

The promise and pitfalls of New Urbanism

## Are we placing smart growth in dumb locations?



An invited comment by Philip Berke, Mark Stevens, and Yan Song

**N***ew Urbanism developments offer many opportunities to avoid hazards associated with conventional low-density sprawl. But research shows that this potential for promoting natural hazards resilience and environmental sustainability has not been fulfilled. Compared to conventional developments, New Urban developments rely more on structural protection rather than avoiding floodplains, protecting environmentally sensitive areas, and installing best management practices (BMPs).*

From their beginnings in 1986, New Urban developments have expanded rapidly throughout the United States. By 2003 there were 647 projects completed, under construction, or planned, covering 559,836 dwelling units and 1.56 million

residents (Song, Berke, and Stevens 2009). New Urban developments appear to be the wave of the future. In spite of the recent housing crisis, we estimate the number of New Urban developments has more than doubled between 2003 to 2011.

New Urbanism emerged as an alternative to conventional low-density sprawl. This pattern of development creates compact, mixed-use urban forms designed to foster social communities by enhancing civic engagement and interactions between public and private spaces. It also creates pedestrian-friendly environments.

New Urban developments require considerably less land than conventional developments to accommodate an equiva-

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# Disaster mitigation contends with a ‘perfect storm’

An invited comment by Ann Patton

Mitigation efforts face challenges, but recent experience offers hope

Changing demographics, climate, and economics are creating a “perfect storm” of challenges for disaster mitigation, requiring a holistic response to create disaster-resilient communities.

There are important implications for disaster policy in the evolving face of the nation, according to Steve Murdock, former director of the U.S. Census. Minorities account for 92 percent of U.S. population growth, while the non-Hispanic white population grew by only one percent. Minorities are quickly becoming the nation’s majority population, as the nation’s middle class is eroding and the numbers of poor and undereducated are rising. These populations are the least able to prepare for and manage disasters, in part because they are consumed with day-to-day survival. Yet most education and outreach targets middle-class Anglos.

Climate change is creating additional challenges. We’re breaking all records for natural disasters across all continents, says the National Oceanic and Atmospheric Administration’s Margaret Davidson, who said she calls it not global warming but “global weirding.”

“Something weird is going on,” she says. “The trends and cycles we are seeing are not like anything we have seen in history.”

Murdoch, Davidson, and other speakers gave presentations at the second annual National Hazard Mitigation Practitioners Workshop sponsored by the Natural Hazard Mitigation Association on July 12 and 13 in Broomfield, Colorado.

As anyone who follows the news can attest, the economy and economic policy are contributing to the weirdness. Distrust of government abounds. “Nobody has any money now,” says Bill Becker of Natural Capital Solutions, “and we are apt to see programs cut, not started. When it comes to climate change, all pollution is global, but localities will have to control their own destinies.” Becker says climate change is the result of countless decisions each of us makes on how we use energy every day. The solution lies in making smarter decisions. But we must also adapt to climate changes already underway. Given cutbacks in government spending, commu-



nities must take charge of their own destinies.

We must focus on building smarter and safer, says the Federal Emergency Management Agency’s Sandra Knight. Creative partnerships are more important than ever, demanding that organizations like NHMA bring together diverse and untapped champions for hazard mitigation, she said.

Taken together, these trends mean, that “despite everything you or your agency have done, things will continue to get worse” unless we change our approach, says the University of Colorado’s Dennis Mileti. The climate is changing, we live in an era of “capitalistic globalization,” and the middle class is gone, he said. We are swimming upstream against overwhelming odds if we fail to attack mitigation holistically and don’t see it in the context of the time.

“Mitigation happens when you change the culture and value thinking in the long term,” Mileti says. “Mitigation spreads when people talk to each other. We once had a program in America to do just that, Project Impact, and we would be wise to bring it back—not necessarily by that name, but showing how mitigation can occur in a community when locals come to value it. We need to get the conversation going in America’s communities and get people talking to each other. It worked before, and it can happen again.”

Ed Thomas, NHMA president, cites models in the way the nation reduced urban fires through many years of fire insurance rating programs and also in the successful acquisition programs after the 1993 Mississippi floods. He urged the group to take the words “natural disaster” out of their vocabularies when they refer to damaging events. “There is no such thing,” Thomas said. “We need to remember what Gilbert White taught us: While hazards such as floods, wildfires, and earthquakes are acts of God, disasters are largely acts of men,” he said.

NHMA is developing a cooperative venture tentatively named NeighborNet to link together grassroots communities working on mitigation, disaster recovery planning, and resilience. The first local pilot using the NeighborNet concept to coordinate community planning and preparedness is Tulsa Partners. Other successful mitigation models include the U.S. Army Corps of Engineers’ Silver Jackets program, FEMA’s Risk MAP program, and the Federal Alliance for Safe Homes.

