidebook*. Washington, DC.
- Peck, David F., Stewart Grant, William McArthur, and David Godden. 2002. Psychological impact of foot-and-mouth disease on farmers. *Journal of Mental Health* 11 (5): 523-531.
- Schoenfeldt, Mary. 2008. Disaster Mental Health and Psychological First Aid. Proceedings. UASI Citizen Corps Conference, Portland, Oregon. [partnersinpreparedness.com/conference](http://partnersinpreparedness.com/conference).
- Vernberg, Eric M., Alan M. Sternberg, Anne K. Jacobs, Melissa J. Brymer, et al. 2008. Innovations in disaster mental health: Psychological first aid. *Professional Psychology: Research & Practice* 39 (4): 381-388.
- Wenzel, James G.W. 2007. Organizational aspects of disaster preparedness and response. *Journal of the American Veterinary Medical Association* 230 (11): 1634-1637.
- Wingfield, Wayne E., and Sally Palmer. eds. 2009. *Veterinary Disaster Response*. Hoboken: Wiley-Blackwell.

# Resources

Below are brief descriptions of some of the resources on hazards and disasters that have recently come to the attention of the Natural Hazards Center. Web links are provided for items that are available free online. Other materials can be purchased through the publisher or local and online booksellers.

All of the material listed here is available at the Natural Hazards Center Library. For more information contact librarian Wanda Headley at [wanda.headley@colorado.edu](mailto:wanda.headley@colorado.edu)

## Hurricanes

**Final Report from the NRC Committee on the Review of the Louisiana Coastal Protection and Restoration (LACPR) Program.** By the National Research Council of the National Academies. 2009. ISBN: 978-0-309-14103-1. 57 pp. \$18.90 (softcover) or free PDF download. National Academies Press. [www.nap.edu](http://www.nap.edu).

Ouch. The National Research Council doesn't think too highly of the U.S. Army Corps of Engineers' Louisiana draft preliminary coastal protection plan, which was completed in March of 2009. The LACPR technical report "does not offer a comprehensive long-term plan for structural, nonstructural, and restoration measures across coastal Louisiana, nor does it suggest any initial high-priority steps that might be implemented in the short term. Instead, a variety of different types of structural and nonstructural options are presented, with no priorities for implementation."

After Hurricane Katrina, the Corps was instructed by Congress to complete a comprehensive analysis and design of options for flood control, coastal restoration, and hurricane protection measures. The Corps produced the technical report, executive summary, and 13 "enclosures" ([lacpr.usace.army.mil/default.aspx?p=report](http://lacpr.usace.army.mil/default.aspx?p=report)). But it still isn't good enough, says the NRC review.

The problem seems to be USACE's continued reliance on engineering solutions to what are often environmental problems. For instance, in its review of the plans for coastline sustainability, the NRC says the Corps plans to use six dredges working round the clock 365 days a year to replace 8.4 square miles annually of Louisiana coastline. This amount, however, is about one-third of the amount lost annually to erosion. "Moreover," the NRC report says, "although this dredging program may be theoretically possible, the question is whether it is economically feasible or environmentally acceptable, particularly since offshore sources and lake bottoms are identified as the source of some of the dredge material (and therefore would entail long and costly transport of sediment)."

The NRC makes 11 recommendations for the next version of the LACPR. Taken together they call for a holistic approach to hurricane protection along the Louisiana coast. These include a storm surge protection standard with an "expected interval return" of 400 to 1,000 years, instead of the more usual 100 years; working with local authorities to limit development in flood-prone areas; and identifying trade-offs between commercial navigation and river diversion for coastal restoration.

In the LACPR Executive Summary, the Corps of Engineers recognizes "the first line of defense against storms is Louisiana's coastal ecological features including barrier islands, marshes, ridges, and coastal forests. The

people of coastal Louisiana are engaged in a battle against the encroaching Gulf of Mexico. A tenet of efforts to restore and sustain coastal ecosystems dictates that risk reduction measures not destroy these resources."

**Encyclopedia of Hurricanes, Typhoons, and Cyclones: New Edition.** By David Longshore. 2008. ISBN: 978-0-8160-6295-9. 468 pp. \$85 (hardcover). Facts on File. [www.factsonfile.com](http://www.factsonfile.com).

As promised by the title, this is an encyclopedic compendium of big storms from Adrian to Zoe with stops along the way covering the science, history, and social impacts of these storms.

**1 Dead in Attic: After Katrina.** By Chris Rose. 2007. 978-1-4165-5298-7. 364 pp. \$15.00 (softcover). Simon & Schuster. [www.simonsays.com](http://www.simonsays.com).

New Orleans *Times-Picayune* columnist Chris Rose offers his tribute to the spirit of the city of New Orleans during and after Katrina. This is a collection of the newspaper columns he wrote, for which he was a Pulitzer Prize finalist. They are, as he says, "A slim volume of love letters to New Orleans, howls of protest, cries for help, and general musings on the surrealistic absurdities of life in a post-Apocalyptic landscape."

