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Disaster Mitigation...Fourth in a Series

Pandemic Influenza in Asia: Potential Risk and Possible Mitigation Strategies

— an invited comment

Since the first outbreaks of avian influenza in Asia in 2003, there has been widespread concern about an avian flu pandemic. The disease has demonstrated the ability to "jump" from birds, especially domestic poultry, to humans. To date more than 200 people around the world have died from avian influenza.

This article examines the mitigation efforts under way in Asia for a potential avian influenza pandemic, which would put millions at risk.

What Is a Pandemic Influenza?

Human influenza pandemics are not new. One has occurred every 20 or 30 years for centuries. In the 20th century, there were at least three: the Spanish flu in 1918; the Asian flu in 1957; and the Hong Kong flu in 1968. Among those, the Spanish flu took the most lives, killing between 40 million and 50 million people worldwide. It isn't possible to predict the timing of the next pandemic, but it is believed to be inevitable. It is not a matter of "if" but a matter of "when."

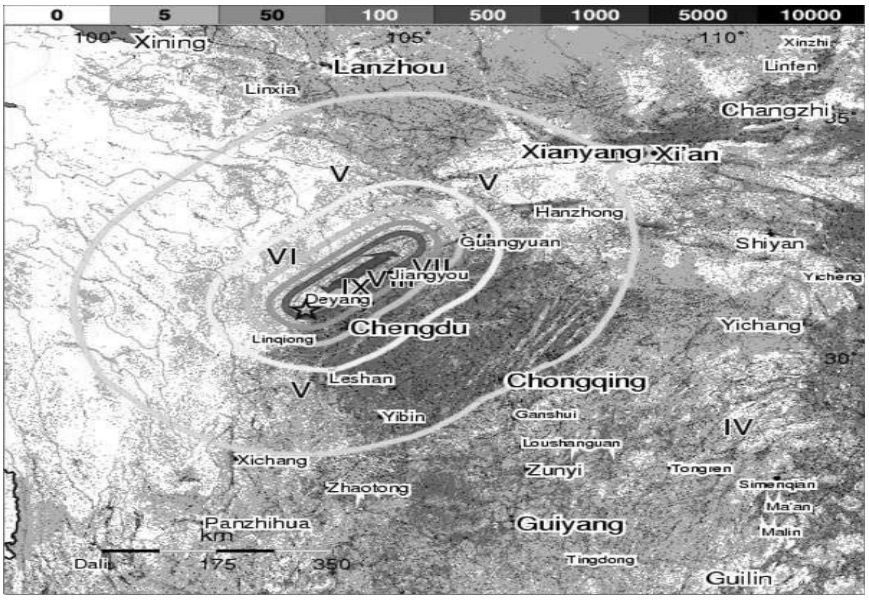
Avian influenza, which is caused by the influenza A (H5N1) virus, is causing outbreaks among poultry and wild

(Continued on page eight)

Modeling Earthquakes in Real Time

Tools for modeling major earthquakes in real time—time enough to aid relief workers—are beginning to make a difference on the ground at disaster sites. Some model results from several sources have assisted in the continuing recovery from the magnitude 7.9 Sichuan, China, quake.

"The state of the art is evolving," geophysicist David Wald said of the computer models. Wald is with the U.S. Geological Survey's PAGER (Prompt Assessment of Global Earthquakes for Response) program. "There is a spectrum of efforts. You want to know as much about the earthquake as possible and the shaking and distribution map. What is the footprint? What is the exposure in terms of population?"



Population exposure per approximately one square km in the Sichuan earthquake region from Landscan 2005 (grayscale at top of image). Darker areas show greater exposure. Concentric ovals show estimated modified Mercalli intensity. *Courtesy USGS PAGER*

The same amount of shaking can result in a different impact depending upon how many people are in the area, how stable local building construction is, and other factors, Wald said. "Ideally, you'd know what every building is in every part of the world. But that is not even realized in California. To do it on a global scale …" He didn't finish the thought.

The 7.9 earthquake that hit China's Sichuan province on May 12, 2008, destroyed 80 percent of the buildings in some of the cities and towns near the epicenter. Mario Chavez of the Autonomous University of Mexico in Mexico City has been working on a computer model of the propagation of very large earthquakes ever since the 1985 magnitude-8.1 Mexico quake that killed 10,000 people and injured another 35,000.

Chavez's group modeled an area around the Sichuan quake of 2,400 km long by 1,600 km wide by 300 km deep (1,500 by 1,000 by 190 miles). The model results were then compared with seismographic measurements from the Chinese quake, supplied in part by the efforts of Chavez's son Erik, who is a student in China and speaks the language.

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Chavez's study also indicated that the ground motions caused by the quake took place at velocities of at least 65 centimeters (2.1 feet) per second. "Our comparisons of modeling with actual results from the Chinese seismograph network are quite encouraging," Chavez said in a news conference from the American Geophysical Union's 2008 Joint Assembly in Ft. Lauderdale, Florida on Friday, May 30.

The modeling results were sent to Chinese officials to aid relief efforts. Chavez said, "Even though the findings are preliminary, they can be used. It's better to have this information than no information." The ground-motion data offer "an explanation of why we observed so much damage in the region." Displacements of at least 1.5 meters (5 feet) would have shattered rock and could readily explain, for instance, the landslide that formed a fragile dam across the Jianhe River and forced the evacuation of approximately 160,000 people.

"We learned that this is a mountainous region. It is difficult to reach. Most of the communication has been damaged," Chavez said. "It may be weeks before they will be able to reach a certain village.

"This information will give the places where you have more displacement and more velocities. The roads might have been separated, in some place by one or two meters (three to six feet). We believe this will be a first type of result that will allow the guys responsible for mitigation of the aftermath to help them decide what they have to do."

USGS's Ward said that the PAGER system also performed at a high level in the Sichuan quake. "In all of these beasts, the amount, quality, and uncertainty change with time. As more seismic data comes in, the nature of the information changes.

"Several hours after the earthquake, things stabilized. The PAGER system was extremely useful," he said. Many mainstream media were using the PAGER data. In addition, USAID officials used it to assess where aid could best be sent.

"When you put this on top of topography, depending on the sophistication of the use, if you're interested in landslides,

you could see where the landslides would be. That's all stuff we are slowly accommodating in our graphics that will be secondary products."

Another group from USGS and Penn State University is using a model to see how the Sichuan earthquake, which took place on the Beichuan fault, affected other portions of that one and other faults in the area. The area in which the Sichuan quake occurred has at least 12 faults in or near it.

"We knew the fault was there and we knew it was active," said Penn State associate professor of geosciences Eric Kirby, "…but I do not think anyone would have anticipated the size of this earthquake."

These researchers looked at nearby faults to try to determine which ones are likely to rupture based on the stresses placed on them after the Sichuan quake. "Rapid mapping of such stress changes can help to locate fault sections with relatively higher odds of producing large aftershocks," Kirby and his co-authors wrote in a July 6, 2008, paper in the journal *Nature*. They found that the area under the most serious stress was the Xianshuihe fault, which runs north and south in a mountainous, relatively unpopulated area to the west of the earlier quake.

"According to the model, after the May 12 earthquake, stress is increased on faults running parallel to the Wenchuan-Maowen fault and the two major faults that are perpendicular and to the north … Some smaller faults south of the earthquake zone show a decrease in stress. However, according to the model, the majority of the faults in the area are still stressed," the authors said in a release.

"The occurrence of triggered earthquakes after a major earthquake can be months, years, or decades," Kirby said. "The analysis does not say there is going to be an earthquake, just that the potential exists on some faults."

— Dan Whipple

Is Climate Change a Hazard?

Forty-one percent of climate scientists surveyed by the Statistical Assessment Service (STATS) at George Mason University believe that global warming "will pose a very great danger to the earth in the next 50 to 100 years." Another 44 percent said climate change was moderately dangerous.

Only 13 percent saw "relatively little danger," according to the poll.

The polling company Harris Interactive surveyed 489 "self-identified members of either the American Meteorological Society or the American Geophysical Union." Seventy percent of the respondents see climate change as very difficult to manage over the next 50 to 100 years, while only five percent were optimistic about dealing with it. Most of the rest called the problem moderately difficult.

One of the controversies among global warming skeptics has been whether a scientific consensus exists on the climate issue. This poll shows a strong one. Harris found that 97 percent of the scientists interviewed believe "global average temperatures have increased" over the past century. "Eighty-four percent say they personally believe human-induced warming is occurring, and 74 percent agree "currently available scientific evidence" substantiates its occurrence. Only five percent believe human activity "does not contribute to greenhouse warming."

On the other hand, if those scientists are reading this, they probably don't believe a word of it. Sixty-one percent of scientists said local newspapers are not reliable on the subject of climate change. Seventy-eight percent said broadcast and cable television are unreliable. The national print media fared a little better, with 67 percent saying they are at least "somewhat reliable." More from the poll can be found at www.stats.org/stories/2008/global_warming_survey_apr23_08.html.

Please see related story on page fourteen ("Adapting to Climate Change Is a 'Political Act'").

Exploring the Cell Phone's Role in Disaster

The spread of cell phone technology worldwide is undeniable. With more than 3.17 billion mobile connections, cellular infrastructure is getting stronger and cell phones more affordable. Once an expensive social accessory in the 1980s the cell phone is now the staple communication tool for the public in developed and developing nations.

Though its effectiveness is still somewhat unknown, the use of cell phones for mass alerts during emergency situations is beginning to take hold. In the case of natural disasters, a simple cell phone alert could save thousands of lives.

In Japan, for example, one of the most seismically active regions of the world, being in the wrong place at the wrong time—and without crucial information—can be deadly. Mobile phone companies there have begun providing their customers immediate notification of earthquakes and other natural disasters—as early as possible and free of charge—with the intention of giving residents enough time to evacuate if they find themselves in a dangerous location. Companies can be notified if a cell user is in distress and needs help via text message or the phone's Iternet browser.

And in April 2003, according to *The New York Times*, Hong Kong's government sent out a text message to more than six million people to quash a rumor that the city had become infected with severe acute respiratory syndrome, or SARS. The effort was hailed as a success.

In April 2008, regulators in the United States approved a plan to create a nationwide emergency alert system using text messages delivered to all cell phones, a service that could be in place by 2010. After the Virginia Tech shootings in 2007, college campuses across the country are asking students to enroll in campus-wide mobile alert systems.

Commercial manufacturers are also taking notice of the value in mobile alert systems, where many experts believe a standardized cellular alert could save countless lives. These companies ask customers to subscribe to a system that will use text messages to issue warnings to all subscribed phones in a specific area. Manufacturers have already targeted residents of tsunami-prone areas, international companies, mobile operators, insurance agencies, aid organizations, journalists, and world travelers.

After the Virginia Tech mass shootings in 2007, college campuses across the country are asking students to enroll in campus-wide mobile alert systems.

"Our system is a complement to public warning systems," said Marcel Brandt, head of marketing for the Germany-based Tsunami Institute, which has recently released its Tsunami Alarm System, a commercial alert network that sends text messages warning of an impending hazard to registered numbers. "If you use all communication channels, than you have the biggest chance to reach the most of the people. With this information people can act before a tsunami will arrive."

During the 2004 Indian Ocean tsunami, individuals who either sensed the danger or received official warning had plenty of time to move to higher ground or evacuate to safer areas. It was reported that from the moment of the quake in the Indian Ocean, the waves took more than 75 minutes to hit Thailand's coast and more than two hours to get to Sri Lanka. It takes less than a minute for one person to receive a text message from another.

"The advantage of the tsunami hazard is that there is enough pre-warning time to warn the people," Brandt said. "They just need the information to act."

Other disasters are different. Because of this fact, there has been significant academic debate over the effectiveness of a mobile alert system. The low predictability of earthquakes makes early warning difficult. Tsunamis, on the other hand, can be predicted much more easily, but false predictions are still common. Though cell phone technology may be helpful, ineffective prediction systems and false alarms can create unnecessary panic.

"In Banda Aceh last year, a false alarm about a tsunami led to mass panic and an evacuation of the city," said Arul Chib, an assistant professor at the Wee Kim Wee School of Communication and Information at Nanyang Technological University in Singapore and an expert in the use of information and communication technology in disaster. "While cell phones were involved, possibly fanning the rumors, the fallibility of the prediction system was the issue."

— Corey Reynolds

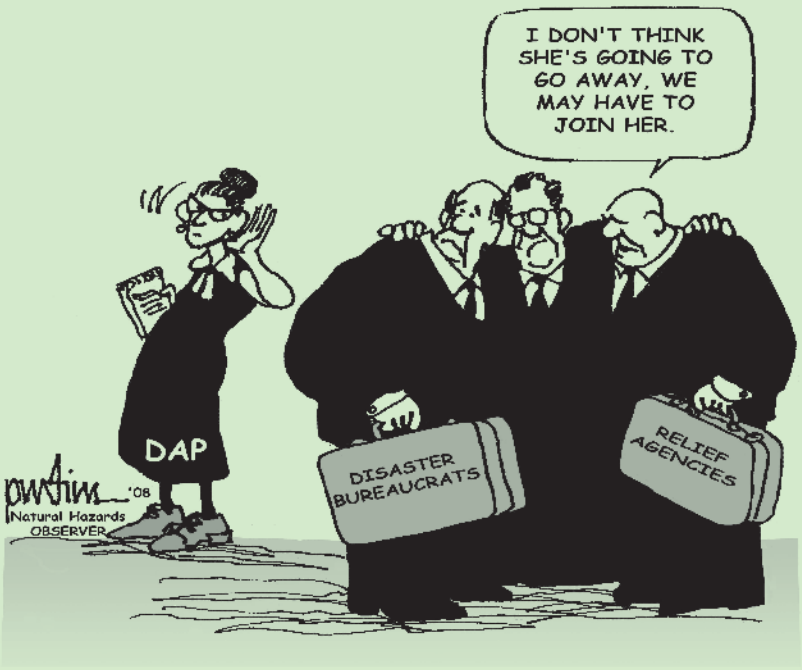
Disaster Accountability Project Uses Volunteers to Monitor Official Response

Like many Americans, Ben Smilowitz watched the destruction of Hurricane Katrina and wanted to help. He volunteered his time with the American Red Cross and managed Client Service Centers along the Gulf Coast, where he witnessed—and tirelessly tried to fix—gaps in critical disaster relief services.