The American Meteorological Society’s Bill Hooke, chair of the NHMA Advisory Committee, says even though the problems look too big to solve, we can take hope from recent advances in aviation and population control. The aviation industry learned from experience and dramatically sliced its accident rate, he said. A few years ago, people thought population control was headed for 15 billion people at hopelessly unsustainable rates, but “after women gained control over their bodies, the birth rate dropped like a stone.” Now we need to attack disaster mitigation with things that are fast, cheap, effective, based on facts, and scalable so small groups can do them, community by community, Hooke said.

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## Natural Hazard Mitigation Association

The Natural Hazard Mitigation Association was formed in late 2008 to meet the need for a multihazard mitigation support group working across hazard categories and management methods. NHMA works for societal change by elevating the value of hazard mitigation so that natural hazards do not cause disasters, suffering, and misery for people, property, the environment, and taxpayers. The group promotes education, policies, and activities that mitigate current and future losses, costs, and human suffering unnecessarily caused by unwise development practices.

To join NHMA or for more information, please go to [www.NHMA.info](http://www.NHMA.info).

Finally an answer to the question ...

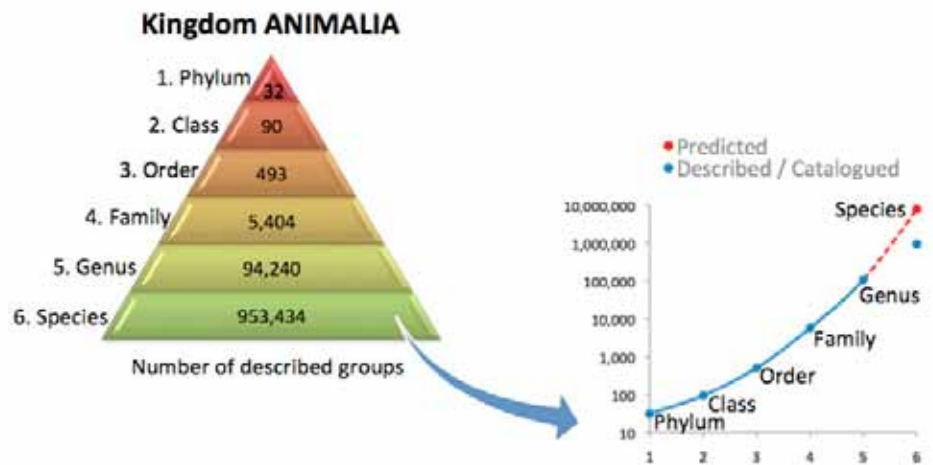
## How many species are there?

Survey finds 8.7 million, more or less

While not precisely a issue for hazards, we can now report that there are 8.7 million individual species on the planet, give or take 1.3 million. This narrows considerably the previous range of estimates, which varied from between three million and 100 million.

Geographer Camilo Mora from the University of Hawaii and Dalhousie University and colleagues analyzed the taxonomic clustering of the 1.2 million species in the *Catalogue of Life* and the *World Register of Marine Species*. From this they concluded there were reliable numerical relationships between the more complete taxonomic groups and the species level. Coauthor and Dalhousie professor Sina Adl says, “We discovered that, using numbers from the higher taxonomic groups, we can predict the number of species. The approach accurately predicted the number of species in several well-studied groups such as mammals, fishes and birds, providing confidence in the method.”

The authors of the paper, which was published in *PLoS Biology*, conclude that 86 percent of land species and 91 percent of sea species have yet to be described.



The description of a new species requires its classification with the Linnaean system adopted about 250 years ago. This is a hierarchical system in which lower taxonomic groups belong to higher ones. For instance, a specific species is grouped with other species of similar characteristics within a genus, which in turn is grouped with genera of similar characteristics within a family, which in turn is grouped with families within a specific order, and so on. There are more groups at lower taxonomic levels than at higher ones. While the later ones are almost fully discovered, many of the earlier ones (e.g., species) remain still to be found. This pattern suggests that the better known number of higher taxonomic groups allows an estimate of the less well-known number of lower groups, including the number of entities at the species level.

Graphic courtesy PLoS Biology

Oxford University zoologist Robert May says, “It is a remarkable testament to humanity’s narcissism that we know the number of books in the U.S. Library of Congress on 1 February 2011 was 22,194,656, but cannot tell you—to within an order of magnitude—how many distinct species of plants and animals we share our world with.”