**Catastrophe in the Making: The Engineering of Katrina and the Disasters of Tomorrow.** By William R. Freudenburg, Robert Gramling, Shirley Laska, and Kai T. Erickson. 2009. ISBN: 978-1-59726-682-5. 209 pp. \$26.95 (hardcover). Island Press. [www.islandpress.org/catastrophe](http://www.islandpress.org/catastrophe).

Hurricane Katrina has inspired a lot of prose, but not much of it has been as forthright and lyrical as *Catastrophe in the Making*. It's sort of an ode to error, from building in the most hazardous places, to the destruction of protective wetlands, to the building of the Mississippi River Gulf Outlet, to the over-reliance on engineering solutions to address the problems caused by the other errors.

The narrative focuses on New Orleans. While the authors are clearly enamored of this most romantic of American cities, they sometimes make it sound like a less-than-perfect place to live. For instance, they decry the loss of wetlands—the ecological euphemism for swamps—as natural protection against the catastrophic storm surges brought by Katrina. But they also write, "The wetlands, moreover, teem with life, but one aspect of that fact is that they are filled with what a local resident called 'things that will stick you, sting you, stab you, and bite you.' Water moccasins and alligators are the most legendary of the region's potentially hostile natural inhabitants, but the environment is also nearly perfect for some of nature's most ravenous insects—mosquitoes and deer flies, to name two—both of which respond with annual population

explosions into the billions ... Even so, humans have long chosen to travel through the wetlands, willing to overlook the insects in the name of other natural wonders, because the Louisiana coastal wetlands—rich with fish, shellfish, waterfowl, and fur-bearing animals—constitute one of the most productive ecosystems on the planet.”

In addition to being a plea for reforms, this book provides a concise history of the ecological, engineering, and economic development of New Orleans and the Gulf Coast.

New Orleans and Katrina ought to be an object lesson for cities elsewhere facing hazards of various kinds—which is to say just about every one. But given the notoriously short attention span of Americans, it seems unlikely that it will be. We’ll be just as horrified and outraged at the next disaster that strikes San Francisco or Sacramento or Miami.

The authors argue “the time may have come for a different approach to reform—one that takes seriously the idea of having the government run ‘like a business,’ rather than just function *for* businesses (emphasis in original) ... In short, perhaps it is time for a new generation of reforms that embrace ‘businesslike’ policies in a genuine way, and not merely as set of empty words. It may be time to stop putting so much faith in ‘reforms’ that let speculators have things both ways.”

## Climate change

**Climate and Society: Climate as Resource, Climate as Risk.** By Nico Stehr and Hans von Storch. 2009. ISBN: 978-981-4280-53-2. 141 pp. \$60.00 (hardcover). World Scientific Publishing Co. Pte. Ltd. [www.worldscibooks.com/environsci/7391.html](http://www.worldscibooks.com/environsci/7391.html).

A new book by German climate scientist Hans von Storch is likely to be greeted with trepidation by the climate science community. Though a firm supporter of the consensus scientific conclusion that anthropogenic climate change is occurring and may be serious, some of von Storch’s work has been used by climate skeptics to try to discredit that conclusion. This book walks a careful line that supports the consensus scientific view on warming, while cautioning that human constructs of climate, weather, and the resulting hazards color our interpretation of them.

“One of the messages of this book,” write von Storch and coauthor Nico Stehr, “is that the scientific subject matter ‘climate’ should not only be located within the domain of natural sciences, but also within the realm of the social sciences and humanities. This is even more valid when the public and policy makers have to be advised how to deal with suggestions and warnings prompted by scientific climate research.

“Scientific climate research, as is the case for all of the natural sciences, is generated within a particular socio-historical context,” they write.

**What We Know About Climate Change.** By Kerry Emanuel. 2007. ISBN: 978-0-262-05089-0. 85 pp. \$14.94. (hardcover). A Boston Review Book. [www.Bostonreview.net](http://www.Bostonreview.net).

Emanuel’s book is even shorter than its advertised 85 pages because it’s in a small format with wide margins. It doesn’t take much longer to read than a *New Yorker* profile. But it’s chock full of climate basics, with an especially clear description of the interaction of carbon dioxide, water

vapor, and other climate drivers.

Based at the Massachusetts Institute of Technology, Emanuel researches hurricanes. His work has been controversial in some circles because it indicates that hurricanes will get more intense on average than they have been. Like a lot of climate change news, it’s something that many people don’t want to hear.

Emanuel points out that some good may come of warming—an increase of arable land in the upper latitudes, for instance, or lower heating costs. But he also notes that increasing sea levels may inundate coastal areas. “My own work has shown that hurricanes are responding to warming sea surface temperatures faster than originally expected, especially in the North Atlantic, where the total power output by tropical cyclones has increased by around 60 percent since the 1970s. The 2005 hurricane season was the most active in the 150 years of records, corresponding to record warmth of the tropical Atlantic.”