"My efforts to get the Red Cross to improve conditions were unsuccessful," Smilowitz said. "I told myself that if an organization did not exist to receive information about gaps in disaster relief services from whistleblowers during disasters, and provide public oversight to the organizations that comprise the U.S. disaster prevention, response, relief, and recovery systems, I would start one."

Smilowitz stuck to his word. With the help of a team of dedicated volunteers, he launched the Disaster Accountability Project (DAP) in August 2007. The nonpartisan, nonprofit organization works to improve U.S. disaster management systems through public accountability, citizen oversight and empowerment, whistleblower management, and policy research using a team of citizen volunteers whom Smilowitz calls disaster accountability monitors.

"Our citizen volunteers provide a valuable and much-needed public role by verifying and reporting gaps in disaster prevention, response, relief, and recovery services typically provided by government agencies and nonprofit organizations," said Smilowitz, who is executive director of the organization.



To this day the U.S. government and many aid organizations receive harsh criticism for the mismanagement and lack of leadership in relief efforts after Hurricane Katrina. The storm was the costliest natural disaster ever to hit the United States.

"DAP was created to change the way disaster preparedness and emergency management are viewed, understood, and prioritized. Donating money and volunteering to help disaster survivors are the top ways Americans traditionally get involved when it comes to disaster preparedness and response," Smilowitz said. "Unfortunately, this approach has provided the organizations and agencies responsible for disaster work with a blank check to maintain status quo in their activities."

The program's approach to disaster accountability is two-fold:

1) Short-Term/Immediate Accountability: A toll-free hotline and national network of concerned citizen monitors ensures that critical gaps in disaster response and relief services are realized and addressed by those responsible for their delivery. After Katrina, gaps in disaster response and relief services caused unnecessary suffering and there was no widely available mechanism for gaps in services to be reported.

2) Long-term Accountability: DAP maintains a unique online database of more than 500 post-Katrina government and nonprofit recommendations to improve the disaster prevention, response, relief, and recovery systems. A Web site allows the public, policy makers, and disaster management professionals to locate recommendations and track implementation progress.

Funded through fellowships and donations, Smilowitz plans on launching an aggressive fundraising campaign to build a broad base of support. He hopes over the next five years his organization will prioritize public education and awareness while continuing to make a case for the importance of disaster oversight.

"We will recruit, train, engage, and encourage concerned citizens to be monitors, ask questions, review local disaster plans, participate in training exercises, and work with local groups to ensure planning is inclusive and comprehensive," Smilowitz said. "In the future, I envision a full-time staff of policy analysts, lawyers, public affairs specialists, organizers, and fundraisers. DAP monitors will be located in every congressional district and the organization will be based in Washington, DC."

More information on the Disaster Accountability Project can be found at www.disasteraccountability.com.

1601 Was a Bad Year, Thanks to Huaynaputina

The Peruvian volcano Huaynaputina erupted in 1600, ejecting a large amount of sulfur into the atmosphere. It may have disrupted agriculture around the world, possibly contributing to the worst famine in Russian history.

Huaynaputina brought cold weather around the world, according to a paper by University of California-Davis geology professor Ken Verosub and undergraduate student Jake Lippmann in *Eos*, the transactions of the American Geophysical Union. Tree ring evidence shows that 1601 was an exceptionally cold year.

Verosub's research indicates the impacts of the Huaynaputina eruption were global. Records from Switzerland, Latvia, and Estonia show cold winters for two years following the eruption. In France, the wine harvest was late. Wine production collapsed in Germany and colonial Peru. Peach trees in China bloomed late. Lake Suwa in Japan had its earliest freeze in 500 years.

The Russian famine of 1601-1603 caused the death of 100,000 people in Moscow and might have killed one-third of Tsar Boris Godunov's subjects.

Verosub notes global climate-changing eruptions may occur every 200 years or so.

Chinese Earthquake Increases Focus on Children in Disaster

On May 12, 2008, the Sichuan Province of China was rocked by an 7.9-magnitude earthquake. At least 4.8 million Chinese were forced out of their homes and left homeless, 69,196 have been confirmed dead, and 374,176 are left with injuries today. But what shook China even more was the horrific number of children's lives lost.

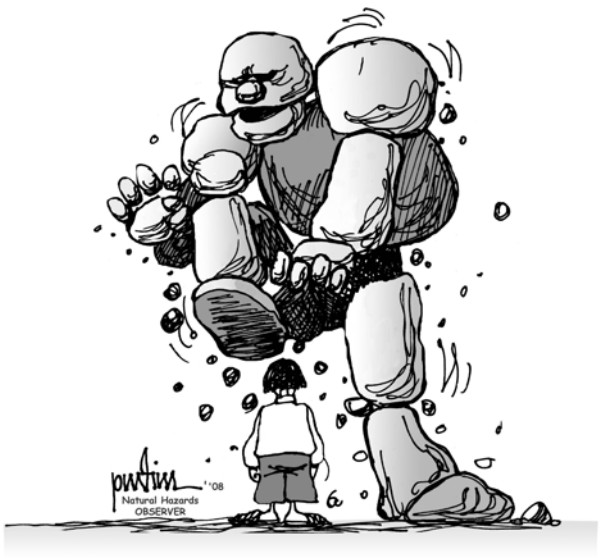
More than 7,000 school rooms were destroyed in the quake, the majority in poor districts. And because of China's "One-Child Policy," a population control tactic that was established in 1979 to alleviate the social and environmental problems caused by overpopulation, most grieving parents who lost a child lost their only child.

The enormity of the devastating numbers forced citizens of China to question if their government did everything possible to ensure each and every citizen's–especially children's–safety in what is now dubbed the "Great Sichuan Earthquake." *The New York Times* reported that the Chinese government's efforts to enforce building codes have been spotty. In 1996 the Sichuan Province mandated that local governments inspect schools because too many remained unsafe.

"If we want to protect children, we must address the structural issue of thousands and thousands of schools that are unsafe, not only in China, but in most countries of the world," said Dr. Fouad Bendimerad, chairman of the Earthquakes and Megacities Initiative. "We can't keep misleading children (and everybody else) by telling them that they will be safe from crushing-heavy concrete slab buildings by ducking underneath their desks."

After the 1933 Long Beach Earthquake, California enacted the Field Act, a revolutionary law mandating that school buildings be earthquake resilient. After the mass destruction in China, experts hope China will follow in California's footsteps.

"For those who are not convinced I give one single undeniable fact: Since the Field Act—that demands and imposes competent earthquake construction for school—not a single school has collapsed or was heavily damaged, and not a single child, teacher, or parent was injured or died in a school due to earthquakes," Bendimerad said.



The vulnerability of children in disaster is an often overlooked phenomenon. The April 2008 edition of the journal *Children, Youth and Environments*, published before the Sichuan earthquake, took a critical look at the unique challenges facing children before, during, and after disaster.

"As the frequency and intensity of disaster events

increase around the globe, children are among those most at risk for the negative effects of disaster," wrote Lori Peek in the journal's introduction. Peek is a professor of sociology at Colorado State University and is considered an expert in the emerging field of children and disaster. "Children are psychologically vulnerable and may develop post-traumatic stress disorder or related symptoms; are physically vulnerable to death, injury, illness, and abuse; and often experience disruptions or delays in their educational progress as a result of disasters," she wrote.

> "If we want to protect children, we must address the structural issue of thousands and thousands of schools that are unsafe, not only in China, but in most countries of the world."
>
> —*Fouad Bendimerad*

Since the electronic journal went live in April, it has been downloaded more than 200,000 times—this represents twice as many downloads as other editions of *Children, Youth and Environments*. Peek sees this as evidence of an increased interest in the field. She has created a list of references—organizations, agencies, educational materials, and other resources—that help children prepare for, respond to, and recover from natural and human-induced disasters. The resource list can be viewed at **www.colorado.edu/journals/cye/18_1/18_1_21_ResourceList.pdf.**

— Corey Reynolds

Zoning Out in Illinois

New Madrid Versus Wabash Valley

When a 5.2-magnitude earthquake struck the Midwest on the morning of April 18, some who felt it may have automatically thought there had been another New Madrid seismic zone tremor. That zone is famous for at least three large shocks during the winter of 1811 and spring of 1812.

But the April epicenter, near Mt. Carmel, Illinois, was actually located in the Wabash Valley seismic zone, defined by the U.S. Geological Survey as "a zone of earthquakes that are scattered across a large area of southeastern Illinois and southwestern Indiana." The Wabash zone has produced at least four earthquakes of M 5.0 or greater since 1968. Confusion about which fault zone the April 18 quake falls within showed up in different accounts of the event, along with discussion of possible connections between the two zones. An Associated Press story after the quake said, "It isn't entirely clear, for instance, whether the Wabash faults are related to the New Madrid faults or not. Some scientists say they are related, noting that the Wabash faults, which roughly parallel the river of the same name in southern Illinois and Indiana, are a northern extension of the New Madrid zone. Others say they're not."

For purposes of defining the region's earthquake hazard, the zones are considered unrelated. Engineering Geologist Bob Bauer at the Illinois State Geological Survey says decades ago researchers considered the hazard in the entire region to be related because it mimicked other geologically active areas where "arms" of activity appeared connected. "But by the 1970's, as more seismic instruments were placed in the Central United States, they showed different levels of activity in the two zones," Bauer says.

The USGS's Eugene Schweig spent more than 20 years studying Midwest earthquake hazards and agrees the two fault systems may be related or connected deep in the earth. "But there's certainly no evidence that, in terms of earthquake hazard, they're connected in any way," he says. He adds it would be "misleading" not to consider them separate. In fact, he notes, there is neither prehistoric nor historic evidence of similar activity between the two zones.

"The differences between the two zones are important for public policy-making," according to Geologic Hazards Section Head Zhenming Wang of the Kentucky Geological Survey. He says policies such as building codes are driven by expected ground shaking and frequency of strong quakes—factors that differ between the two zones.

Studies of the hazard in either zone are made difficult by the low number of "felt" events.

-- Mike Lynch
Kentucky Geological Survey

Avian Influenza...

(Continued from page one)

birds around the world. It has spread from Asia to other regions, including Europe, the Middle East, and Africa. The number of cases of human H5N1 infection also continues to rise. More than 380 human cases have been reported to the World Health Organization. Sixty percent of those were fatal. These outbreaks have raised global concern about the imminent occurrence of a pandemic influenza.

Only two subtypes of influenza A—H1N1 and H3N2—are currently circulating in the human population. These two subtypes have been causing seasonal epidemics nearly every year for many years: H1N1 since 1977 and H3N2 since 1968. Since influenza viruses are changing constantly, people can be infected many times with the same subtype. But most people should have some immunity to these prevalent subtypes because they have previously been infected with them.

Pandemic influenza is caused when a new subtype that has not been circulating in the human population—like H5N1—is introduced. No one has immunity to such a virus, so a huge human health impact can be anticipated. Billions of people could develop the illness and millions might die from it. Pandemic influenza usually emerges when an animal influenza changes into human influenza by acquiring transmissibility among humans. H5N1 has already infected many people, but most humans acquired the disease from infected poultry. There is still no efficient and sustained human-to-human transmission. But there is a risk that the virus will acquire full transmissibility among humans. (*See sidebar, page nine.*)

What can we do when a pandemic influenza occurs?

1) Rapid Containment

Epidemiological models have shown the theoretical possibility that, if addressed rapidly, a potential epidemic could be contained and the epidemic averted. According to these models, however, the window of opportunity is narrow. The necessary measures must be implemented within two to three weeks after the first human-to-human transmission. This is a big challenge for many Asian countries where most of the human cases have been reported. The national surveillance system is still not optimal for detecting and reporting all possible cases in a timely manner. Laboratory testing to confirm the infections is not widely available, often requiring confirmation by an international reference laboratory.

To be effective, containment measures should include mass prophylaxis for more than 90 percent of the population in the containment zone, together with restriction of people's movement into and out of the area. The mass prophylaxis requires a quick mobilization of antiviral drugs and human resources. The restriction of movement must consider ethical issues as well as a careful risk communication strategy.

There is no guarantee of success even if all these difficult measures are implemented properly. This strategy has never been tested. It is based solely on epidemiological models. Because most of the human cases of H5N1 have been reported in Asian countries such as Indonesia, it is critical for these Asian countries to be prepared for rapid containment operations.

2) Mitigation Strategy for Pandemic Influenza

If containment operations fail, there are still measures available to mitigate the impact of pandemic influenza. These include pharmaceutical interventions like vaccines and antivirals, as well as non-pharmaceutical efforts such as quarantine, isolation, social distancing, and personal hygiene. Pharmaceutical interventions are critically important in mitigating the impact of an influenza pandemic. Vaccines for H5N1 viruses are currently being developed. Clinical trials are under way. But worldwide vaccine production capacity is limited, and is primarily located in developed countries. Most developing countries, including those in Asia, do not have vaccine production capacity. They will likely be forced to confront the next pandemic with few vaccines available.

Antivirals are also considered effective for an influenza pandemic. They are particularly important in the early stages when there is a shortage of vaccines. Stockpiling of neuraminidase inhibitors—a class of antiviral medications targeting influenza—is under way in many developed countries as part of national influenza pandemic preparedness.

But the supply of antivirals available in developing countries is small. The most critical limiting factor for the stockpiling of neuraminidase inhibitors is their high cost. One ten-tablet treatment course of oseltamivir costs $15, even at discounted rates, which is far too expensive for developing countries.

The most critical limiting factor for stockpiling antivirals in developing countries is high cost. One ten-tablet treatment course of oseltamivir costs $15, which is far too expensive.

Non-pharmaceutical interventions can also be important to limit or slow the spread of pandemic viruses. Mathematical models indicate these non-pharmaceutical interventions can significantly reduce the impact of pandemic influenza. The currently available models, however, simulate the situations in developed countries, particularly the United States. Many of the assumptions are not relevant to developing countries.

Home-based interventions such as isolation of the symptomatic cases at home and quarantine of close contacts at home are considered to be a core intervention for the mitigation. But it isn't realistic to recommend that people stay at home for a few weeks in tropical Asian countries where most houses do not have air conditioning or even electric fans.