## They Said It ...

"9/11 was not just an event trauma. It was the loss of the assumptive world. When you presume and assume you'll wake up to the same safety net that you had yesterday and you don't, you not only lose that assumption, you lose all related assumptions."—**K. Mark Sossin, Pace University psychology professor, quoted in USA Today.**

"We are extremely resilient as human beings. We were remarkably resilient ... I don't think people are permanently scarred at all."—**George Bonanno, Columbia University professor of clinical psychology, also quoted in USA Today.**

"The U.S. Government will work tirelessly to counter support for violent extremism and to ensure that, as new violent groups and ideologies emerge, they fail to gain a foothold in our country. Achieving this aim requires that we all work together—government, communities, the private sector, the general public and others—to develop effective programs and initiatives. To support a community-based approach, the federal government is working to strengthen partnerships and networks among local stakeholders."—**White House strategy document Empowering Local Partners to Prevent Violent Extremism in the United States.**



"We appreciate the administration's new plan to engage communities throughout America in this important aspect of homeland defense ... we are concerned that the plan does not designate a lead agency—an individual in charge—to ensure accountability and effectiveness."—**Statement by U.S. Sens. Joe Lieberman, I-Conn., and Susan Collins, R-Me., responding to the strategy document, quoted by hstoday.us.**

"As extremists try to inspire acts of violence within our borders, we are responding with the strength of our communities, with the respect for the rule of law, and with the conviction that Muslim Americans are part of our American family."—**President Barack Obama, State of the Union, January 2011, cited in White House strategy document Empowering Local Partners to Prevent Violent Extremism in the United States.**

"We continue to be disappointed that the administration remains reluctant to identify violent Islamist extremism as the main cause of the homegrown terrorist threat ... to understand this threat and counter it, we must not shy away from making the sharp distinction between a major religion followed by millions of law abiding Americans and a twisted ideology."—**Statement by U.S. Sens. Joe Lieberman, I-Conn., and Susan Collins, R-Me., responding to the strategy document, quoted in hstoday.us.**

## Hazards we hadn't worried about before

Your dishwasher is trying to kill you

A potential disease-causing fungus has evolved to live in extreme conditions in some common household appliances, like dishwashers, washing machines and coffee makers. Two black yeasts, *Exophiala dermatitidis* and *E. phaeomuriformis* have become tolerant to the hot moist environments found in those places, especially in the rubber insulation around the doors of dishwashers and washing machines, according to research in *Fungal Biology*.

*Exophiala dermatitidis* is rarely isolated from nature, but is frequently encountered as an agent of disease, both in compromised and healthy people. It is also known to be involved in pulmonary colonization of patients with cystic fibrosis, and occasionally causes fatal infections in healthy humans.

While these particular species may present a household health hazard, thermophiles are some of the oldest extant life

forms, probably emerging early in the history of the earth. Life may have begun in shallow, very hot pools in the early earth, requiring species that could tolerate these harsh conditions.



# Sea level rise is accelerating

## Steepest increase of the past two millennia

Sea level is rising faster now than at any time in the last 2,000 years—and the culprit is global warming, according to researchers.

With about half of the global population now living near the coast, the rising seas have serious implications. Andrew Kemp of Yale University and colleagues developed a reconstruction of sea level for the past 2,000 years, then compared it with global temperature variations.

They found sea level was relatively stable from about 200 BCE to 1000 CE. Then for about 400 years, sea level rose by a half millimeter a year. A second stable period of sea level was ushered in by the so-called Little Ice Age from about 1400 to the end of the 19th century.

Since the late 19th century, “sea level has risen at an average rate of 2.1 mm/y, representing the steepest century-scale increase of the past two millennia,” Kemp and colleagues write in the June 20, 2011, issue of the *Proceedings of the National Academy of Sciences*. “This rate was initiated between AD 1865 and 1892.” The changes in sea level are consistent with global temperature changes for the last 2000 years.

Since 1993, sea level rise has been even greater, about 3 millimeters a year (0.125 inches), according to the National Oceanic and Atmospheric Administration. “A warming Earth causes sea level rise in two ways,” said Gregory Johnson, a NOAA oceanographer at the Pacific Marine Environmental Laboratory in Seattle. “The warming heats the ocean, causing it to expand, and melts continental ice, adding water to the ocean. The expansion and added water both cause the sea to

encroach on the land.”

In a study of the deep ocean, Johnson and colleague Sarah Purkey at the University of Washington found that the deep ocean around Antarctica—below 3,300 feet in depth—is taking up about 16 percent of the heat the upper ocean receives.

About half of that 3 millimeters has been caused by ocean thermal expansion and the other half because of additional water added to the ocean, mostly from melting continental ice. Purkey and Johnson note that deep warming of the southern ocean accounts for about 1.2 mm (about 0.05 inches) per year of the sea level rise around Antarctica in the past few decades.

## Into the great unknown

A great unknown in the future trends of rising seas is how much the vast icecaps—in Greenland, Antarctica, the Himalayas, and the other great landlocked glaciers—are going to contribute by melting. Early estimates from models suggested that the contribution might not be great, but more recent assessments have been less optimistic. While the Kemp and Purkey studies have looked at the relatively recent past, several others have looked at warming periods from the earth’s deep history to see if there are any lessons there.

During last interglacial, about 125,000 years ago, the oceans were at least 4 meters (13 feet) higher than they are now—and might have been as much as 6.5 meters (20 feet) higher. People have feared that the most likely culprit in past warming—and the likely suspect for contributing most to modern sea level rise from warming—would be the melting of the Greenland ice sheet. But a paper in the July 29 journal *Science* found that this may not have been the case in the last interglacial. Greenland’s ice may be more stable—and

Antarctica’s less so—than has been believed, according to University of Wisconsin-Madison geoscientist Anders Carlson.