Many predictions about future climate are based on computer models of climate. A strength of this short book—did I mention that this book is short?—is an unflinching look at the strengths and weaknesses of climate modeling.

For those trying to sort out the evidence provided by climate scientists and the assertions made by climate contrarians—whom Emanuel gently calls *les refusards*—he offers some basics on which virtually no one disagrees: temperature is going up, Arctic sea ice has declined, greenhouse gases are accumulating in the atmosphere.

Then he offers “findings that most climate scientists agree with but that are disputed by some.” These include some hazards that the globe already has trouble dealing with—an increase in sea level of six to 16 inches, more if the continental ice sheets become unstable; higher intensity, but less frequent, rainfall; increasing incidence, intensity and duration of both drought and flood; and increasing intensity of hurricanes, though potential less frequency.

**Climate Change: The Science, Impacts and Solutions.** By A. Barrie Pittock. 2009. ISBN: 978-1-84407-786-1. 350 pp. \$112 (hardcover). Earthscan. [www.earthscan.co.uk](http://www.earthscan.co.uk).

At the American Geophysical Union meeting in San Francisco in December 2009, University of Colorado scientists showed some dramatic video of soil erosion on Alaska’s north coast. Time lapse photography taken in two hour increments between July 3 and July 26, 2008 showed a couple of elephant-sized hunks of shoreline disappear into the Beaufort Sea. “Alaska’s northern coast is eroding at rates as high as 30 meters (nearly 100 feet) per year,” according to Bob Anderson of CU’s Institute of Arctic and Alpine Research. In contrast, coastlines might normally erode by only a few centimeters per year.

“This is one of the fastest erosion rates along any coastline in the world,” Anderson says. It’s the result of several factors. There has been a 4.5 percent per decade decline in sea ice, and the ice-free season has increased by two weeks per decade. Normally, the ice hugs up against the shoreline, keeping the permafrost frozen. But when the sea ice retreats, the distance between the coast and the ice—known as the “fetch”—increases both the energy of the waves crashing into the coast, and the height at which the warm sea water contacts the bluffs, melting the permafrost. With the permafrost no longer cementing the soil, it peels away in large chunks into the sea. The eroding shoreline

sometimes means entire towns along the coast must be relocated further inland.

Air temperatures across the Arctic are rising at rates of one to three degrees C per decade. In 2009, the Arctic had already experienced nearly all of its predicted 21st century warming “and yet here we are only at the first decade of the century,” Anderson says.

With this and much other evidence about the warming planet, you wouldn’t think we’d need another book about climate change. But apparently we do. Only about 55 percent of Americans think there is substantial evidence behind the science of climate change.

A. Barrie Pittock is long-time Australian climate researcher, who first became interested in climate change in 1972, when he published a paper concluding that human dependence on a stable climate might be more critical than generally believed, especially regarding rainfall, land use, and water usage patterns. His *Climate Change* is an encyclopedic, sober, and sobering look at the evidence of the changes going on around the planet.

He offers a message of hope, however. “Climate scientists who warn about potentially dangerous climate change hope that such forebodings will motivate people to act to avoid the danger,” he writes. “Hope lies not only in science, but in going beyond the science to grapple with the policy questions and moral imperatives that the scientific projections throw into stark relief.”

**Development and Climate Change.** World Development Report from the World Bank. ISBN: 978-0-8213-7987-5. 300 pp. \$26 (softcover), \$50 (hardcover). World Bank Publications. [www.worldbank.org/publications](http://www.worldbank.org/publications).

One of the “main messages” from this report, which was completed before the Copenhagen climate treaty meeting in December 2009, is that “an equitable and effective global climate deal is needed.” In the foreword, World Bank Group President Robert Zoellick writes, “We need a new momentum. It is crucial that countries reach a climate agreement in December in Copenhagen that integrates development needs with climate actions.”

The reason for this accelerated concern is that “even two degrees C warming above preindustrial temperatures—the minimum the world is likely to experience—could result in permanent reduction in GDP [gross domestic product] of four to five percent for Africa and South Asia,” the report says.

At the Copenhagen meeting, the developed countries did agree in principle to provide financial assistance to the developing world. This report makes it starkly clear how much that help will be needed. Many developing countries will see a reduction in crop yields by 2050. Some—in Africa and South America—will be as high as 50 percent.

The report says, “Developing countries are more exposed and less resilient to climate hazards.” Further, while economic development is necessary, it is not enough in itself. “But there is no reason to think that a low-carbon path must necessarily slow economic growth,” the report says. “Many environmental regulations were preceded by warnings of massive job losses and industry collapse, few of which materialized.”