School closures are shown to be effective in developed country models. Most close contact among children—hence the highest contagion risk—occurs at school. But developing countries usually maintain traditional close communities where school-age children still spend most of their out-of-school time with other children from the community. School closures can be effective only when there is little opportunity for them to have close contact with other children outside the schools. It's also difficult to expect children to stay home for long periods when no video games or even television sets are available.

So even non-pharmaceutical interventions that don't require expensive drugs may be less effective in poor communities in developing countries.

Potential Impact of Pandemic Influenza in Developing Countries

When an influenza pandemic emerges, all countries worldwide will inevitably be affected. However, the

impact will probably vary both between and within countries. Developing countries with fewer resources to mitigate the impact due to lack of effective pharmaceutical and non-pharmaceutical interventions are likely to be more seriously affected than developed countries.

During past pandemics, the mortality impact was much higher in poor countries than in rich ones. The estimated excess mortality rates during the Spanish flu between 1918 and 1920 were generally less than one percent of the total population in richer countries like the U.S. (0.39 percent), England (0.34 percent), and Japan (0.94 percent). In contrast, mortality was much higher in Sri Lanka (1.84 percent), the Philippines (2.84 percent), and India (4.39 percent).

It is not entirely clear why there are such high mortality rates in developing countries attributable to pandemics. Several factors may be involved, including lack of access to adequate medical care, weak public health infrastructure, social factors such as housing conditions and population density, and host factors such as nutritional status and co-morbidity. The mortality gap could be even larger for the next pandemic, since rich countries now have more options to mitigate the impact.

Future Directions

Pandemic influenza is a serious global threat that requires a global approach. All human cases of H5N1 virus have so far occurred in less developed countries, particularly in Asia. Thus a pandemic is likely to emerge from these countries. Rapid containment is possible only if an internationally coordinated response is implemented.

Both developing and developed countries should work together to prepare an international response. Unequal distribution of resources, including vaccines and antiviral stockpiles, could be a major international issue during the next pandemic. Countries with limited or no vaccines and antiviral stockpiles and other resources might not be able to cope with an influenza pandemic. A pandemic poses a serious threat to global health security if large gaps in capacity and available resources persist. It is not possible to prepare for a pandemic by simply strengthening preparedness within one country. Pandemic is a global issue. Pandemic preparedness should be considered from a global perspective.

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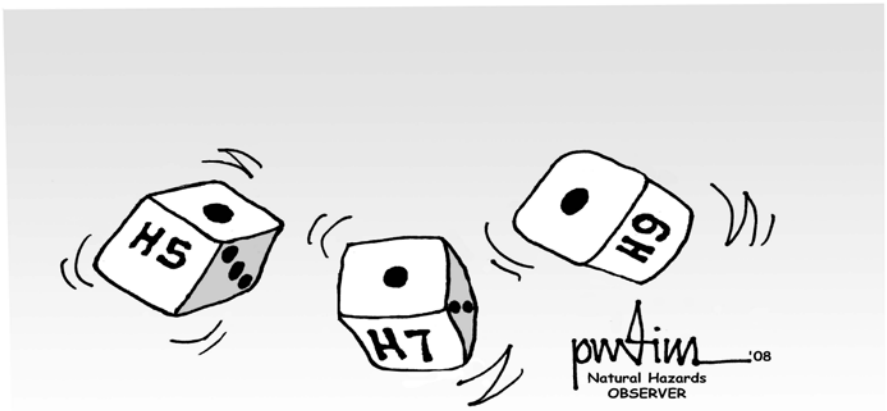
Rolling the Dice on Avian Flu



The risk of an avian influenza pandemic is "a lottery that's being played every day," said Ruben Donis, chief of molecular virology at the influenza division at the U.S. Centers for Disease Control and Prevention.

While avian influenza has not yet developed efficient human-to-human transmissibility, researchers are very concerned it will. But there are large gaps in our knowledge, Donis said.

"The first part is why do we think that H5 is a greater threat than many other influenza viruses in animals?" he asked. "We know that viruses that go from ducks to poultry have a better chance of infecting mammals." The virus in ducks is an intestinal infection, transmitted by oral-fecal contamination. When it makes its way to terrestrial birds, it becomes a respiratory tract infection. "For details which we don't understand, this increases the risk to humans," Donis said.

"We have documented evidence that H5, H7, and H9 have jumped from terrestrial birds to humans. The infections so far have either been a dead end in humans or have had very limited transmission in humans … Those are the facts so far."

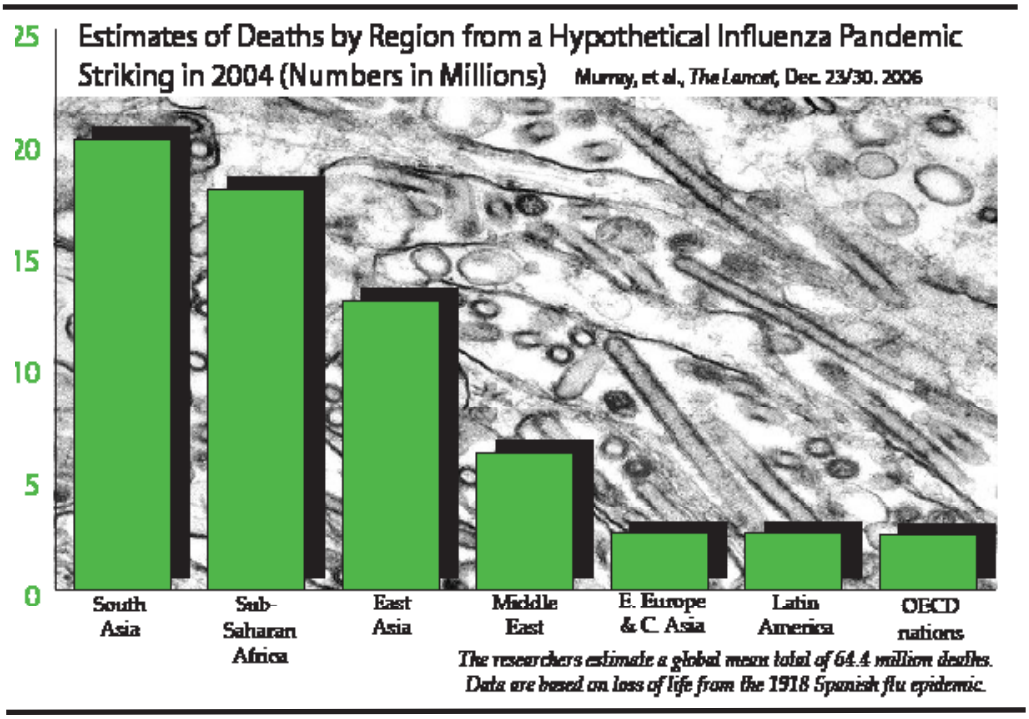
(Continued on page ten)

Rolling the Dice...

(Continued from page nine)

Trying to predict transmissibility in humans is a much trickier issue, Donis said. The work so far has been based on studies with animals models, primarily ferrets.

"Human-to-human transmissibility by droplets is not easy to replicate in a test tube," Donis said. "It requires someone sneezing, generating a droplet. It seems like a very trivial problem, but it is extremely complicated because of all the parameters involved. What actually ends up in the droplet when people sneeze? How much virus is in the mucus? Then this floats in the air, the droplet dries. What is the resistance of the droplet to drying? What is the influence of temperature and humidity?"



The results of attempts to estimate risk of human-to-human transmissibility using animal models are sobering. Early results from University of Maryland models of H9 virus transmissibility using ferrets have shown only two mutations in the H9 virus made it transmissible among the animals.

"It doesn't take a whole lot to generate a mutation at one position," Donis said. "The virus makes hundreds of millions of pathogens in one human."

— Dan Whipple

Community Solidarity and Disaster: New Research from Virginia Tech

It's well known that good community relationships are vital to successful recovery after tragedy. Research shows that a tight-knit, cohesive, and united community—such as Blacksburg, Virginia, the site of the 2007 Virginia Tech massacre—will heal faster. But does the relationship between tragic events and community cohesion depend on the type of community that suffers the tragedy? Do the social relationships people use to cope with a disaster vary by type of community?

Drs. James Hawdon and John Ryan of the Virginia Polytechnic Institute and State University attempt to answer these questions using their recently completed research that explores the mass shootings at their home university.

"Our primary research question, both there and in this research, is to discover what types of social relations sustain community cohesion and provide the most efficient means by which community members can recover from a disaster," Hawdon said.

By analyzing the influences of interactions with family and friends, with the community, and with state agencies and the media, Hawdon said he hopes to identify differences in three communities, each of which has experienced a mass shooting tragedy—Omaha, Nebraska; Jokela, Finland; and Blacksburg.

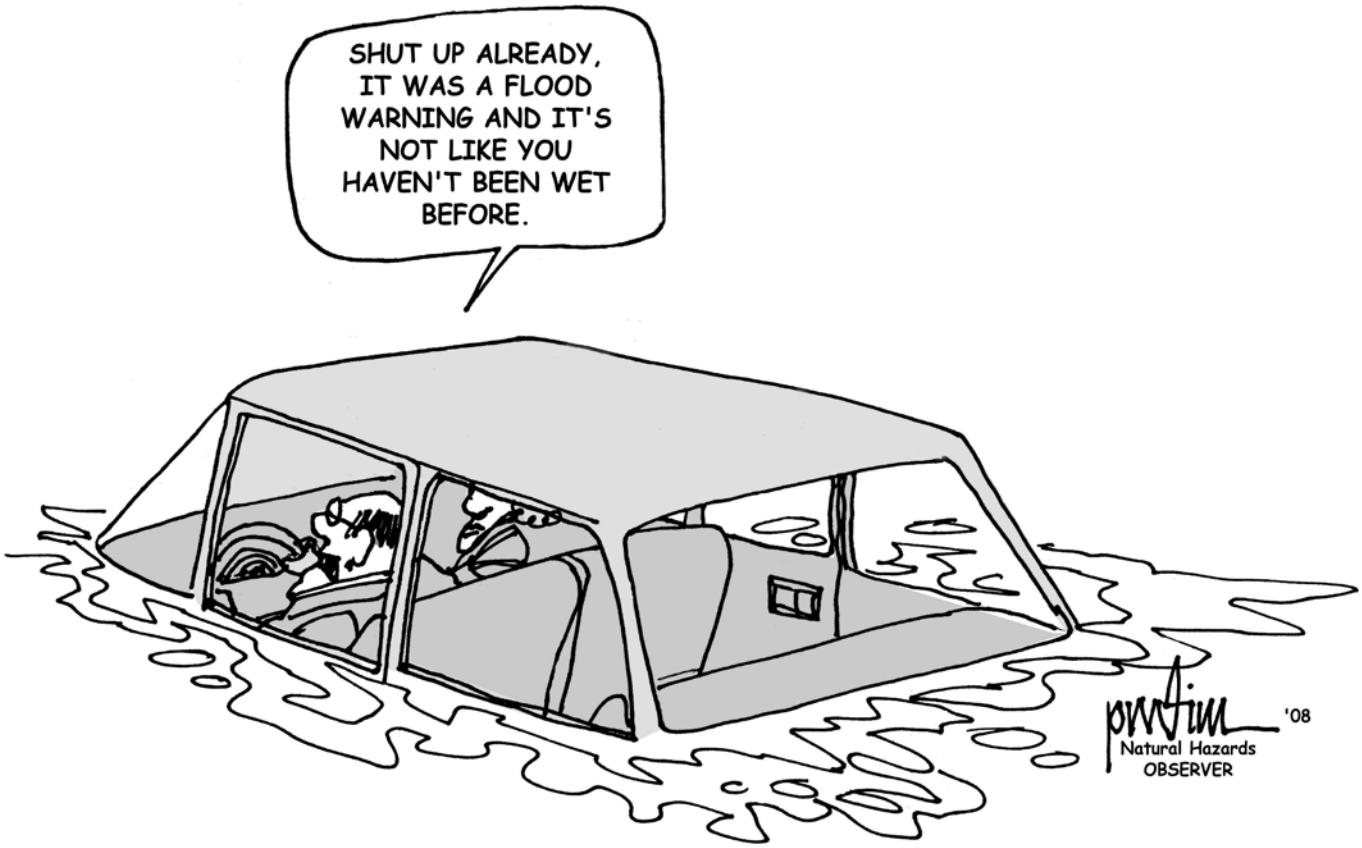
Hawdon and Ryan will measure recovery by analyzing fear of crime and self-reported measures of emotional and behavioral well-being. The team expects to find that participating in community-based activities, both in general and those specific to the tragedy, promotes and helps sustain community solidarity. In turn, that community solidarity will help individuals recover from the disaster.

"Why this is important is that a strong community, one that is united and highly solidified, can help people heal," Hawdon said. "A sense of togetherness can reaffirm that things will be OK, they will get better, and we are here to help."

The research could have applications for emergency management professionals and others who respond to disasters. According to Hawdon, on-the-ground practitioners responding to a tragedy need to be sensitive to the community's level of social solidarity. Often, he said, a reductionary approach to recovery is adopted—that is, those working in disaster recovery treat individuals using a psychological model of well-being.

"Uncritically adopting this approach and applying it to everyone in the community can strip the community of its social ability to help members," Hawdon said. "This approach may damage solidarity by individualizing the collective problems the community faces, defining grief individually instead of collectively, and impeding the grieving individuals' opportunity to use their existing—or develop new—parochial networks."

Hawdon and Ryan were awarded a $44,918 grant from the Social and Economic Sciences division of the National Science Foundation. Research activities began in May and will conclude in April 2009.



Flash Flood Research—Past, Present, and Future

— an invited comment

In 1976, 144 people were killed the night of Colorado's Big Thompson flood. Of the approximately 2,500 folks then in the canyon 35 miles northwest of Boulder, most received no official warning that a catastrophic flash flood was about to shatter their lives.

Even more frustrating, seven deaths—people who reacted by doing "the right thing"—might have been avoided. Aware of the flood's approach, they immediately went to higher ground. However, they then miscalculated the flood's actual moment of arrival, returning to lower ground to move a vehicle or collect something from a dwelling. They paid for that decision with their lives.