Carlson found that Greenland ice melt was probably responsible for about half of the total sea level rise 125,000 years ago, with Antarctica accounting for the rest. “The implication of our results is that West Antarctica likely was much smaller than it is today,” he says. “If West Antarctica collapsed, that means it’s more unstable than we expected, which is quite scary.”

In 2010, the Greenland ice sheet started melting earlier, and finished melting later than at any time since records have been kept. The melt period was 50 days longer than normal, with summer temperatures up to 3 degrees Celsius (5.5 degrees Fahrenheit) higher than average. The Greenland ice sheet holds a lot of water. If it melted entirely—which no one currently expects, at least for the foreseeable future—the world’s oceans would rise about 7 meters



(about 23 feet).

The Antarctic ice sheets may be subject to “Heinrich events,” rapid onset ice sheet collapses that can occur within years of a significant temperature change. A study in *PNAS* by Oregon State University researcher Shaun Marcott found that warming of water by 3 to 4 degrees Celsius was enough to trigger “huge episodic discharges of ice from the Laurentide ice sheet” in what is now Canada.

The Laurentide ice sheet is no more. It disappeared about 20,000 years ago. But the work has implications for the contribution to sea level rise in the Antarctic. If water were to warm by about 2 degrees C under the ice shelves that are

found along the edges of much of the West Antarctic ice sheet, Marcott says, it might greatly increase the rate of melting to more than 30 feet a year. This could cause many of the ice shelves to melt in less than a century, he said, and is probably the most likely mechanism that could create such rapid changes of the ice sheet.



Until relatively recently, the melting or collapse of the west Antarctic ice was considered very unlikely. In fact, earlier climate models indicated that snow and ice might actually accumulate in the region rather than contribute to sea level rise. Anomalous behavior in that region, however, including the collapse of Larsen B ice shelf in 2002, has caused scientists to be more cautious in those predictions. The loss of the west Antarctic ice sheet could raise sea level by about five meters (16 feet), and both east and west Antarctic ice sheets could raise it by 70 meters (230 feet).

### The anomalous Pacific Coast

Curiously, while mean sea level rise globally has increased 50 percent in the 20th century—from 2 mm/yr to 3 mm/yr, as noted earlier—there has been virtually no increase along the Pacific Coast of North America. But a paper in the *Journal of Geophysical Research—Oceans* indicates that this, too, may pass. Wind patterns from the Pacific climate cycle known as the Pacific Decadal Oscillation have probably suppressed sea level rise on the West Coast, according to Scripps Institution of Oceanography oceanographer Peter Bromirski and colleagues. Their study indicates the PDO may be flipping from a warm phase to a cold one, raising sea levels along the coast at global rates—or possibly even higher.

Despite the threat to humans implied by the rising seas, the slogan “Don’t buy oceanfront property” hasn’t caught on.

## Drought threat looms large

### More climate uncertainty

- *The U.S. Drought Monitor sets “exceptional drought” record in July.*
- *Drought in Syria pushing millions into poverty.*

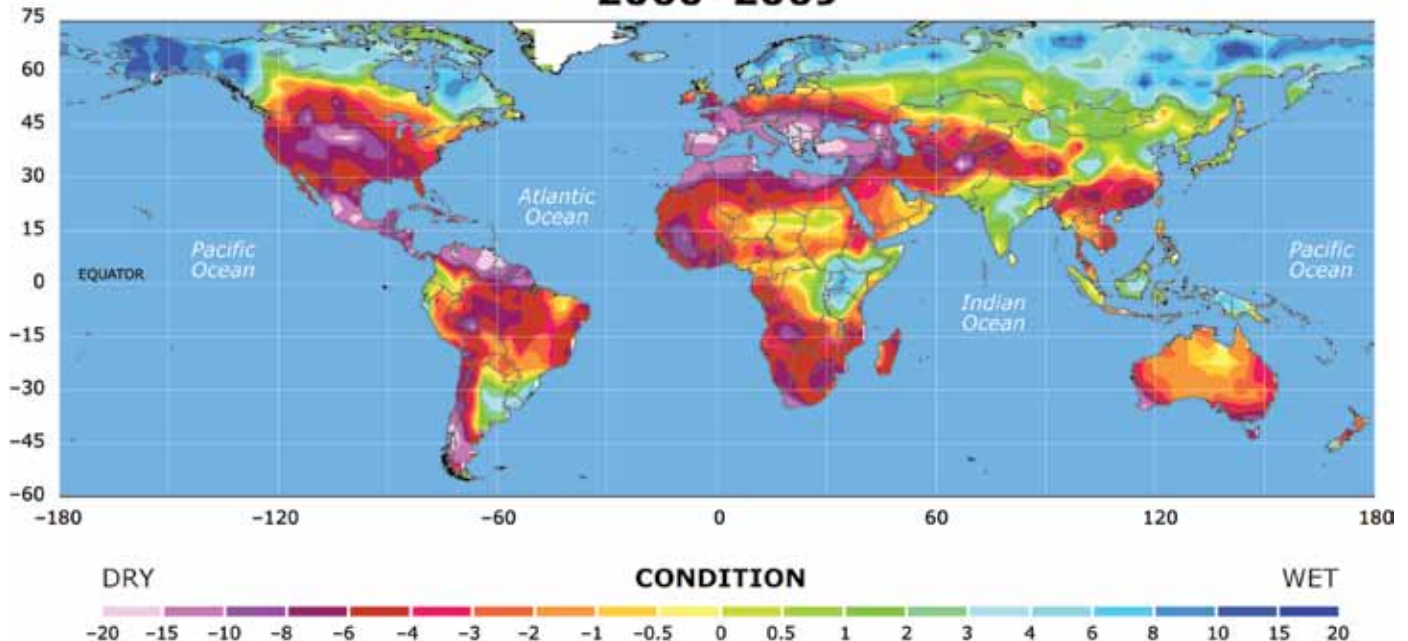
- *Two severe Amazon droughts in five years “alarm scientists.”*
- *Catastrophic drought looms for La Paz, Bolivia.*
- *Ten million at risk from East Africa drought.*