**Poles Apart: Beyond All the Shouting, Who’s Right About Climate Change?** By Gareth Morgan and John

McCrystal. 2009/ ISBN: 978-1-921640-09-4. 287 pp. \$35 (softcover). Scribe Publications. [www.scribepub.com.au/book/polesapart](http://www.scribepub.com.au/book/polesapart).

Way back in 2003, my editor at United Press International dispatched me to cover climate science. The job, as he described it, was to get to the bottom of the issue, find out whether global warming was real or not.

A journalist is supposed to be detached and disinterested as he approaches an assignment, but I confess I wasn’t. I had covered environmental controversies for 25 years. I’d seen more than one overblown “the-sky-is-falling” claim from environmentalists. I was skeptical that global warming was happening or, if it was, that a somewhat warmer globe would be such a horrible outcome, all things considered.

Once a week for three years, I wrote a column about the science of climate change, based on the research papers appearing at the time, interviews with scientists, interviews with contrarians, interviews with everyone it seemed, except the participants’ pets. I floundered around quite a bit at first. Climate is a complex topic. I read hundreds of scientific papers, studied the physics, talked to experts, weighed the evidence. It was like being the ball in a slow-motion tennis match. One side of the debate would produce some new finding, so I’d talk to them about it, then call the other side to see what their response was, then call back the first person to learn the response to the response. And so on. Pretty soon, it felt like the fuzz was wearing off.

For some reason—maybe because the world’s collective investment in fossil fuels is involved—climate has become the most controversial, invective-laden scientific discussion since Darwin. The debate is personal as well as professional. Recent disclosure of email exchanges stolen from the University of East Anglia’s Climatic Research Unit displayed some of this snippiness for the public. Even in 2003 it was evident. No one who’s covered climate for any length of time was surprised by the personal nature of some of the CRU emails. I’ll wager if emails from the Competitive Enterprise Institute or the University of Alabama-Huntsville’s Earth System Science Center were made public, the heat would be on there, too. One climatologist told me, for instance, that another scientist’s work was suspect because that scientist was an evangelical Christian.

In *Poles Apart*, Morgan and McCystal take up the same challenge that UPI handed to me in 2003—who’s right about climate change?—albeit with more resources than I was given. They’ve produced a conscientious, readable work that outlines the essential findings of climate science, drawing their own conclusions. They read hundreds of papers, had scientists review their findings, studied the physics, talked to experts. (Why does this seem familiar?)

And what do you know? We both reached the same conclusion. While the science isn’t perfect, it is strongly persuasive that human beings are causing the globe to heat up, and that the consequences are likely to be unwelcome. While work remains to be done, the prudent thing to do is to take steps to both reduce emissions of greenhouse gases into the atmosphere and to plan adaptation measures to the inevitable warming that is already in the pipeline.

*Poles Apart* is an excellent summary of the current state of climate science knowledge, warts and all.

—Dan Whipple

# Contracts and Grants

Below are descriptions of some recently awarded contracts and grants related to hazards and disasters.

**Leave early or stay and defend: Post-traumatic stress disorder and the public's response to wildfire.** USDA Forest Service. Three years. \$157,045. Principal Investigator David Eisenman, UCLA, DEisenman@mednet.ucla.edu.

This study will answer the following questions:

1) What is the frequency of traumatic mental health consequences, such as PTSD and depression, among property owners who stay to defend their property during a wildfire compared to persons who leave? 2) What is the relationship between traumatic mental health consequences of a fire and individual preparedness to fight a fire, socio-demographic factors, social factors, resilience factors, and trauma-exposure, among persons who stay to defend their home during a wildfire and among persons who leave?

**Peer-mentored disaster preparedness for adults with developmental disabilities.** National Institute of Nursing Research/National Institutes of Health. Two years. \$345,723. Principal Investigator David Eisenman, UCLA, DEisenman@mednet.ucla.edu.

This project will test the feasibility of delivering a disaster preparedness program to adults with a developmental disability (ADD), such as mental retardation, epilepsy, cerebral palsy or autism, who are living independently in the community. This project fills a gap in disaster preparedness and applies peer-mentored health promotion to the disaster field. In phase one, we will work with key informants and a community advisory board to identify facilitators and barriers to disaster preparedness among ADD living independently in the community. In phase two, a health educator and peer mentors will deliver the disaster preparedness program to the ADD audience.

**A closer look at the May 18th, 1980 pumice plain deposits: Implications for assessing eruptive conditions and pyroclastic density current dynamics.** National Science Foundation grants #0948588 and #0948543. Two years. \$128,398 to principal investigator Josef Dufek, Georgia Institute of Technology, dufek@gatech.edu, and \$74,488 to principal investigator Brittany Brand, University of Washington, bbrand@u.washington.edu.