The year of the Big Thompson flood, Eve Gruntfest was a graduate student in geography at the University of Colorado-Boulder, where she was working as the Natural Hazards Center's first research assistant. She studied the Big Thompson disaster in hopes of deriving lessons for the many officials along Colorado's urban front range who realized that the 14 inches of rain in less than three hours could have similarly affected them. In 1976, flash floods were not recognized as a separate category of flood. Much has changed in 32 years. Many more researchers and practitioners engage in work that maps, warns of, and otherwise mitigates the effects of landslides, debris flows, and alluvial fan flooding associated with flash floods.

Early warning systems have advanced since the 1976 flood, including emergency callback systems, automated stream and rain gauge networks, Doppler radar, and satellite imagery. But flash floods often occur in catchments too small for the rainfall signal to appear on Doppler radar. In addition, the emphasis on the "detection" rather than "response" part of the warning system means many of the problems identified in 1976 remain unresolved. Are campers more aware that a severe thunderstorm can produce catastrophic flash flooding in the middle of the night? Probably not.

Even if rain can be detected on radar, it is still difficult to notify campers and other non-residents (e.g., tourists) about short-fuse flash floods. Cell phone reception is not very good in mountain canyons. Publicizing information such as flash flood recurrence intervals is also problematic—the recurrence interval for the Big Thompson flood varies in the scientific literature from 500 to 10,000 years.

Early warning systems have advanced since the 1976 flood, including emergency callback systems, automated stream and rain gauge networks, Doppler radar, and satellite imagery. Unfortunately, flash floods often occur in catchments too small for the rainfall signal to appear on Doppler radar.

More than 30 years after the Big Thompson flood and 5,100 miles away, Isabelle Ruin completed her doctorate in geography focusing on perception and behavior during the French flash floods of 2002. Now working as a post-doctoral researcher at the National Center for Atmospheric Research in Boulder, Ruin is collaborating with Gruntfest to gather additional data on behavior in response to flash floods. Part of their work includes a recently completed National Science Foundation study of Austin, Texas, and Denver, Colorado. In that study, she learned 80 percent of the respondents know that a flash flood warning is more severe

(Continued on page twelve)

Flash Flood ...

(Continued from page eleven)

than a flash flood watch. Fewer than 40 percent in each city said they would drive across flooded roads, an activity which is a major problem during flash floods.

Much more also is known about the hydrologic and geologic science of flash floods, contributing to improved understanding of flood seasonality. New work by Ruin and her colleagues at the *Laboratoire d'études des Transferts en Hydrologie et Environnement (LTHE)* and the *Laboratoire PACTE* at Joseph Fourier University in Grenoble, France examines the consequences of different response time-scale,s for the river, the public, and forecasters. An interesting finding from their research is that middle-aged workers in cars are most vulnerable to flash floods. They often believe they must get to work—that they do not have the discretion to cancel their trip even if they perceive the risk posed by a flash flood as being high.

Ruin's findings reinforce other research indicating there is no "one-size-fits-all" answer to more effective flood warnings. People need different information at different times of their lives, at different times of the day, presenting a serious challenge for weather forecasters who shoulder warning responsibilities.

The Internet could offer a new wrinkle in the world of risk communication. Cedar League, writing a Master's thesis in geography at Colorado Springs, is examining "what people were thinking" when they filmed themselves driving across flooded roads and posted the video on YouTube. To what degree were these motorists aware of the true risks they were taking? Were they aware their actions could have gotten them killed? In 2008, as in 1976, cars remain the deadliest place to be in a flash flood. Too many people attempt to drive across flooded roads and pay the ultimate price.

In 2007, 46 people died in Texas as a result of a series of localized flash floods, representing more than half of flood deaths in the entire country. Perhaps not surprisingly, over 76 percent of those deaths were vehicle related.

Debris flows caused by flooding after wildfires are another newly recognized problem. The U.S. Geological Survey now works closely with the National Weather Service in Southern California to warn residents about debris flow hazards.

In an effort to tie together the research and mitigation practice related to flash floods, a new laboratory is being established under the sponsorship of the James and Marilyn Lovell Center for Environmental Geography and Hazards Research (JMLC) in the Department of Geography at Texas State University-San Marcos. The goals and activities of the International Flash Flood Laboratory (IFFL) are being developed by JMLC's Director, Pam Showalter, and Gruntfest who will co-direct the Laboratory.

Located in central Texas, at the edge of the Hill Country and about half-way between Austin and San Antonio, San Marcos is the perfect location for the IFFL because flash flooding is a particularly serious problem in Texas and the Texas Hill Country. In 2007, 46 people died in the State of Texas as a result of a series of localized flash floods, representing more than half (52.9 percent) of flood deaths in the entire country (NCDC 2008). Perhaps not surprisingly, over 76 percent of those deaths were vehicle related (Eblen 2007, pers. comm.). Numerous agencies in Austin and San Antonio are actively involved in flash flood mitigation. But despite the barriers, daily exposure to flood-depth gauges, and even a law prohibiting people from driving around barriers, people continue to try to drive across flooded roads.

One Less Victim

Darrell Johnson was counted among the dead in the 1976 Big Thompson Flood. But it turns out he's been alive and well in Oklahoma for the last 32 years, according to the Associated Press.

Johnson, now a funeral director in Oklahoma City, told the Fort Collins *Coloradoan* that he didn't know he'd been counted among the victims until a Ft. Collins resident called him last year.

Johnson and his family left their cabin the morning of the flood after staying there only one night, AP said. A few hours later, the resort was washed away. It's unclear why he's been counted among the dead all this time.

The IFFL will work closely with local, regional, and city authorities such as Austin, San Marcos, San Antonio, the Lower Colorado River Authority, local television and radio stations, private sector forecasters, media representatives, hydrologists, meteorologists, social scientists, emergency managers, and road departments to address the "end-to-end-to-end" process of flash flood mitigation. Research questions identified nine years ago at a NATO Advanced Studies Institute meeting titled, "Coping with Flash Floods" will be addressed. The IFFL's goal is to cross national, political, agency, and disciplinary boundaries to reduce the losses caused by flash floods. Toward that end, we encourage *Observer* readers, researchers and practitioners to contact us.

If the IFFL achieves its goals, when the next 14-inch rainfall that falls on the headwaters of the Big Thompson Canyon, or in the Texas Hill Country, or in the Gard region of France, or elsewhere in the world will take fewer people by surprise. Fewer will place themselves at risk, more people will know to climb to safety, and fewer lives will be lost.

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Mary Fran Myers Award
Call for Nominations

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 the areas of disaster risk reduction. Established in 2002, 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, and may also expose boys and men to harm. The award was named to recognize Myers' sustained efforts as Co-Director of the Natural Hazards Center to launch a worldwide network promoting women's opportunities in disaster-related professions and supporting research on gender issues, disasters, emergency management, and higher education.

The intent of this award is to recognize women and men whose advocacy, research, or management efforts have had a lasting, positive impact on reducing disaster vulnerability. All those whose work has added to the body of knowledge on gender and disasters, is significant for gender-theory or practice, or has furthered opportunities for women to succeed in the field are eligible.

The award committee is especially interested in soliciting nominations from outside the United States and strives to enable award recipients with high travel costs to attend the Natural Hazards Center workshop in Colorado.

There are three steps to nominate someone and all materials should be submitted electronically:

- 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, and
- Optional: A one-page letter of support from another person or organization may also be submitted.

The deadline for nominations is April 1, 2009.

Please direct any questions and submit nomination materials to mfmawards2008@gdnonline.org or call, +44 (0)191 227 3108 or fax, +44 (0)191 227 4715.

(Please see page twenty-seven for a profile of this year's winner)

Adapting to Climate Change is a 'Political Act'

Roger Pielke

Not everyone in the scientific community has acknowledged our climate may be changing, let alone that humans are causing some of that change—but Roger Pielke Jr. isn't one of these climate change naysayers. Regardless, the political scientist—a professor at the University of Colorado and director of the Center for Science and Technology Policy Research—has been assailed by the media, by environmentalists, and by his peers for his views that many see as disadvantageous to the "green movement" and counter to ideas now seen as much-needed solutions to our climate problem.

Though he believes humans are contributing to a changing climate, Pielke disputes that global warming means more natural disasters and he openly questions whether reducing greenhouse gas emissions is the best way to address the problem.

At the 33rd Annual Natural Hazards Research and Applications Workshop year in Broomfield, Colorado, Pielke discussed his views of climate change, explained that we're not seeing bigger hurricanes because of global warming, and gave recommendations on how the climate and hazards communities can work together more effectively. It was his discussion of climate change adaptation and mitigation that really got workshop attendees talking.

Mitigation measures, like the reduction of greenhouse gas emissions, will be costly and won't have any beneficial impacts on the climate system in the near-term, Pielke explained. Adaptive measures, like smart development that reduces vulnerabilities to potential effects of climate change, can have an immediate impact—and most should be taken anyway, regardless of any change in climate.

"Adaptation is necessary regardless of what society does about energy policy and emissions," Pielke said.

This is not to say mitigation isn't important, Pielke added, especially since mitigation measures could have profound effects on areas outside of climate, such as public health. Adaptive measures should focus on those that promote resiliency, rather than specifically on addressing climate change. Adaptation and mitigation are complements, he said, and an effective climate policy needs elements of both.

"Unfortunately, the current nature of the climate debate has them [adaptation and mitigation] as competing policies," Pielke said.

It is this competition between mitigation and adaptation that often puts the climate change and hazards communities at odds.

It is this competition between mitigation and adaptation that often puts the climate change and hazards communities at odds.

"Thus, hazards professionals can find their work disparaged in the climate debate, which is strange given the broad importance of their work around the world," Pielke said in an e-mail after he delivered the workshop's keynote address, "The Hazards Ahead."

Joel Smith, vice president of Stratus Consulting and lead author of the key vulnerabilities chapter in the Intergovernmental Panel on Climate Change (IPCC) *Fourth Assessment Report*, discussed the panel's findings during a workshop plenary session featuring three other IPCC chapter authors. Smith agrees there is value to adaptation, and he, like Pielke, said most adaptive measures should be taken anyway, even without factoring in any climate change—what he calls "no regrets" adaptation. But mitigation is still crucial to address future impacts.

"The more climate change you have, the harder it is to adapt," Smith said. What it comes down to, Smith said, is more mitigation means less adaptation; less mitigation means more adaptation.

But for Pielke, it all goes back to the unnecessary, highly politicized debate.

"The definition of adaptation is itself a political act."

—Corey Reynolds

Catastrophe Got Your Tongue?

Researchers Must Get the Word Out

Researchers need to speak up.

Changing climates—environmental, political, and social—have converged in a way that makes it more important than ever for disaster researchers to add their educated voices to the din of popular opinion, according to many of the speakers at the 33rd Annual Natural Hazards Research and Applications Workshop, held July 12-15 in Broomfield, Colorado.

Participants at sessions ranging from discussions of the 2007 Southern California wildfires to media and public perceptions of disaster were told to go forth and voice their knowledge—to the public, legislators, journalists, and each other.

The alternative is leaving lay people to make their best guess about how to interpret and deal with disaster.

"We've got to come to some sort of grips with reality and the people making these policies," said one participant attending a panel on dealing with the dead during pandemics. "There's a huge disconnect between what we know and what we do."

Some think the divide between the left and right hands of those who deal with disaster might narrow with some stronger efforts at communication. This is true especially in the public and government arenas, where factors such as climate change, an impending presidential transition, and

the quickening pace and style of communication can lead to a cacophony of miscommunication.

For those who can communicate effectively, though, it's an opportunity to make academic discoveries more relevant and the information more accurate.

"It's important that media be on the ground and have access to accurate information," said James O'Byrne, a New Orleans *Times-Picayune* reporter who served on a panel that included FEMA spokesman Ed Conley, National Public Radio's Susan Feeney and Amanda Ripley of *Time Magazine*.

All too often, journalists find out facts are wrong after their stories have hurriedly been posted online or broadcast. Researchers can stanch misinformation flow by developing relationships with journalists and other communicators pre-disaster, the panel said.

When it comes to making decisions about disaster policy, lawmakers could be using the same information collected by reporters to form their opinions. Lack of specialization means legislators are looking for direction and the squeakiest research wheel is likely to provide it.

"There's no better time to raise key issues as when you're at a point of political transition," Margaret Davidson, an Intergovernmental Panel on Climate Change author, pointed out in a plenary discussion of the recent IPCC report's implications.

Even with the most well-informed leaders and communicators, though, those who study disaster still need to reach out to people on a community level. This might mean talking to faith-based organizations, speaking at city council meetings or chatting with local businesses. Whatever the effort, many feel it's worth it to make sure people at the community level can control their fates in a disaster.

"We're too dependent on the government," said Gavin Smith of the University of North Carolina Center for the Study of Natural Hazards and Disasters in a plenary session on recovering from catastrophic events. "We need to work on teaching grass roots recovery."

Ironically, even as the hazards and disasters community is being urged to be more communicative, there's evidence that, thanks to technology, the members of the general public is getting better at communicating disaster risk among themselves.

Gavin Smith

"Communication related to disasters is a social process and technology can enhance that process," said Bill Anderson of the National Research Council.

Anderson moderated a research to policy to practice session on peer-to-peer communication and social media in disaster situations. Session presenters found evidence that peer-to-peer communication enabled students at Virginia Tech to formulate a more complete and timely picture of danger than other information sources. Other research showed communities using GIS technology to understand the impact and pace of recovery after Katrina.

The get-the-word-out mentality isn't surprising, considering the point of the Workshop is to bring academics and practitioners together to discuss needed resources, challenges, best practices, and other like-minded topics. It is a reminder, though, of the vast community touched not only by the threat of disaster, but by the good work disaster researchers do every day—and that's something to shout about.

—Jolie Breeden

'There Are Two Kinds of Levees...'

There are only two kinds of levees, Gerald Galloway told the more than 400 people gathered at the 33rd Annual Natural Hazards Research and Applications Workshop in July, those that have been overtopped and those that will be.