Most recent above-the-fold disaster headlines recently have been about earthquakes, but the slow onset of

drought is starting to make its media mark, as evidenced by the stories listed above. The concern has been spreading, especially given the uncertainty surrounding the impact of the changing climate on precipitation patterns.

National Center for Atmospheric Research’s Aiguo Dai says the United States and other heavily populated countries “face a growing threat of severe and prolonged drought in the coming decade.” Analyzing an ensemble of 22 computer climate models and previously published work, Dai found “most of the Western Hemisphere, along with parts of Eurasia, Africa, and Australia will be at risk of extreme drought this

### 2060–2069



Map courtesy University Corporation for Atmospheric Research (UCAR)

century.”

The percent of the lower 48 states suffering “exceptional drought” in July 2011 reached the highest levels ever recorded by the U.S. Drought Monitor. Nearly 12 percent of the contiguous United States had drought categorized as D4, exceptional drought, the most severe rating the Drought Monitor hands out. Seven states, mostly in the southeastern part of the country, were at least 85 percent abnormally dry.

### East Africa

East Africa is see its worst drought in more than 60 years, with 10 million people at risk. Crop failures and high food prices are worsening an already difficult situation. Many of the people at risk are in southern Somalia, where armed conflict and instability makes it difficult to deliver aid.

In a report released in August, Oxfam said, “It is no coincidence that the worst affected areas are those suffering from entrenched poverty due to marginalization, conflict and lack of investment. While severe drought has undoubtedly led to the huge scale of the disaster, this crisis has been caused by people and policies, as much as by weather patterns. An adequate response to the current crisis must not only meet urgent humanitarian needs, but also address these underlying problems.”

Mean annual temperatures increased by 1 degree Celsius in Kenya and 1.3 degrees C (1.8 to 2.3 degrees Fahrenheit) in Ethiopia over the 1960-2006 period. Recent research indicates that the March-June “long rains” have shown a decline in total precipitation.

The Oxfam report also said, “Over the coming decades, unless urgent action is taken to slash greenhouse gas emissions, temperatures in the region will continue to rise and rainfall patterns will change. This will create major problems for food production and availability—one recent estimate published by The Royal Society suggests much of East Africa

could suffer a decline in the length of the growing period for key crops of up to 20 per cent by the end of the century, with the productivity of beans falling by nearly 50 per cent. “

Elsewhere on the continent, the late 20th century droughts in northwest Africa rival some of the worst dry periods of the last 900 years, according to research done by Ramzi Touchan and colleagues at the University of Arizona. Using the record of moisture created by tree rings, the team found that the region’s 20th century drying trend matches what climate models predict will occur as the climate warms. Persistent drought was more prevalent across northwest Africa between about 1100 and 1500, the group found. But “the pattern of widespread regional drought then seems to re-emerge in the late 20th century.”

### South America

In a study of a 2,300-year climate record in South America, University of Pittsburgh researchers say that as temperatures rise in the Northern Hemisphere as a result of climate change, the tropical regions are likely to suffer from water shortages as the monsoons become drier. “This model suggests that tropical regions are dry to a point we would not have predicted,” says Pitt geologist Mark Abbott. “If the monsoons that are so critical to the water supply in tropical areas continue to diminish at this pace, it will have devastating implications for the water resources of a huge swath of the planet.”