Pyroclastic density currents are ground-hugging mixtures of hot gases and pyroclastic material that propagate at high velocities down the flanks of volcanoes. While PDCs are among the most hazardous volcanic phenomena, they are difficult to study because the large amount of ash produced during an eruption hinders visual observation of the interior flow dynamics. Consequently much of the understanding of PDC dynamics comes from analysis of the deposits they produce. The May 18, 1980 eruption at Mount St. Helens has had a significant impact on the world's awareness and understanding of explosive eruptions. Earlier studies of the PDCs produced during this eruption were correlated with changes in eruptive intensity and behavior. Since then, however, deeply incised drainages have provided new, extensive exposures that contain

important information about the currents that produced them, allowing a more complete study of these deposits to take place. This project is a multidisciplinary approach to better understand PDC dynamics at one of the best-documented eruptions.

This research focuses on three questions regarding the transport of PDCs: 1) How is flow intensity and concentration related to the transport capacity of lithic clasts, and how does this lead to current segregation and density stratification with distance from source? 2) How much clast comminution occurs during PDC transport, and how does this influence subsequent dynamics? and 3) How does the self-channelization of PDCs influence transport distance? It is hypothesized that self-channelization, aided by the ease of the erosion of recently deposited unconsolidated pyroclasts, played a role in some of the largest Mount St. Helens PDCs.

The results will advance our knowledge and ability to assess the hazards related to PDCs in similarly explosive eruptions elsewhere, including relative runout distance and quantification of fine ash produced during lateral transport, which has significant relevance to aviation hazard assessment.

**Changes of rainfall seasonality and drought severity over Amazonia and their connections to global climate change.** National Science Foundation grant #0937400. Three years. \$555,231. Principal investigator Rong Fu, University of Texas at Austin, rongfu@jsg.utexas.edu.

The rain forest of the Amazon accounts for roughly 15 percent of Earth's terrestrial photosynthesis. Anthropogenic global warming could lead to reduced rainfall and a "die-back" of the world's greatest forest. Whether or not such die-back will actually occur is uncertain. Climate models show a wide range of projections for warming-induced rainfall change over the Amazon. This project will examine Amazon rainfall variability and associated dynamical mechanisms over the period of available observations, and determine the extent to which these mechanisms are correctly represented in climate models. The work has three main objectives: (1) to determine observationally whether or not rainfall seasonality and drought severity have changed significantly over the Amazon during the past few decades and, if so, what mechanisms have caused these changes; (2) to determine whether the observed rainfall changes are mainly attributable to natural climate variability or to forcing by anthropogenic emissions; and (3) to validate the physical processes that control rainfall seasonality and drought severity in climate models, in order to reduce uncertainty in projections of future climate change in the Amazon.

**Megathrust seismic hazards by reflection mapping.** National Science Foundation grant #0926614. One year. \$299,782. Principal investigator Donna Shillington, Columbia University, djs@ldeo.columbia.edu.

Most of the world's great earthquakes are shallow

*(Continued on page twenty-four)*

## Grants ...

(Continued from page twenty-three)

events that occur in association with the tectonic process of subduction. Damage and loss of life result not only from the earthquakes themselves, but from the tsunamis they commonly spawn as well. Regions in the United States that will certainly experience such events at some time in the future include Alaska and Cascadia, the coastal region extending from northern California to southern Canada. Estimating the ground motions that can be expected from these earthquakes is a matter of considerable importance. Estimates depend on the width of the subduction megathrust that produces great earthquakes—the seismicogenic zone. The nearer the landward edge of this zone is to the coast, the longer and stronger the ground motion is likely to be. Deep reflection seismic methods may provide a means of locating the downdip limit of the seismicogenic zone. This project will test this method by acquiring marine multichannel and wide angle reflection data over a large portion of the Alaska-Aleutian subduction zone. The reflection mapping results can then be compared with the earthquake rupture limit defined by existing earthquake aftershock and geodetic data.

**International travel grant for survey of structural damage from the September 2009 Samoan Islands tsunami.** National Science Foundation grant #1005740. Six months. \$24,995. Principal investigator Solomon Yim, Oregon State University, [solomon.yim@oregonstate.edu](mailto:solomon.yim@oregonstate.edu).

The September 29, 2009, earthquake-induced tsunami caused extensive damage to coastal structures on the American Samoan and the Western Samoan islands. Field data from these islands may provide invaluable evidence for calibration of the experimental and numerical models

and design guidelines being developed under the current NSF-supported NEES research (NEESR) project entitled “NEESR-SG: Development of Performance Based Tsunami Engineering, (PBTE).” A seven-member team will survey the structural damage and aerial and submarine scour effects of the affected Samoan islands. Similar to a survey conducted by members of the field team after Hurricane Katrina, this survey will collect and preserve data to: (1) compare against numerical simulations; (2) update the database for risk models; (3) develop retrofit and design recommendations; and (4) improve the understanding of the dynamics of fluid, structure, and sediment interactions, which is critical to the general design and retrofit of levees, dams, and a wide range of coastal structures.