Gerald Galloway

As numerous Midwest states were inundated by flood waters, Galloway explained the history of levees in the United States and attributed much of the United States' levee problems to the fact that no one knows who's responsible for them. Federally controlled and maintained levees sit right next to state levees, local levees, and private levees.

"We have a system of nothing. We have all sorts of independent levees. Many levees are poorly sited and will fail again in the future," said Galloway, a professor of engineering at the University of Maryland and levee expert.

For Galloway, this is all beginning to sound like a broken record. It's been 15 years since the Great Midwestern Flood of 1993 and the publication of *Sharing the Challenge: Floodplain Management into the 21st Century*, known more familiarly as the Galloway Report.

The Galloway Report recommends "a better way to manage floodplains [that] begins by establishing that all levels of government, all businesses and all citizens have a stake in properly managing the floodplain. All of those who support risky behavior, either directly or indirectly, must share in floodplain management and the costs of reducing that risk."

He echoed this sentiment – some 15 years later and again with much of the Midwest underwater—during his keynote speech at the Natural Hazards Center's workshop.

"How many times do you have to say something before everybody listens?" Galloway asked. "We haven't figured that out yet."

(Continued on page twenty-three)

Contracts and Grants

Below are descriptions of recently awarded contracts and grants related to hazards and disasters.
An inventory of awards from 1995 to the present is available at www.colorado.edu/hazards/resources/grants/

Seeking a Better Understanding of Canopy-Snowpack Interactions in Relation to the Avalanche Hazard: U.S.-Switzerland Planning Visit. Funding Organization: National Science Foundation, $15,588. One year. Principal Investigator: Delphis Levia, University of Delaware, dlevia@udel.edu.

The award is for travel to Switzerland for the principal investigator and two graduate students. They will be meeting with Swiss colleagues to investigate interactions between forest canopy and snow cover in avalanches. The planning visit will identify forest sites, characterize tree stands and scout potential sites for microclimatological instrumentation. The planning work will result in a proposal to NSF for research on snow-canopy interactions.

Collaborative Research: Geo-engineering Extreme Events Reconnaissance (GEER) Association: Turning Disaster Into Knowledge. Funding Organization: National Science Foundation (three grants). Principal Investigator: Ellen Rathje, University of Texas at Austin. One year: $7,134. e.rathje@mail.utexas.edu. Principal Investigator: Jonathan Bray, University of California at Berkeley. One year: $47,862. bray@ce.berkeley.edu. Principal Investigator: J. David Frost, Georgia Institute of Technology. One year. $10.874. dfrost@ce.gatech.edu.

Currently, the Geo-Engineering Earthquake Reconnaissance Association performs post-earthquake reconnaissance. Having succeeded in developing innovative techniques for post-earthquake reconnaissance, the association is broadening its scope to include other natural and human-made disasters. This broadening of its mission is reflected in its new name: Geo-engineering Extreme Events Reconnaissance (GEER). While post-earthquake reconnaissance continues to be a central mission, GEER members have already participated effectively in reconnaissance efforts that document geotechnical effects of other extreme events (e.g., World Trade Center Towers collapse and Hurricanes Katrina and Rita).

Much of the data and information generated by extreme events is perishable and therefore must be collected within a few days or weeks of the event. There continues to be a real need for assembling strategic geo-engineering survey teams with NSF support. Many of the innovative techniques employed in recent reconnaissance efforts, such as use of digital cameras, GPS devices, PDAs, remote sensing, and digital mapping, were developed by GEER members.

This award provides funds for continuation of GEER management and reconnaissance activities under the new expanded scope of providing quick response investigations of major geo-engineering-related disasters. In the event of a major disaster, a small quick response team would be dispatched to determine the magnitude of the needed response so that a request for additional funds could be quickly submitted.

14th World Conference on Earthquake Engineering (14WCEE); Beijing, China; October 12-17, 2008. Funding Organization: National Science Foundation. $59,819. One year. Principal Investigator: George Lee, SUNY at Buffalo, 716/645-5000. gclee@mceermail.buffalo.edu.

This grant will support the travel of 40 U.S. scientists and engineers to participate in 14th World Conference in Earthquake Engineering to be held in Beijing, China October 12-17, 2008. This forum, held every four years, provides an opportunity for the exchange of scientific information and ideas about earthquake engineering. The U.S. researchers will present technical papers to disseminate research results, to interact with international researchers who are working in the area of earthquake engineering, and to participate in the post-conference technical event. With the recent occurrence of a devastating earthquake in Chengdu area, there are likely to be several presentations in this conference about the effect of this earthquake.

CAREER: Developing Dynamic Relational Models to Anticipate Tornado Formation. Funding Organization: National Science Foundation. $421,053. Four years. Principal Investigator: Amy McGovern, University of Oklahoma. 405/325-4757. amcgovern@ou.edu.

The goal of this research is to develop advanced techniques for statistical pattern discovery in spatially and temporally varying relational data in order to anticipate the formation of tornadoes. These models are applied to complete fields of meteorological quantities obtained through data assimilation and simulation. Doppler radar data is limited and, while modern data assimilation techniques allow the unobserved quantities to be estimated, the resulting four-dimensional fields are too complicated for the extraction of meaningful, repeatable patterns by either humans or current data mining techniques.

By studying a full field of variables, the models can identify critical interactions among high level features. The models are developed and verified in close collaboration with domain experts. The interdisciplinary research is used to improve retention and recruitment in computer science. This draws on recent evidence that underrepresented groups are not drawn to computing careers because they do not appreciate how computing can be used to solve real world problems.

The broader impact of this research is to society, through the potential for reduction in loss of human life, property, and money. All data and results will be disseminated through peer reviewed publications and via open source online repositories accessible on the project Web site (http://www.cs.ou.edu/~amy/career/)

Shifting Baselines: Antarctica—Embodying the Antarctic Experience and Envisioning Climate Change Through Multi-media Installations, Artist's Books, Web Projects and Education. Funding Organization: National Science Foundation. $1. One year. Principal Investigator: Judit Hersko, California State University San Marcos Foundation. 760/750-4700. jhersko@csusm.edu.

This is a multifaceted project conceived by artist Judit Hersko to bring the Antarctic experience to viewers both, nationally and internationally in gallery, museum, and classroom settings. The project will include multimedia instal-

lations, artist books, and a web project. The proposed work builds on a previous collaboration between the artist and a biological oceanographer conducting Antarctic research. "Shifting Baselines Antarctica" will follow the research of the biological oceanographer and other scientists at McMurdo station and at the same time investigate the perceptual and physiological effects of Antarctica on human beings. Specific themes identified by the artist include climate change, the Antarctic landscape and human perception, and nature and culture in Antarctica.

The project will also examine the cultural landscape that humans create in order to turn unfamiliar space into a place of memory and home. The artist considers this project as part of a larger initiative aimed at increasing scientific literacy through art.

CAREER: Technology R&D Policy, Climate Change, and Uncertainty. Funding Organization: National Science Foundation. $241,972. Principal Investigator: Erin Baker, University of Massachusetts Amherst. 413/545-0698. edbaker@ecs.umass.edu.

This CAREER project addresses issues related to decision making under uncertainty for climate change. The objective is to apply science to science policy, to improve the analysis and evaluation of alternate portfolios of technology research and development programs in response to climate change.

Research objectives are: (1) Investigate the optimal technology R&D portfolio in the face of uncertain climate change, using data derived from prior expert elicitations, and using a multiple model approach; and (2) Provide a vehicle for communication to policy makers and the public, through the design and testing of a decision support system (DSS) aimed at the evaluation of technology R&D portfolios in response to climate change.

Specific teaching objectives are: (1) Provide a forum for informal education, putting the DSS on the web next to a carbon footprint calculator, introducing the public to key concepts in climate change, energy technologies, and uncertainty; (2) Prepare case studies appropriate for operations research students at both graduate and undergraduate level; (3) Provide decision support, including training and information on decision making under uncertainty, to policy makers and stakeholders.

Modeling Nuclear Disaster Risk: The Effects of Perceived Risk and Radiation Exposure on Post-Chernobyl Psychosocial and Behavior Outcomes in Ukranian Residents. Funding Organization: National Science Foundation. $640,000. Principal Investigator: RoseMarie Perez Foster, University of Colorado at Boulder. 303/735-5436. Rosemarie.Foster@Colorado.edu

The project will develop models of human nuclear disaster risk to scientifically inform psychosocial and health behavior consequences of radiological and other toxic disasters.

The researchers will study a representative sample population explosed to the Chernobyl nuclear accident in Ukraine, the largest nuclear disaster caused by an industrial plant malfunction.

Previous reserach on nuclear catastrophes such as Hiroshima, Three Mile Island, and Chernobyl have clearly pointed out that the psychological and behavioral consequences of these events reverberate in the long term. Anxiety-ridden survivors lie in expectation of dreaded illnesses. Employment is inhibited. Social and outdoor activities are curtailed. Families restrict births for fear of congenital malformation.

For some survivors, these behavioral consequences are further exaggerated by serious mental health disturbance and radiogenic cancers. It remains unclear how much of this long-lasting behavioral alteration in the wake of radiation disasters are explained by the radiation dose itself, and how much by the community's perception of the risks it's been exposed to.

The study will conduct a probability sampling for current residents the Kiev and Zhitomir oblasts (states) of Ukraine. The research team, consisting of a radiation physicist, hazards sociologist, and medical consultant will: (1) reconstruct levels of radiation dose from exposure to Chernobyl radionuclide fallout for each study participant; (2) measure long-term psychosocial and health behavior consequences of the nuclear disaster in the population; and (3) endeavor to understand the complex relationships among radiation dose exposure, perceived radiation exposure, and risk projection for illness.

The study will have a direct impact on the prevention of adverse psychosocial consequences associated with communities exposed to nuclear accidents.

Pandemic Disease Transmission in Canadian Hutterite Communities. Funding Organizations: Rx&D Health Research Foundation, Canadian Institutes of Health, and the Canadian Food Inspection Agency. US$1.6 million. Principal Investigator: Mark Loeb, McMaster University. 905/525-9140 ext. 26066. loebm@mcmaster.ca.

Loeb and a research team of ten others will work in western Canadian Hutterite communities to examine the transmission of flu viruses from person to person and from pigs to humans. "Hutterite communities are uniquely well-suited to this sort of research," Loeb says, "because they are active swine farmers and because they live in isolation from mainstream society. We hope to use this research grant to learn important lessons about how disease spreads and how to prevent it." This award is the first of a series of annual thematic grants to be made by the HRF on important public health issues.

NEH Offers $1 Million in Disaster Recovery Assistance to Educational and Cultural Institutions Affected by Flooding in the Midwest

In late June, the U.S. National Endowment for the Humanities announced that it will provide up to $1 million in disaster recovery assistance to educational and cultural institutions that have been adversely affected by the recent floods in the Midwest. The emergency funding will provide aid to museums, libraries, colleges, universities, and other cultural and historical institutions in their efforts to recover and preserve manuscripts, historical records, art and artifacts, recordings, rare books, photographs, and other materials of cultural or historical significance damaged by the floods in federally designated disaster areas.

Affected institutions can apply immediately for emergency grants of up to $20,000 to salvage, protect, and treat historical collections damaged by the flooding. Application details are available on the NEH web site, www.neh.gov/Flood_Assistance.html.

Under a similar program, NEH has awarded $2 million in the Gulf Coast states in the wake of Hurricane Katrina.

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. Direct Web links are provided for items that are available free online. Other materials can be purchased through the publisher and/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

Book Review

Apocalypse: Earthquakes, Archaeology and the Wrath of God by Amos Nur with Dawn Burgess. Princeton University Press. 2008. 309 pages. $26.95.

Amos Nur, armed with earthquake science and a new perspective, has set out to rock the world of the old-school archaeologists and historians who insist only man can bring about the end of a civilization.

In *Apocalypse: Earthquakes, Archaeology and the Wrath of God*, Nur and co-author Dawn Burgess shake up age-old theories of invaders bringing the demise of civilizations such as Mycenae, Troy, and numerous other ancient societies by posing another possible enemy—earthquakes.

While many ruins exhibit signs of earthquake damage, archaeologists are often wary of postulating the all-too-easy "act of God" scenario, according to Nur. Adding to the disciplinary bent of making the simple complicated is disregard for geological evidence of natural disasters while excavating —a problem that makes it difficult to definitively point to anything other than human action in a society's decline.

Still, Nur, a geophysicist who applies earth science to archaeological sites in a discipline known as archaeoseismology, believes evidence such as fault scarps, regional geologic history, ground displacement, and pulverized human remains are enough to at least entertain the possibility of earthquakes as the culprit in the downfall of some well-known civilizations. From that jumping-off point, Nur goes on to examine how our view of history changes when natural disasters become part of the picture.

Apocalypse begins with a quick-and-easy course in earthquake science and background on how written records, including biblical and poetic accounts, are used by both archaeologists and earth scientists. The book then looks at evidence pointing to earthquakes and other natural occurrences at archeological sites and winds up with a discussion of how earthquakes past and present can change societal and political landscapes. In the end, Nur states, archaeoseismology can help archaeologists find better methods of verifying written earthquake accounts, as well as giving earthquake researchers a better historical record of quakes that could effect modern-day fault movement.

Apocalypse is an interesting, easily-accessible read that frames some long-standing presumptions in an intriguing new light, while melding the historical, sociological, and scientific implications of challenging those paradigms.

Although controversial, the application of earthquake science to ancient ruins is a compelling lens through which to view not only history, but contemporary attitudes toward earthquake danger and its impact on society. While the field is still new, *Apocalypse* hints at the rumblings of change that could result from that vision.

— *Jolie Breeden*

All Hazards

Using Highways for No-Notice Evacuations. U.S. Department of Transportation Federal Highway Administration. December, 2007. 108 pp. www.trb.org/news/blurb_detail.asp?id=8618

Evacuations that must carried out without any advance notice—like a toxic chemical spill, a tornado or other rapidly developing hazard—pose difficult problems for planners. For instance, says the DOT publication, "Sufficient information is likely to be unavailable to decision makers before a determination has to be made on whether to order an evacuation. Instead incomplete, imperfect, and at times contradictory information about the incident is arriving, if at all, at the same time decisions need to be made."