Historical research in the Andes indicates that if temperatures rise more than 1.5 to 2.0 degrees C (2.7 to 3.6 degrees F) above modern times, parts of Peru and Bolivia will become deserts. This “would be disastrous for the water supply and agricultural capacity of the two million inhabitants of La Paz, Bolivia’s capital city,” according to research by scientists from the Florida Institute of Technology scheduled to appear in the November issue of *Global Change Biology*.

Essentially, as the climate warms, there is evaporative loss from Lake Titicaca, which results in a “tipping point” that throws the regions ecosystem from a woodland to a desert. Given a rate of warming in the Peruvian Andes of about 0.3-0.5 degrees C per decade, that tipping point would be reached between 2040 and 2050.

Research in South America’s Amazon Basin shows that the region has had two “hundred-year droughts” in the last five years, one in 2005 and one in 2010. The Amazon forests are a major carbon sink, buffering the carbon dioxide emissions emitted by the industrial world. Drought kills trees, reducing this carbon uptake by about five billions tons of CO<sub>2</sub>—or roughly as much as the United States emits in a year from its fossil fuel use.



# Haiti 2010: From Bulletproof Pledging to Hesitant Reconstruction

An invited comment by  
Richard S. Olson

Haiti has been described as “a beautiful people, a great nation, no state”—or less poetically, “the NGO republic.” Consider Haiti’s place in the 2009 United Nations Human Development Index: 149th out of 182 nations ranked, the lowest ranking received by any country in the Western Hemisphere. The UNHDI measures social and economic

development from the perspective of the national population’s wellbeing.

In its 2009 “Failed State” index, which measures a national population’s civil rights and civil liberties, Freedom House put Haiti in 12th place out of 172 countries—that’s 12th from the bottom, close to the much dreaded and globally worst Somalia ranking. In its 2011 report, Freedom House called Haiti only “partly free,” and assigned it a downward trend arrow, indicating that things are getting worse there from a civil liberties governance perspective.

Finally, Haiti is ranked 146th out of 178 countries in Transparency International’s 2010 Corruption Perceptions Index. TI says Haiti is more corrupt than Pakistan, but better than Cambodia—faint praise indeed.

And these data were collected before the earthquake on January 10, 2010.

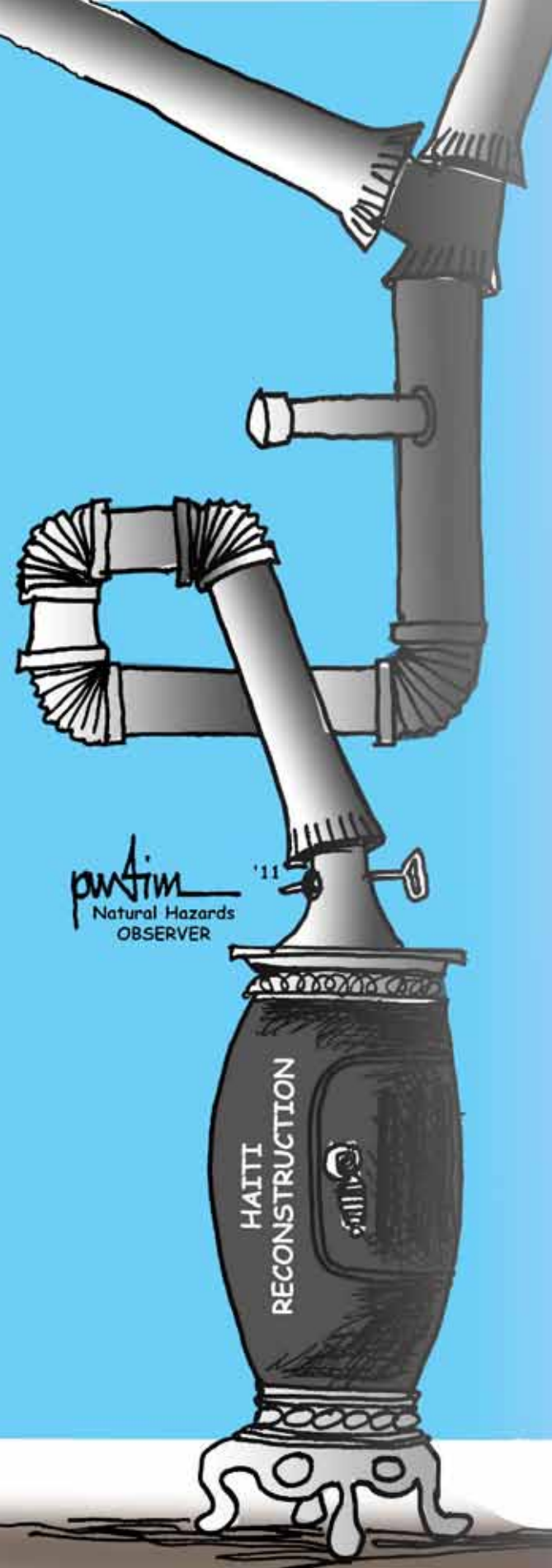
But it probably comes as no surprise to anyone that Haiti fares poorly in any analysis of competent governance. A long-running tragedy of the nation-state era, Haiti’s placement on these indexes explains why the 2010 earthquake caused such extensive damage. Low human development, extreme poverty, and inequality present such urgent daily problems that longer vision issues, such as safe building practices and informed land use, never achieve a place on any political agenda.