**Tsunami reconnaissance of the 29 September 2009 American Samoa and Samoa Islands earthquake.** National Science Foundation grant #1000694. One year. \$60,570. Principal investigator Hermann Fritz, Georgia Institute of Technology, [hermann.fritz@gtsav.gatech.edu](mailto:hermann.fritz@gtsav.gatech.edu).

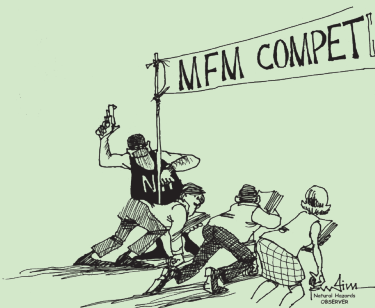
Grantees will study the immediate and transient effects of the September 29, 2009 earthquake and tsunami in American Samoa. A team of 10 experts from eight institutions traveled to the islands to measure and examine impacts of the earthquake and tsunami on built infrastructure, erosion and deposition of sediments, extent and duration of flooding and inundation, and the effectiveness of local warnings and previous outreach and education about the tsunamis and their danger. The work will benefit our understanding of tsunami impacts to engineered structures, to humans, and the natural environment.

## Mary Fran Myers Scholarship Seeks Applicants

The Mary Fran Myers Scholarship Committee is now accepting applications for its 2010 scholarship award. Recipients will receive financial support enabling them to attend the 2010 Natural Hazards Research and Applications Workshop in Broomfield, Colorado, July 10-13. Scholarships cover part or all of the cost of transportation, meals, and workshop registration.

This scholarship is awarded annually to at least one workshop participant. Recipients are recognized at the workshop and may be asked to serve as panelists on one of the many workshop concurrent sessions, highlighting their research or practical experience with hazards and disasters.

As the longtime codirector of the Natural Hazards Center, Myers recognized that many people and organizations who could benefit from and contribute to the workshop—including local practitioners, students, and international professionals—were among those least able to afford it. The scholarship was established in 2003 to support the attendance of qualified individuals.



Those who have attended the Hazards Workshop previously are not eligible. For the 2010 competition, applicants must reside in North America or the Caribbean. (They do not have to be citizens of nations in those regions.) Applicants from other regions of the world will be eligible for the scholarship in 2011. Preference will be given to those who can demonstrate financial need as well as a strong commitment to disaster management and mitigation. For more information on how to apply, visit the Mary Fran Myers Scholarship page at the Natural Hazards Center Web site: [www.colorado.edu/hazards/awards/myers-scholarship.html](http://www.colorado.edu/hazards/awards/myers-scholarship.html). Applications must be received by Monday, March 29, 2010.



# Letters

To the Editor:

Following are some reasons that may explain the article that an increasing percentage of people doubt evidence of global warming (“Show Me the Evidence,” *Observer*, January 2010).

Many thoughtful people have delved beyond the news of the duped media, Gore’s discredited movie, and the terribly flawed Intergovernmental Panel on Climate Change. They realize there has been some warming, but we should take carbon dioxide out of the discussion. Even before emails from East Anglia University showed clearly that scientists were purposely hiding evidence to the contrary, we knew that CO<sub>2</sub> was not the cause. A few facts not found in IPCC and unfortunately not even in *Natural Hazards Observer* documents:

There is no consensus on global warming. Over 6,000 and counting PhD scientists have signed documents that dispute anthropogenic warming.

Global warming has only slightly occurred in the last 100 years (a little over one degree C). The warmest decade was the 1930s when hydrocarbon use was minimal, not the 1980s or 1990s when hydrocarbon use was seven times higher. Plus, only about 11 percent of temperature monitoring stations in the United States meet National Weather Service’s own standards, and the other 89 percent virtually all tend to measure on the high side up to several degrees F.

Yes, CO<sub>2</sub> is a greenhouse gas, but it acts according to the “law of diminishing returns”, meaning the more there is, the less added effect it has. It has done most all it can do. For instance, if we doubled the present CO<sub>2</sub>, global temperatures would increase only a degree or so (with a net positive result).

In the last 11 years, CO<sub>2</sub> has increased, but global temperatures have decreased.

In all the many cycles of warming/cooling in the last 150,000 years, geological records do show that global temperatures and CO<sub>2</sub> rose and fell in tandem. But the warming/cooling occurred first, then CO<sub>2</sub> rose/fell hundreds of years later. Something else caused the warming, like sun spot activity, which does track with temperature.

The UN’s “scientific” committee—the IPCC—uses flawed input and computer programs to predict their doomsday warming and flooding. The programming requires other occurrences right now, and they are not occurring (like temperature inversions in certain parts of the world). To stay brief, incorrect assumptions were put in the complex programming, so it’s “garbage in-garbage out.”

Aside from some of the results of the known warming, the portrayals and conclusions in Al Gore’s movie have been proven false and/or deceiving! For instance, the polar bears swimming across the water occurs every spring, and in fact their population has been increasing. Glacier shortening has occurred, but it started in 1800! It has continued at the same linear rate since then, so the industrial revolution and all the coal and gas burned by man has not quickened it.