Using Highways offers advice on the planning process emergency planners must be aware of to be prepared for no-notice events. The book contains a 16-page checklist for reviewing effective evacuation planning.

It emphasizes the use of new tools of traffic simulation modeling to identify potential bottlenecks or traffic choke points. In the July, 2008, *Natural Hazards Observer*, Louisiana State University engineering professor Brian Wolshon wrote, "One of the goals of these new models is testing the adequacy of current plans over any set of conditions. They include scenarios with greater levels of urgency resulting from less warning time; the potential for segment losses within the road network because of traffic incident lane blockages, road flooding, and other forms of malevolent activity; and greater or lesser rates of evacuee participation."

The issues are complicated by uncertainties about where a no-notice hazard might occur. A hurricane's track, for instance, can be predicted in advance with some reliability, but the location of a chemical spill is not so easy to predict. *Using Highways* said, "Advanced planning for evacuations can identify locations and areas where a coordinated evacuation effort is most likely to be needed."

Capitalizing on Catastrophe: Neoliberal Strategies in Disaster Reconstruction. Edited by Nandini Gunewardena and Mark Schuller. AltaMira Press. 2008. 273 pp. $32.95 (paper). www.altamirapress.com

The essays and case studies in this book trace the character of "disaster capitalism," which is "National and transnational governmental institutions' instrumental use of catastro-

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Storm of Katrina Research Finds 'Issues Are Interconnected'

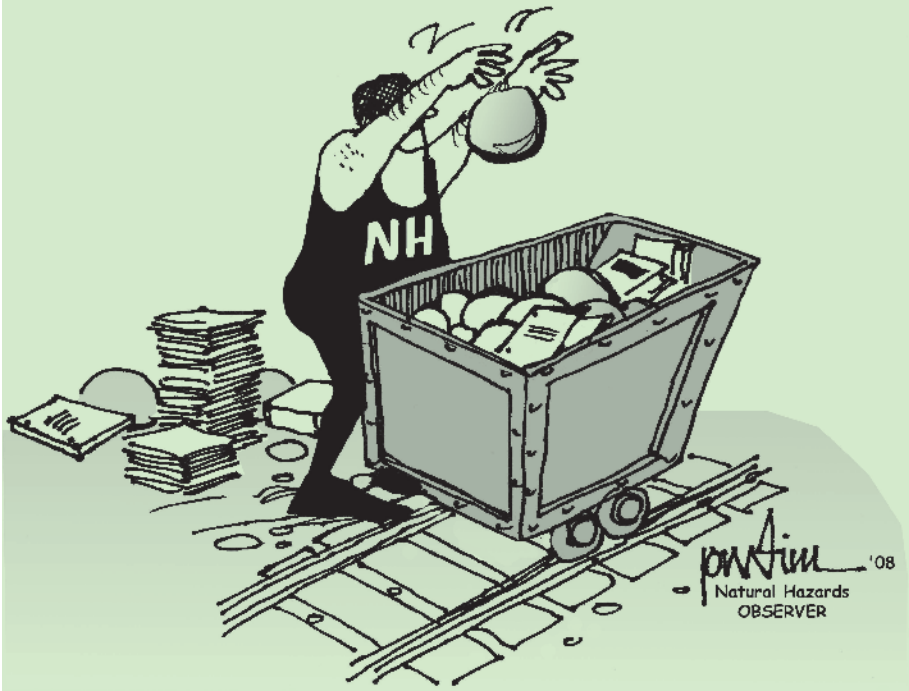
It's been three years since Hurricane Katrina hit the U.S. Gulf Coast. Several reports have appeared recently bringing a sharper focus to what's been learned about the direction of recovery—and what is still be discovered.

One thing the emerging reports make clear is, "Post-Katrina issues are interconnected, and what we can learn from the disaster is how to break down the silos and take an interdisciplinary approach to research," according to the National Academies' Institute of Medicine's workshop summary *Environmental Public Health Impacts of Disasters: Hurricane Katrina*. (Lynn Goldman and Christine Coussens, *rapporteurs*. National Academies Press. Washington, D.C. 2007. 88 pp. ISBN 978-0-309-10500-2. $18.90 (paper) or free .pdf download at www.nap.edu.)

The book focuses on the environmental threats to human health in Katrina's wake. It reports, for instance, on several short- and long-term environmental health problems, including immediate threats such as providing potable water, reducing the threat of insect-borne diseases, and treatment of sewage.

"Environmental health issues are very complex," the book said, "relating to each other in very intricate, weblike ways. Water is interrelated with food, electricity is interrelated with safety and so on."

The report finds, for instance, a surge in carbon monoxide poisoning attributed to the use of generators to produce electricity in the two weeks or so following Katrina. Curiously, however, the majority of West Nile virus cases occurred several weeks before the hurricane. There was rapid spraying after the disaster to minimize and control the mosquito population. Nonetheless, "It was enough to raise concerns that in the aftermath of the hurricane further cases of West Nile could occur," according to the summary.



The New Orleans Health Department monitored facilities to check for outbreaks resulting from *E. coli* exposure. They found that after an initial increase in diarrhea cases, they declined significantly over the subsequent month, as measured as a percentage of patients going to treatment facilities.

The summary said, "In the long term, there is a need for reconstituting the communities in the region – knitting back together communities to provide social support."

A separate report on health impacts from Katrina was issued by the Multidisciplinary Center for Earthquake Engineering Research (MCEER) (*Hurricane Katrina: Health and Environmental Issues*. James N. Jensen, and Pavani Ram, Vol. 3 of the MCEER Special Report Series, Engineering and Organizational Issues Before, During and After Hurricane Katrina. May, 2007. 31 pp. 716-645-3391. mceer@buffalo.edu. http://mceer.buffalo.edu.)

An MCEER public health and reconnaissance team visited the region hit by Katrina for a week in October of 2005. They visited 18 public health facilities and private homes to assess the health and environmental impact of the hurricane. They collected data from about two days prior to Katrina's landfall. There were a total of 7,508 "health events" reported, with injuries accounting for about 27 percent of the reasons for visits to the facilities assessed. Falls were the biggest problem, both among residents and relief workers. Infectious diseases accounted for 37 percent of the illnesses recorded. Skin or wound infections were diagnosed in 40 percent and acute respiratory infections in 32 percent of the infectious disease cases. Four hundred eighty-seven bodies were released to families as of Dec. 1, 2005. The coroner estimated that 466, or 96 percent, were storm-related deaths.

The researchers found that hurricanes Katrina and Rita did not result in large epidemics of infectious disease, though there were clusters of diarrheal disease and bacterial infections. They urged that future planning take into account the provision of adequate water, sanitation and material for hand and body hygiene.

On the environmental side, they found the hurricanes disrupted drinking water service to five million people, but drinking water treatment was usually restored as soon as electricity became available. Electricity failures also affected the functioning of wastewater collection systems.

The "knitting together" called for in the National Academies report may be taking longer than initially expected, according to *The Role of Community Rebuilding Plans in the Hurricane Recovery*, a GulfGov report from the Public Affairs

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Katrina...

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Research Council of Louisiana and the Nelson A. Rockefeller Institute of Government (www.rockinst.org/WorkArea/showcontent.aspx?id=14958).

While the pace of recovery is picking up, the report said, "Local officials who once talked optimistically of rapid rebuilding now talk in terms of 10-year time frames for recovery. Housing, insurance, and flood elevation requirements top the list of ongoing obstacles to recovery, followed by labor shortages, construction costs, and infrastructure repair needs."

The study also offers some steps officials can take to expedite recovery the next time disaster strikes. They include:

1. A clearly-defined disaster response plan in place well before a disaster strikes;
2. Long-term recovery planning almost as soon as the immediate danger from the disaster has passed;
3. Specific people within recovery offices designated as local liaison to help local officials navigate all the paperwork and other bureaucratic requirements necessary to gain access to recovery money; and
4. Federal recovery funding rules revisions to create a new category to deliver federal funding money more quickly in the wake of large-scale disasters.

A second MCEER report released recently looks at how buildings fared during Katrina. The catastrophic level of damage to buildings "was caused by a combination of hurricane-driven winds, storm surge and flooding," the report concluded. However, it said that the majority of multistory commercial buildings constructed of steel or reinforced concrete framing performed well during Katrina.

"However," the authors say, "extensive losses were incurred from nonstructural damage to cladding, windows and roof-mounted equipment." In many of these cases, wind, water- and wind-borne debris infiltrated the interior of the building causing additional water damage to property.

In contrast to cast-in-place concrete buildings, however, precast concrete structures did not fare so well along the Mississippi Gulf Coast. "Many precast/prestressed concrete decks of parking structures fell from their support," the authors said. More attention should be paid to reducing buoyancy of these structures in hurricane-prone areas, they said, perhaps by drilling air vents and fitting them with grilles. (*Hurricane Katrina: Buildings*. Gilberto Mosqueda, and Keith A Porter, Vol. 4 of the MCEER Special Report Series Engineering and Organizational Issues Before, During and After Hurricane Katrina. August, 2007. 31 pp. mceer@buffalo.edu. http://mceer.buffalo.edu.)

The federal Centers for Disease Control and Prevention found that temporary shelters – trailers – that housed evacuees from hurricanes Katrina and Rita had formaldehyde levels in excess of 100 parts per billion—"higher that typical U.S. indoor levels" and levels "at which health effects have been described in sensitive persons."

"Because formaldehyde levels tend to be higher in newly constructed trailers and during warmer weather, levels measured in this study are likely to underrepresent long-term exposures," the CDC report said. "Many of these trailers are approximately two years old, and the study was conducted during the winter." The trailers were supplied to evacuees by the Federal Emergency Management Agency. (www.cdc.gov/nceh/ehhe/trailerstudy/pdfs/SummaryofStudyFindings.pdf)

Jim Shea, the chairman of trailer builder Gulf Stream Coach, told the U.S. House Committee on Oversight and Government Reform on July 9, 2008, that his company didn't disclose either to Katrina evacuees or to the government that the company's own research indicated formaldehyde levels in some trailers were 45 times as high as federal health standards allow.

According to the *Washington Post*'s Spencer Hsu (www.washingtonpost.com/wp_dyn/content/article/2008/07/08AR2008070802315.html), Shea told the committee that the company thought the results were "irrelevant information" because FEMA already knew about the problem. He said that in retrospect the company should have shared the data.

One thing that made the Hurricane Katrina disaster so poignant was its firm association with New Orleans, a city whose spirit resonates deeply with many people. The authors of *Hurricane Katrina and the Redefinition of Landscape* examined how landscape interacts with culture, economy and environment to "set the stage for human tragedy." They concluded that in developed modern societies, the gap between the social and cultural *vis a vis* physical landscape has become so large that people are often blind to the hazards of their environment. "We are proposing," they wrote, "that future societies must close the gaps among place attachment, the social and cultural landscapes, and the physical landscapes and return to an ideological model that uses place-based knowledge."

In other words, we must develop an ethic built on a sense of our physical spaces. (Desmond Shondell Miller, and Jason David Rivera. Lexington Books. 2008. 171 pp. ISBN:978-0-7391-2146-7. $70. www.lexingtonbooks.com)

Resources...

(Continued from page eighteen)

phe … to promote and empower a range of private, neoliberal capitalist interests," according to editor Mark Schuller, an adjunct instructor at Vassar College.

Neoliberalism, in turn, is the combination of free market capitalism and reliance on "rugged individualism" in current humanitarian efforts, according to the authors. By relying on private interests to provide humanitarian aid, the authors say, communities are left powerless. These funds often come with strings attached, they write, reducing transparency and undermining the "overall governing capacity of nation-states, an element in creating 'fragile' or 'failed' states."

The book offers an overview and case studies of some of the highest profile disasters of recent years, including the chemical contamination in Bhopal, India; the destruction of

the World Trade Center towers on September 11, 2001; Haiti; and Hurricane Katrina.

Capitalizing on Catastrophe wants to put post-disaster recovery into the hands of communities so that efforts serve the needs of those communities rather than the governments and contractors who carry it out. In thefForward, Harvard professor Alexander de Waal writes, "Power inequities are typically accentuated in all stages of disaster, from prevention and insurance, through protection and evacuation at the height of crisis, to relief and rehabilitation. Disasters with proximate causes that are natural events … strike disproportionately in locations with poor infrastructure and where people are poor and marginal."

Governing After Crisis: The Politics of Investigation, Accountability and Learning. Edited by Arlen Boin, Allan McConnell, and Paul Hart. Cambridge University Press. 2008. 322 pp. $90 (hardcover), $32.99 (paper). www.cambridge.org

A crisis can make or break a politician and his government. New York Mayor Rudy Giuliani became a presidential contender as a result of his leadership after 9/11. U.S. President George Bush came out less well as a result of his administration's handling of Hurricane Katrina and its aftermath. The editors here have assembled case studies of crisis politics from around the world, attempting to explain how the qualities of leadership of the principals in each case led to their fate.

The authors do not paint a hopeful picture of better government through crisis management. "The political language of leaders tends to emphasize through inquiry the need to learn lessons and the necessity of renewal," they write. "In practice, however, these same leaders lean heavily toward the status quo. After 9/11, President George W. Bush promised that every possible lesson would be learned, yet in practice he attempted to thwart the establishing of the inquiry and then the investigation itself."

Operational Risk Management: A Case Study Approach to Effective Planning and Response. by Mark D. Abkowitz. John Wiley & Sons, Inc. 2008. 277 pp. ISBN:978-0-470-25698-5. $50 (hardcover) www.wiley.com

In his first chapter, Abkowitz, an engineering professor at Vanderbilt University, asked, "Why do disasters happen?" He gives "ten basic risk factors": design and construction flaws; deferred maintenance; economic pressures; schedule constraints; inadequate training; failure to follow procedures; lack of planning and preparedness; communication failure; arrogance; and "stifling political agendas."

From this list, Abkowitz is clearly talking mostly about human-caused and technological hazards. The book goes through numerous case studies. Five are anthropogenic technical disasters. Five more are terrorist acts. And the final five are natural disasters. He also offers two "success stories."

"Risks can be managed. It is just a matter of doing it the right way," Abkowitz says. "When you take a step back and take a holistic view, you see that there are a number of simple things that we can do that would substantially increase our safety and sense of well being." He argues for a "more organized approach to managing the risks that affect our daily lives coupled with greater tolerance for unfortunate events that sometimes will occur no matter how hard we try."