Poor governance capabilities means that, even if the political will were present, “the lights may be on, but no one is home” when it comes to assuring even the most minimal on-the-ground attention to risk. High levels of corruption would vitiate any efforts at real enforcement even if their will and governance capabilities were somehow magically present. In the end, low human development, low governance, and high levels of corruption are a deadly triad, as Haiti amply demonstrated.

It doesn’t really matter whether the final death toll, now in some dispute, turns out to be the official estimate of about 230,000 or the much lower figure of perhaps 60,000 arrived at in a U.S. government report. Haiti’s lifelong commitment to bad government explains why reconstruction has been so hesitant and has generated so much criticism. The more than \$9 billion in pledges from the international community generated expectations and optimism that could never be met, taking Haiti’s on-the-ground realities into account. As these indexes show, the island nation was hardly a blank slate before the catastrophe—and most of the writing on that slate was negative.

In the aftermath of the enormous emergency response came the reconstruction pledges. These pledges occur in a politically bulletproof world of their own. Only the most jaded critic will find fault with heartfelt offers of assistance to a nation in the wake of a catastrophe. Pledging conferences are always well-covered by the media, offering plentiful opportunities for pithy sound bites and heartwarming photo ops for both donors and recipients. Indeed, they are one of the few feel-good moments in most postdisaster situations, and their uplifting value is not to be underestimated.

Turning pledges into actual reconstruction, however, is an entirely different matter. It requires different individuals with very different concerns.





The fact is that the pledgers of aid are not the implementers. That falls to agencies, organizations, administrators, and bureaucrats. These folks live in a fishbowl world of questions and scrutiny, particularly when large amounts of humanitarian assistance money involved. They also face eventual audits, carried out by people who tend to care little about intentions or hopes, but much more about verifiable on-the-ground results.

So pledgers to reconstruction can be generous and high-minded. Implementers of reconstruction, however, cannot afford to be—especially if they would like to prolong their careers. They must be very attentive to feasibility, effectiveness, and demonstrable outcomes, all with an eye toward eventual close accountability. This perspective goes a long way toward explaining why reconstruction in Haiti—and there has been and continues to be reconstruction—appears to be so piecemeal and so project driven. Because it is.

The current situation in Haiti reminds me of post-1976 earthquake reconstruction in Guatemala, which was roundly criticized as “stovepipe,” with donor countries, NGOs, private groups, churches, and goodness knows who else simply adopting towns, neighborhoods, or project ideas and then doing their own things. There was very little coordination and no apparent coherence to direct the multitude of projects toward a vision of “a new Guatemala.” Instead, by the early 1980s, the on-the-ground outcome was a large number of “little Guatemalas.”

The Haiti case has many parallels. But there it is exacerbated by internal political instability and impasse. Haiti

was struck by the earthquake during the last months of the Preval government. Haiti saw its subsequent national election annulled by massive irregularities, only forming a government in mid-2011. Meanwhile, the Interim Haiti Reconstruction Commission—comprised half and half by international community and Haitian members in a generous nod toward a largely fictional Haitian sovereignty—has not been able to lead the country toward a coherent vision of a “new Haiti.” But asking what is in essence a committee to do that is ... well ... oxymoronic. Committees don’t lead.

What should our takeaway be on Haiti reconstruction at this point? Well, everyone needs to calm down and sober their expectations—in the vernacular, “get a grip.” We must remember what Haiti was like before the January 2010 catastrophe, virtually a non-state dominated by nongovernmental organizations. We’re still less than 20 months past the event, with a new Haitian government barely in office.

The larger problem is, when viewed analytically and in historical perspective, Haiti is very unlikely to be able to develop either a national consensus on a coherent “new Haiti” or the quality governance institutions to achieve it. The most likely outcome will be a spotty, stovepipe, project-driven type of reconstruction. It will be reconstruction. Like the “little Guatemalas,” we’re likely to see “little Haitis.” It won’t represent a coherent vision.

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# Lessons from the earthquakes

By Dan Whipple

**I**N THE LAST YEAR AND A HALF OR SO, several places on the planet have been hit with powerful earthquakes. Haiti, Japan, and New Zealand have seen devastating quakes, each unprecedented in its own way. Collectively they demonstrate the importance of strong institutions, especially sound safety practices and coherent government, to prepare for a disaster and deal with its aftermath.

The nuclear crisis in Japan following the earthquake and tsunami there was the result of an “exemplary poor safety culture and lax regulatory oversight system,” says University of Southern California engineer Najmedin Meshkati.

In Haiti, the long-running failure of government not only contributed to the initial disaster, but is hampering the emergence of a coherent vision for national recovery.