In the distant past, the Earth has had 20 times the present level of CO<sub>2</sub> and the climate was stable and did not experience a runaway warming. And it returned to the present much lower levels.

So it is patently false that the tiny warming we have seen lately is caused by human activity with CO<sub>2</sub>. If one is still concerned with warming, look elsewhere.

Please check the facts, then lift this otherwise fine publication out of an unfounded miasma of climate change panic and hysteria. Then publish articles that debunk the need for expensive and wasteful measures to limit CO<sub>2</sub>.

**Walter Barth, P.E.**  
**President, Midway Consulting**  
**Crestwood, Kentucky**

To the Editor:

The books and publications detailed in the Resources section of the *Natural Hazards Observer* have a summary or review following the identification of the Resource. I find it curious that the *Observer* does not identify who did the summary or review. Seems reasonable that a name and means of contact would be included.

Regarding the review conducted on the book on terrorism, *When Terror Comes to Main Street* by Joseph Ruffini (*Observer*, January 2010), I expected that a reviewer would fairly summarize the content and positions taken by the author by citing specific examples contained in the book. I did not expect the review to become a forum for the reviewer’s own biases and ideology.

One case in point is that the reviewer admonishes the author for ignoring “domestic terrorist groups.” To equate the Ku Klux Klan and the Aryan Nations with international, state sanctioned, martyrdom-seeking Islamic terrorist groups is absurd. The reviewer states several times that the book is “anti-Islam” but cites no examples directly from the book that supports these statements. At the end of the review the reviewer states “I know I do” (with a wink, wink) to make a political statement. Prior to this in the review stated “But we may not all want to consider ...” and elsewhere “There are others, however ...” which in context was just a thinly veiled “we think.” Well, I’m sorry but I don’t believe “I” and “We” belong in an objective review. If a reviewer wants to put forth a personal point of view, he or she should write his own book (or editorial column).

What is equally telling is that all of the other reviews seemed to be a fair summary and an objective assessment with nary an “I” or a “we” in any of them. Could it be that this book received a “special” review solely because the author is a retired Army officer?

**Dean Banz**  
**dnbanz@gmail.com**

*(The editor of the Observer writes most—though often not all—of the items in the “Resources” section. There’s no byline mostly as a matter of tradition. Editor Dan Whipple does get all the blame for the summary discussed by Mr. Banz.)*

# Mary Fran Myers Gender And Disaster Award 2010 Nominees Sought

**Deadline: April 16, 2010**

The Gender and Disaster Network and the Natural Hazards Center invite nominations of those who should be recognized for their efforts to advance gender-sensitive policy, practice, or research in disaster risk reduction. The Mary Fran Myers Award recognizes that vulnerability to disasters and mass emergencies is influenced by social, cultural, and economic structures that marginalize women and girls, also exposing boys and men to harm.

The award recognizes Myers' sustained efforts as codirector of the Natural Hazards Center to launch a worldwide network promoting women's opportunities in disaster-related professions while supporting research on gender issues, disasters, emergency management, and higher education.

The selection committee is especially interested in nominations from outside the United States. We also invite renominations in recognition of the excellence of past nominees who have not yet been recognized. The award carries no travel funds or other compensation but recipients are honored "virtually" at the annual July Natural Hazards Workshop of the University of Colorado, and featured in the annual GDN poster. Individual selected will be invited to serve on the Mary Fran Myers Gender and Disaster Award Selection Committee for one year, then encouraged to serve as Chair the second year.

There are three steps to making a nomination:

- Submit your full name and contact information (mailing address, e-mail, telephone, fax) and that of the nominee;
- Attach a current resume or *curriculum vitae* of the nominee;
- Write a letter of nomination detailing specifically how this individual's work fits the award criteria as described above;
- Optional—Submit a one one-page letter of support from another person or organization.

Please electronically submit these materials electronically by April 16, 2010 to Kristinne Sanz at [mfmawards2010@gdnonline.org](mailto:mfmawards2010@gdnonline.org). Questions? Please contact Elaine Enarson [[enarson@gmail.com](mailto:enarson@gmail.com)] or Kristinne Sanz [[kristinne.sanz@northumbria.ac.uk](mailto:kristinne.sanz@northumbria.ac.uk)].

## Conferences and Training

**March 8-10, 2010**

### **Fifth International Conference on Pedestrian and Evacuation Dynamics**

**National Institute of Standards and Technology  
Gaithersburg, Maryland**

*Cost and Registration: \$650, open until filled*

Changes in pedestrian activity, development, and human behavior mean policy makers, designers, and emergency managers must be better prepared to respond to emergency events. This conference will address the changing dynamics of pedestrianism and evacuation. Topics will include vertical egress systems, behavioral theory, and engineering guidance.