Trauma Psychology: Issues in Violence, Disaster, Health and Illness, Volume 1, Violence and Disaster. Edited by Elizabeth Carll, Praeger Publishers. 2007. 334 pp. ISBN 978-0-275-98531. $225. www.praeger.com

In her introduction, Elizabeth Carll wrote, "The need for a recognized body or specialty area of trauma research and knowledge within the discipline of psychology had been growing significantly." Trauma psychology encompasses a wide spectrum, she said, ranging from personal violence to accidents, illness, and warfare. The first chapter in the book deals with the psychological aftermath of the Sept. 11, 2001 attack on the World Trade Center. Authors Mary Tramontin and James Halpern said that the initial "worst-case fears" of widespread psychopathology were unfounded. They also said that early intervention to address the emotional needs of victims increased the effectiveness of treatment. The media has a "central role," the authors said. "A significant relationship was discovered between media exposure to the event and postdisaster stress, especially among children. Sensitive reporting of traumatic events is needed, and adults should monitor their own exposure to graphic images and details while paying careful attention to their children's exposure."

The authors also said that mental health professionals should be better incorporated into preparedness and planning.

Another essay in the book examined the psychological aftermath of large and small fires, dealing with the impacts on both the victims of fire and the fire professionals who respond to them.

The Elements of Disaster Psychology: Managing Psychosocial Trauma. By James L. Greenstone. Charles C. Thomas Publisher, Ltd. 2008. 270 pp. ISBN 978-0-398-07784-6. $62.95 (hardcover), $42.95 (paper). www.ccthomas.com

Greenstone, who has 40 years of experience in disaster response and police work, has provided the "book of lists" for disaster psychology. His shortest list is the "three-legged stool" of effective disaster response: "care of self; care of disaster victims; care of other intervenors." His longest, 68 items, is about understanding crisis intervention. In between he lists the ingredients of a 72-hour pack for extended deployment (58 items), the proper use of triage (33 items), and many, many others.

Emergency Management in Higher Education: Current Practices and Conversations. Edited by Jessica A. Hubbard. Public Entity Risk Institute. 2008. 342 pp. ISBN 978-0-9793722-1-6. $40. riskinstitute.org

In a book titled "Emergency Management in Higher Education," one might expect a compilation of emergency management plans in place at various colleges and universities. In fact, this book is a very effective compendium of research presented at the 10th Annual Emergency Management Higher Education Conference. The papers are all gripping reports on emergency management issues from Katrina to the "war on terror." The University of Pennsylvania's Ian Lustick gave away his point of view with the title of his paper, "The War on terror: When the Response is the Catastrophe." Lustick made a closely argued case that "we continue to let our fears and anxieties drive our policies by cultivating titillating images of immensely powerful Muslim terrorists invisibly poised to end the American way of life. This hysterical posture serves our enemies' purposes and distracts our experts from the real but ultimately minor threat terrorism poses."

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Resources...

(Continued from page twenty-one)

University of Pennsylvania's Robert Meyer offers a paper, "Lessons from the earthquake Lab: An Experimental Analysis of Learning from Experience about Natural hazards," which offered the discouraging conclusion (which many of us have long suspected) that people don't often learn from their mistakes.

Climate Change

Integrating Climate Change Actions into Local Development. Edited by Livia Bizikova, John Robinson and Stewart Cohen. A special issue of *Climate Policy*. Earthscan. 2007. www.earthscan.co.uk. www.climatepolicy.org.

The growing awareness of climate change requires adaptation, mitigation and sustainable development at the local and regional level. This special issue of the journal *Climate Policy* looks at approaches integrating these with the governments, regulatory agencies, and other players in developing sustainable economies in the face of global warming.

Climate and Society in Colonial Mexico: A Study in Vulnerability. By Georgina H. Endfield. Blackwell Publishing. 2008. 235 pp. ISBN 978-1-4051-4583-1. $39.95, www.blackwell-publishing.com

June 28, 1692 was a very wet day in the city of Celaya in south-central Mexico. "Unusually heavy rains began falling late in the afternoon and continued all through the evening," writes Georgina Endfield, "causing a rapid increase in the level of the River Laja which ran adjacent to the town. Finally, just after 10 o'clock that night, the river burst its banks."

Except for the date the scenario is a familiar one. Three thousand families lost their homes. Many died. Endfield uses the case study of early Mexican society in a changing climate to explore issues of vulnerability, recovery, and resilience. She notes that most of Central America is likely to warm over the coming century as the global average temperatures increase, but that precipitation in the region is likely to decrease. Endfield looks at "the complex interaction between climate and society in historical perspective across Mexico, by investigating the nature and scale of the impacts of climate variability and unusual and extreme weather events on different agricultural communities in colonial Mexico between 1521 and 1821."

Human-Induced Climate Change: An Interdisciplinary Assessment. Edited by Michael E. Schlesinger et al., Cambridge University Press. 2007. 426. pp. ISBN 978-0-521-86603-3. $115 (hardcover). www.cambridge.org

The initial 1995 meeting of climate modelers and integrated assessment modelers "was organized under what turned out to be a rather naïve assumption that the climate change impact-modeling community would show up and hand off a set of damage functions to the integrated assessment modelers, and then the two groups could part and continue on their independent research paths." Eleven meetings later, an integrated assessment of climate impacts on humanity is not near at hand, but much has been learned.

This book compiles much of what is known on this interdisciplinary front in four sections: climate system science; impacts and adaptation; greenhouse gas mitigation; and policy design and decision making under uncertainty.

In one of the later papers in the volume, "Whither Integrated Assessment? Reflections from the Leading Edge," authors Hugh M. Pitcher, *at al*. concluded that while the tools for completing an integrated assessment for climate are growing, much is needed to realize their full potential. These yet-to-be-realized tools include a better understanding of ecosystems at various scales, better understanding of demographic and water issues, and more sophisticated economic analyses.

Climate Change Adaptation and Mitigation in the Tourism Sector: Frameworks, Tools and Practices. United Nations Environment Programme. 2008. 136 pp. ISBN 978-92-807-2921-5. $40. www.unep.fr/scp

This book is geared toward senior officials from tourism and environment ministries, especially in developing nations and small island states. It summarizes what is currently known about climate change and its impact on the tourism industry. It offers policy and practical suggestions on how to respond.

Earthquakes

Asian Catastrophe Insurance. Edited by Charles Scawthorn and Kiyoshi Kobayashi. Risk Books. 2008. 279 pp. ISBN 978-1-904339-67-0. $167. www.riskbooks.com

Asia is emerging as the economic tiger of the world, but at the tail of the tiger is the rising level of loss from catastrophes there. "Historically," write the editors, "Asian disasters have resulted in disproportionately large loss of life and property due to a fatal combination of high hazard, high population density and lagging development."

The growth in the region offers challenges and rewards for the insurance industry. This book is a series of essays coming out of a December 2007 meeting among experts at Kyoto University on how best to manage insurance of catastrophic risks in Asia. The book focuses on earthquake risk, but it examines other hazards as well.

Fires

The Benefits of Behavioral Research to the Fire Service: Human Behavior in Fires and Emergencies. By Peter W. Blaich. iUniverse, Inc. 2008. 129 pp. ISBN 978-0-595-48549-9. $14.95. www.iuniverse.com

The United States had 1.9 million fires and 4,266 fires deaths between 1992 and 2001. Those most at risk are males, the elderly, African Americans, Native Americans and the very young. Blaich, a lieutenant with the New York City Fire Department and an adjunct professor in fire science at John Jay College of Criminal Justice, summarizes the current research in human behavior in fires. Despite the Hollywood scenario that panic sets in when the fire alarm is rung, Blaich notes that the usual problem is that people don't evacuate fast enough. "Growing evidence suggest that the delay in warning people in a number of major fires has been the primary reason why people have been unable to escape in time … Any hesitation to inform people of a potentially dangerous situation out of fear of causing panic most often leads to a situation in which panic inevitably occurs," Blaich writes.

Levees...

(Continued from page fifteen)

Communication and education on this "risky behavior" are key components of risk reduction, especially in regards to levees. A confusing and outdated system of labeling areas as 100-year or 500-year floodplains, and labeling floods as one-percent or five-percent events, must be reconsidered if we're to reduce impacts of the all-too-certain flooding in the United States, Galloway said.

"For a variety of political reasons, we decided to say if you're behind a 100-year levee, you're safe," Galloway said. Kamer Davis, strategic planning director with J. Walter Thompson, an advertising consultancy that works with the Federal Emergency Management Agency's FloodSmart program, agreed. Davis served on a workshop panel that addressed communicating risk "behind the levees."

"We must stop believing that the presence of a levee is a license to build, work, and develop without risk, which requires a new approach to depicting and communicating about the risk," Davis said.

Part of the FloodSmart program, and another major component of floodplain risk reduction, is the oft-criticized National Flood Insurance Program, which provides federal flood insurance to citizens who own property in floodplains. Currently, this insurance is not mandatory for these residents. However, at the same time Dr. Galloway delivered his presentation, committees of the U.S. House of Representatives and U.S. Senate were working out a compromise on a bill that would require property owners in areas of residual risk to purchase flood insurance. The Senate version of House Resolution 3121, the Flood Insurance Reform and Modernization Act of 2007, includes this requirement; the House version does not.

After hearing Galloway's presentation, workshop attendees crafted a resolution to be sent to both the House and Senate urging the adoption of the flood insurance requirement. More than 240 hazards professionals signed the resolution.

"The suffering of thousands of home and business owners was compounded because they lacked flood insurance, not because it was unavailable, but because they did not purchase it," the resolution read. "… We urge Congress to retain the mandatory purchase requirement in the Senate's version of H.R. 3121. It is a reasonable and prudent approach to increasing citizens' ability to prepare for and recover from flood disasters."

Details of the bill are still being worked out.

Conferences and Training

Seismic Risk 2008: Earthquakes in North-Western Europe—Liège, Belgium: September 11-12, 2008. This colloquium is an opportunity for seismologists, engineers, and architects to discuss significant seismic events which can occur throughout Europe, including their direct effect on building stock, along with associated socio-economic impacts. Specific problems in regions characterized by a low to moderate seismic risk will be examined. The colloquium will include keynote lectures, oral presentation of papers, discussions, and poster sessions.

Seismic-risk@misc.ulg.ac.be
http://www.argenco.ulg.ac.be/seismic-risk-2008.php

5th European Workshop on the Seismic Behavior of Irregular and Complex Structures—Catania, Italy: September 16-17, 2008. The 5th EWICS provides an excellent opportunity for exchanges among seismic engineers, a forum for discussions, and a convivial atmosphere in which to make new contacts and renew old friendships. It also provides a valuable contribution to the development of our research field.

5ewics@dica.unict.it
http://www.5ewics.dica.unict.it/

Symposium on Seismic Sources (Hazards) in Central U.S.: Is New Madrid All There Is?—September 18, 2008. (*Date tentative***).** The purpose of the New Madrid Earthquake Scenario is to provide estimates of governmental, social, business, and economic impacts of one or more New Madrid seismic zone earthquakes. The particular earthquake scenario chosen and the needed scenario products will be determined by workgroups.

www.newmadrid.eeri.org

Reducing Firefighter Deaths and Injuries: Changes in Concept, Policy, and Practice—Fairfax, Virginia: September 22-October 3, 2008. This two-week online symposium focuses on the high rate of firefighter deaths and injuries. The free symposium will feature papers from a broad range of experts including physicians, safety trainers in non-fire occupations, city managers, foreign fire officials from regions with lower death/injury rates, university researchers, and leading U.S. fire chiefs and labor officials.

https://www.riskinstitute.org/peri/content/view/288/73/

9th Workshop on Three-Dimensional Modeling of Seismic Waves Generation, Propagation and their Inversion—Miramare-Treiste, Italy: September 22-October 4, 2008. The workshop will provide training in advanced methodologies of research and development in fundamental studies of the Earth's evolution and dynamics, and in numerous applied problems, such as prospecting for mineral resources, estima-

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Conferences...