[www.bfrl.nist.gov/info/PED2010](http://www.bfrl.nist.gov/info/PED2010)

**March 29-April 2, 2010**

### **2010 National Hurricane Conference**

**National Hurricane Conference  
Orlando, Florida**

*Cost and Registration: \$350, open until filled*

This conference is a forum for national officials to

exchange ideas and recommend policies to improve emergency management. Hurricane preparedness, response, recovery, and mitigation will also be covered.

[www.hurricanemeeting.com](http://www.hurricanemeeting.com)

**April 6-7, 2010**

### **Partners in Emergency Preparedness Conference**

**Washington State University  
Tacoma, Washington**

*Cost and Registration: \$400, closed April 2, 2010*

Topics at this meeting include earthquake research, contingency planning, school safety, public health preparedness, homeland security, and public information.

[conferences.wsu.edu/emergencyprep](http://conferences.wsu.edu/emergencyprep)

**April 17-20, 2010**

### **Fourth Forum on Domestic Disaster Ministry**

**Church World Service Emergency Response Program  
New Windsor, Maryland**

*Cost and Registration: \$650, open until filled*

This forum examines ways in which religious

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Copies of the *Observer* and the Natural Hazard Center's electronic newsletter, *Disaster Research*, can be downloaded free from the Center's Web site:

[www.colorado.edu/hazards/](http://www.colorado.edu/hazards/)

communities respond to disasters in the midst of economic and social change. New research approaches and disaster preparedness case studies will be discussed.

[www.cwserforum.org](http://www.cwserforum.org)

**April 26-29, 2010**

**Second Human Dimensions of Wildland Fire Conference**

International Association of Wildland Fire

San Antonio, Texas

Cost and Registration: \$385, open until filled

The social elements of wildland fire management, such as effectively communicating with public and land and fire officials, identifying knowledge gaps, and encouraging innovation in the field will be covered at this conference. Topics include firefighter safety, homeowner fire protection and mitigation, and public response during fires.

[www.iawfonline.org/texas2010](http://www.iawfonline.org/texas2010)

**May 2-5, 2010**

**Seventh International Conference on Information Systems for Crisis Response and Management**

International Community on Information Systems for Crisis

Response and Management

Seattle, Washington

Cost and Registration: \$650 before March 21, open until filled

This conference will provide a multidisciplinary forum to define crisis management, with an emphasis on how rapidly changing socio-technical environments affect crisis response. Conference tracks will include social networking, geo-information support, humanitarian challenges, and others.

**May 3-7, 2010**

**Fifth Global Conference on Oceans, Coasts, and Islands**

United Nations Education, Scientific, and Cultural Organization

Paris, France

Cost and Registration: Not posted, open until filled

This conference addresses the ability of coastal and island communities to respond to climate change through the use of adaptation, mitigation, financing, and technology. Innovative private-sector solutions and

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improving governance will be discussed.

[www.globaloceans.org](http://www.globaloceans.org)

**May 25-29, 2010**

**BALWOIS 2010: Water Observation and Information System for Decision Support**

Balkan Institute for Water and Environment, the Macedonian Association of Meteorology, and others

Ohrid, Republic of Macedonia

Cost and Registration: \$368 before April 15, open until filled

This conference provides a solution-based examination of climate and environment in relations to floods, droughts, environmental degradation, and risk. The meeting will emphasize improving the quantity and quality of water, water engineering, and state and federal policies.

[www.balwois.com/2010](http://www.balwois.com/2010)

**May 30-June 3, 2010**

**International Disaster and Risk Conference**

Global Risk Forum

Davos, Switzerland

Cost and Registration: \$751 before March 31, open until filled

Risk management will be examined at the conference from many perspectives with an eye to creating safer, more resilient, and sustainable societies. Topics include risk reduction and disaster management, environment, resources, climate change, and more. A series of conference-related trainings, workshops, and special sessions determined by participants will be offered.

[www.davos2010.org](http://www.davos2010.org)

**June 7-11, 2010**

**Third U.S. Geological Survey Modeling Conference**

United States Geological Survey

Denver, Colorado

Cost and Registration: Free, open until filled

Participants will gain understanding of the analytical and theoretical models that support resources and protect property. Themes include climate change, natural hazards, risk, and resilience assessment programs.

[geology.usgs.gov/modeling2010](http://geology.usgs.gov/modeling2010)



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THE MISSION OF THE NATURAL HAZARDS CENTER is to advance and communicate knowledge on hazards mitigation and disaster preparedness, response, and recovery. Using an all-hazards and interdisciplinary framework, the Center fosters information sharing and integration of activities among researchers, practitioners, and policy makers from around the world; supports and conducts research; and provides educational opportunities for the next generation of hazards scholars and professionals. The Natural Hazards Center is funded through a National Science Foundation grant and supplemented by contributions from a consortium of federal agencies and nonprofit organizations dedicated to reducing vulnerability to disasters.

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*Observer* cartoons are drawn by Rob Pudim.

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