(Continued from page twenty-three)

tion and mitigation of possible seismic hazard, and development of tsunami warning systems. These methodologies are based on a deep understanding of the physics of seismic wave generation by natural and artificial sources and the propagation of these waves through complicated earth structures.

smrl965@ictp.it
cdsagenda5.ictp.it/full_display.php?email=0&ida=a07174

IFAT CHINA 2008: 3rd International Trade Fair for Water, Sewage, Refuse, Recycling and Natural Energy Sources—Shanghai, China: September 23-25, 2008. This international trade fair for environmental solutions takes place every two years and brings together 2,200 exhibitors from 36 countries, and over 109,000 trade visitors from 166 countries. The show focuses on the search for global environmental solutions, featuring a technical scientific conference program, exhibitor presentations, and more.

info@ifat-china.com
www.ifat-china.com

Deep Foundations Institute Annual Conference—New York, New York: October 14-17, 2008. Case histories on projects which include innovative use of the various deep foundations construction systems covered by DFI's technical committees will be presented.

staff@dfi.org
www.deepfoundations08.org

3rd Conference on Earthquake Hazards in the Eastern San Francisco Bay: Science, Hazard, Engineering, and Risk—Hayward, California: October 22-24, 2008. The purpose of this conference is to synthesize and make available information on earthquake hazards in the eastern San Francisco Bay Area that has been developed since the 1992 conference. The activities and publications will take advantage of interest in earthquake hazards and risk generated by the 140th anniversary of the 1868 Hayward fault earthquake. In addition to technical sessions, the conference will include a public forum, field trips, and tutorials for educators.

www.consrv.ca.gov/cgs/news/eastbayconference.htm

U.S. EPA Region III Emergency Preparedness and Prevention and Hazmat Spills Conference—Richmond, Virginia: October 26-29, 2008. This four-day all-hazards conference for government and industry includes educational workshops, training sessions, and networking opportunities. It will provide attendees with the opportunity to meet and mingle with key decision makers in the emergency preparedness and prevention fields.

administrator@2008conference.org
www.2008conference.org

3rd International Conference on Systems and Networks Communications (ICSNC 2008)—Sliema, Malta: October 26-31, 2008. The Third International Conference on Systems and Networks Communications continues a series of events covering a broad spectrum of systems and network related topics. The conference covers fundamentals of wireless, high speed, sensor, mobile, and ad hoc networks; security; policy-based systems; and education systems. Topics are targeting design, implementation, testing, use, tools, and lessons learned for such networks and systems.

http://www.iaria.org/conferences2008/ICSNC08.html

Altered Standards of Care and Surge Capacity Conference: Mass Casualty Management in Times of Crisis—Washington, D.C.: October 27-28, 2008. This conference will bring together an influential gathering of medical and public health leaders to teach preparedness planners at the federal, state, regional, community, and health systems levels how to plan and support surge capacity in healthcare systems and develop altered standards of care to meet mass casualty needs during all-hazard and hazard-specific emergencies. At this one-and-a-half day conference, best practices for preparedness will be highlighted for disasters, acts of terrorism, and pandemic diseases.

customerservice@governmenthorizons.org
www.governmenthorizons.org/SurgeCapacityConference/

The American Evaluation Association Annual Conference—Denver, Colorado: November 5-8, 2008. AEA's annual meeting will bring together 2,500 evaluation practitioners, academics, and students. This conference represents a unique opportunity to gather with professional colleagues in a supportive, invigorating atmosphere. The conference is divided into 41 Topical Strands that examine the field from the vantage point of a particular methodology, context, or issue of interest to the field as well as the Presidential Strand highlighting this year's Presidential Theme of Evaluation Policy and Evaluation Practice. Presentations may explore the conference theme or any aspect of the full breadth and depth of evaluation theory and practice.

heidi@eval.org
www.eval.org/eval2008/default.htm

35th Annual Conference on Ecosystems Restoration and Creation: Assessment of Wetland Mitigation and Mitigation Banks—Plant City, Florida: November 6-8, 2008. The Conference provides a broad forum for exchange of results of the latest research and experience with restoration, creation, and management of ecosystems. The theme of this year's conference is "Assessment of Wetland Mitigation and Mitigation Banks". In addition to exchange of results in the presentation format, the Conference will feature national and international guest speakers, panel discussions, and a tour of mitigation case studies.

svyapari@hccfl.edu
www.hccfl.edu/ifs/conference/

International Earthquake Conference: Policy, Planning, and Preparedness—Los Angeles, California: November 12-14, 2008. This conference will present best practices and policies, new ideas, and cutting-edge technologies that reduce earthquake risk and minimize losses. Both policy approaches and recent tools used to prepare communities and respond to disasters will be discussed.

info.iec@lacity.org
www.iec.lacity.org/

Coastal Cities Summit 2008: Values and Vulnerabilities—St. Petersburg, Florida: November 17-20, 2008. The

(Continued on page twenty-six)

Web Sites of Interest

Arizona Earth Fissure Maps

azmap.org/fissures, www.azgs.az.gov/efmaps.html

In April 2008, the Arizona Geological Survey (AZGS) released the first in a series of interactive and scalable maps—to 1:12,000 scale—of earth fissures for parts of Maricopa and Pinal Counties. The internet map server (IMS) platform, hosted by the Arizona Department of Real Estate, allows the public and civil authorities to construct their own custom maps. Related earth fissure information, including maps, reports, informational brochures, and GIS fissure data, are available at www.azgs.az.gov/efmaps.html.

Bradford Disaster Research Unit

www.ilankelman.org/bdru.html

In the mid 1970s, the Project Planning Centre for Developing Countries at England's University of Bradford developed a Disaster Research Unit to address, among other things, human response to disasters, an assessment of the impact of tropical cyclones in Fiji, and a Bahamas-based field study on pre-disaster planning. Bradford researchers published a series of "Occasional Papers" on topics ranging from precautionary planning and disaster management to disaster definitions that set the stage for modern day disaster reduction research. Fourteen of the papers are now available on the Web site.

The National Interagency Fire Center—Incident Management Situation Report

www.nifc.gov/fire_info.html

The Incident Management Situation Report provides up-to-date information on fire activity across the country, including the number of new fires, large fires, and uncontained large fires. The report also tracks the spread of these fires and lists areas where blazes might damage facilities, residences, power lines, and communication towers, as well as active evacuations. To access this information, click on the Incident Management Situation Report link.

U. S. National Seismic Hazards Maps

earthquake.usgs.gov/research/hazmaps/

The U.S. Geological Survey has released this updated version of the National Seismic Hazard Maps. The revised version incorporates new seismic, geologic, and geodetic information on earthquake rates and the manner in which the energy released in earthquakes dies off with distance from the rupture. National-scale maps of earthquake shaking hazards provide information essential to creating and updating the seismic design provisions of building codes used in the United States.

Why More Men Die in Floods

www.time.com/time/nation/article/0,8599,1817603,00.html

This TIME Magazine article by Amanda Ripley explores gender differences in fatalities from this summer's extreme Midwest flooding. According to the article, men are more likely than women to die in floods or other storms and natural disasters. Experts believe men have a higher risk of fatality in many storms because they are more likely to work outside. But the high number of deaths also can be attributed to men's increased willingness to take risks.

FAO Conference on World Food Security

www.fao.org/foodclimate/hlc-home/en/

The Web site for the Food and Agriculture Organization of the United Nations' High Level Conference on World Food Security has links to conference documents, webcasts of the conference, photos, and links to relevant information such as the world food situation, climate change, and bioenergy. Links to preparatory meetings, held earlier this year, also are included.

National Integrated Drought Information System

www.drought.gov/portal/server.pt

The National Integrated Drought Information System (NIDIS) Web site has a wealth of information on monitoring and forecasting drought conditions, including drought indicators, hydrological monitors, data sets, and planning processes. Maps aggregating information from federal, state, and local sources help researchers visualize trends.

Disaster Preparedness for People with Disabilities

www.disability911.com

Disaster Preparedness for People with Disabilities was created to help ensure those with disabilities are ready for disaster. The site includes links to webcasts, books and newsletters, training materials, and other resources aimed at helping centers for independent living, public officials, emergency preparedness officials, and people with disabilities stay prepared.

Edu4drr

edu4drr.ning.com

Edu4drr is a just-launched social networking site for "teachers who want to make a difference in disaster prevention." Forums, shared resources and videos, event listings, and fun gadgets are now on the site and Edu4drr developers aim to make the site more robust through content contributions from educators and other interested members.

Road to Ready Radio

ricktobin.com/roadtoready/index.html

This Internet radio show by Rick Tobin of TAO Emergency Management Consulting covers hazards topics that range from pandemics to earthquake safety to pet evacuation during disasters. Listen to shows live at 3 p.m. EST on Fridays, or download MP3s to listen to at your leisure. A list of links related to programs also is included.

Conferences...

(Continued from page twenty-four)

Coastal Cities Summit aims to bring together public officials, nongovernmental organizations, citizens, and natural and social scientists to consider the values and vulnerabilities of coastal regions around the globe. They will discuss environmental, social, economic, and public policy challenges faced by coastal communities with the aim of producing viable solutions. Topics include climate change, sea level rise, new maritime security needs associated with increase transportation by sea, and the ever present danger of extreme events such as tropical storms and tsunamis.

mara@ioiusa.usf.edu
www.coastalcities.org/

The Emergency Services Show 2008—Stoneleigh Park, Coventry, England: November 19-20, 2008. An effective response to most civil emergencies, from terrorist incidents to floods, fires, and road traffic accidents, relies upon a close working relationship between the industry services and organizations. Now in its third year, the Emergency Services Show is the definitive event for promoting multi-agency collaboration within the United Kingdom's emergency services. The 2008 event combines an extensive industry exhibition with a comprehensive conference.

alison@mconieagency.com
www.theemergencyservicesshow2008.com/index.lasso

The World Conference of Humanitarian Studies (WCHS)—Groningen, Netherlands: February 4-5, 2009. This conference seeks to provide a venue where scholarly communities can further understanding of humanitarian crises through a dialogue with policy actors and implementing agencies. It aims to produce close collaboration and dialogue with policy makers and practitioners. As a world conference, its central aims are to provide a meeting ground for academic communities and practitioners concerned with in-depth research on humanitarian issues; to take stock of the current theory, debates, and issues of humanitarian studies; and to reflect on current practice and identify opportunities for improving humanitarian practice.

info@humanitarianstudies2009.org
www.humanitarianstudies2009.org

Environmental Connection '09—Reno, Nevada: February 10-12, 2009. Environmental Connection provides peer–reviewed education, products, and technology, along with specific tracks focusing on stormwater management, beach and shoreline stabilization, and wetlands technology.

www.ieca.org/conference/annual/ec.asp

The BSSC Seismic Design Procedures Reassessment Group Workshop—San Francisco, California: September 10, 2008. The Building Seismic Safety Council (BSSC) will hold a one-day workshop sponsored by the Federal Emergency Management Agency and the United States Geological Survey. The workshop is open to the BSSC membership and the general public. It will be held at the Embassy Suites, San Francisco Airport, in Burlingame, California.

http://www.bssconline.org/2008AnnualMeeting/08infopage.html

Letters

Natural Hazards Center,

On page 12 of the July 2008 *Observer*, under "Earthquake—Midwest USA," you refer to a 'magnitude 5.3 earthquake' of April 18 which "occurred in the Wabash Valley fault system, which is adjacent to the New Madrid Seismic Zone." On page 15 of the same edition, under "New Madrid Seismic Zone Alive and Shaking," you reference a "5.2-magnitude" quake on that same day which "struck a northern portion of the New Madrid Seismic Zone."

Outside of the inconsistent magnitude references in two stories about the same event, the different identifications of the "system" or "zone" is not a small matter. I think you will find that at least some seismologists and geologists will disagree that the Wabash zone is simply a "northern portion" of the NMSZ.

The relatively low number of significant earthquake events in the Midwest makes earthquake studies trickier than studies of faults and zones on the West Coast, but please be more careful and consistent when identifying earthquake-generating areas of the Midwest so that you don't confuse the public or possibly increase the controversy surrounding seismic studies in this region.

Mike Lynch
Kentucky Geological Survey
University of Kentucky

(***Editor's note:*** *Ouch. Two different numbers for the same event. To clarify, the U.S. Geological Survey's PAGER system calls this event a magnitude-5.2 quake in the "Illinois Basin/ Ozark Dome region." Please see page seven for a fuller explanation of the fault zone identification issue.*)

Mary Fran Myers Award

The Mary Fran Myers Award was established in 2002 by the Gender and Disaster Network and is coadministered by the Natural Hazards Center. The award recognizes that vulnerability to disasters and mass emergencies is influenced by social, cultural, and economic structures that marginalize women and girls. The award was named to recognize Mary Fran's sustained efforts to launch a worldwide network among disaster professionals for advancing women's careers and for promoting research on gender issues, disasters, emergency management, and higher education.

(Please see page thirteen for nomination information.)

2008 Award Winner - Cecilia Castro Garcia

Cecilia Castro García is an independent researcher and consultant who has dedicated her work to enabling practices to mainstream approaches of gender equity and integral disaster risk management in community activities, government programs, urban and social development policies, and institutes advancing women's issues. She has worked on the theories of comprehensive disaster risk management and environmental management as part of a more just and sustainable approach to development. She holds a bachelor's in human settlement design (urban and regional planning), is a specialist in gender studies and has doctoral studies in social sciences.

Her doctoral research focuses on the social construction of disaster risk and housing policies with a concentration on social vulnerability and the limited living conditions of housing for the socially disadvantaged from 1985 to 2000.

In 2006, Castro García was responsible for a National Institute for Women in Mexico project that developed methodologies and teaching tools aimed at incorporating gender and integral disaster risk management approaches into government policies and programs and the community. Research from the project, which was completed in association with the United Nations Development Program (UNDP) and the Interior Department's Office for Civil Protection Coordination, was later published in the book Desastres naturales y vulnerabilidad de las mujeres en México (Natural Disasters and the Vulnerability of Women in Mexico), which she coordinated and co-authored.

In 2006-2007 she was a consultant for the El Salvador UNDP regional Latin American project "Gender Equity Mainstreaming in Disaster Risk Management in UNDP Institutional Work," which organized a workshop and regional meeting; a virtual forum with the UNDP's gender and risk management focal points; and a compilation of materials with bibliography, sources and web links on the subject.

Castro García has given conferences and training workshops for different federal and local institutions, especially municipal women's institutes, civil defense units, and research and teaching centers. In 2007, she was academic coordinator for a Center for Research and Advanced Studies in Social Anthropology (CIESAS) and the National Institute for Social Development (INDESOL) project strengthening government and local community coordination in disaster risk prevention and gender equity in two southeastern states. The project coincided with the rains and floods in Tabasco and Chiapas. That year she also coordinated the CIESAS/SEDESOL study "International Seminar on Prevention of Risks, Disasters and Vulnerability of Urban Settlements" in Mexico City.

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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/

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The success of the Natural Hazards Center relies on the ongoing support and engagement of the entire hazards and disasters community. The Center welcomes and greatly appreciates all financial contributions. There are several ways you can help:

Support Center Operations—Provide support for core Center activities such as the Disaster Research e-newsletter, annual workshop, library, and the Natural Hazards Observer

Build the Center Endowment—Leave a charitable legacy for future generations.

Help the Gilbert F. White Endowed Graduate Research Fellowship in Hazards Mitigation—Ensure that mitigation remains a central concern of academic scholarship.

Boost the Mary Fran Myers Scholarship Fund—Enable representatives from all sectors of the hazards community to attend the Center's annual workshop.

To find out more about these and other opportunities for giving, visit:

www.colorado.edu/hazards/about/contribute.html

Contact Ezekiel Peters at ezekiel.peters@colorado.edu or (303) 492-2149 to discuss making a gift.

A U.S.-based organization, the Natural Hazards Center is a nonprofit, tax-exempt corporation under Section 501(c)(3) of the Internal Revenue Code.

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.

Send items of interest to to the Natural Hazards Center, University of Colorado at Boulder, 482 UCB, Boulder, CO 80309-0482; (303) 492-6818, (303) 492-2151 (fax); hazctr@colorado.edu. The deadline for the next *Observer* is **October 24, 2008**.

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