And in New Zealand, the importance of strong building safety codes enforced by governments was demonstrated conclusively. “New Zealand, California, and Japan are seen as global leaders in seismic mitigation,” says Lori Peek of Colorado State University. “Strong seismic safety codes work.”

## Japan

TOKYO ELECTRIC POWER COMPANY has a very poor safety culture, has been falsifying data for over two decades, and been ignoring or dismissing tsunami risk, Meshkati says. Japan’s nuclear regulation is done by an “unholy triangle” in which there is a revolving door between industry and regulators. These problems existed long before the Fukushima plant failure following the March 11, 2011, earthquake and tsunami in northern Japan. “The regulatory regime has been a totally convoluted system,” Meshkati says.

The immediate issue that caused the failure and radiation pollution from the Fukushima plant was the tsunami. The tsunami knocked out the alternative cooling power sources—not only the reactor, but also the offsite power from the backup diesel generator. The station then blacked out, and all the cooling pumps became inoperable.

But the company had long underplayed the potential severity of a tsunami like the one that hit Japan, resulting in “stupid errors that led to the disaster,” Meshkati says.

In early August, workers at the crippled Fukushima Daiichi nuclear plant recorded radiation levels of 10 sieverts per hour, enough to kill a person “within a few weeks,” ac-

ording to a story in the online magazine *Slate*. The World Nuclear Organization says the sievert is such a large unit that doses to humans are usually measured in millisieverts, or one-thousandth of a sievert. National radiation protection standards in the United States limit public exposure to one millisievert annually averaged over five years.

On the other hand, the journal *Nature* reported online on July 12 that radiation in the soil around the damaged nuclear plants is low enough that farmers can go back to work, and that the food grown there is safe.

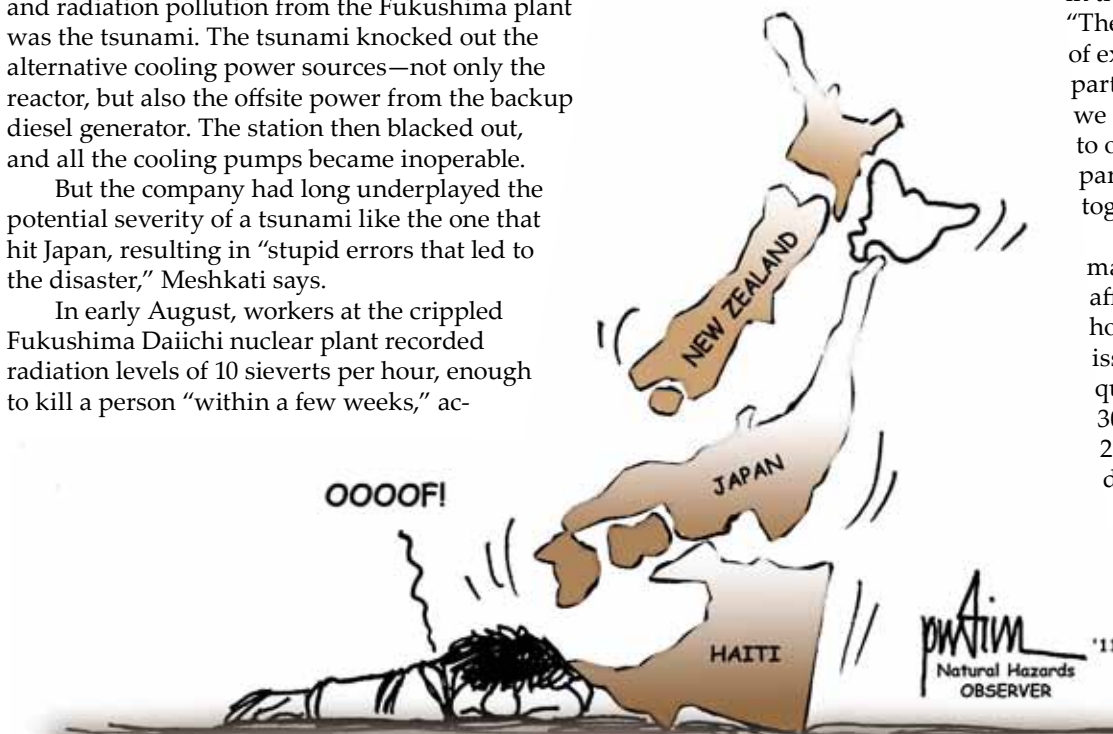
Japan’s response to the nuclear crisis was harshly criticized by Kevin Maher, a former director of the U. S. State Department’s Japan Office. As reported by the *Los Angeles Times*, the U.S. government was distressed by the failure of Japanese leadership in the wake of the Daiichi plant failures. “There was nobody in charge,” Maher told reporters at a speech to the Foreign Correspondents Club of Japan. “Nobody in the Japanese political system was willing to say, ‘I’m going to take responsibility and make decisions.’”

The March 11, 2011, event was actually three earthquakes that occurred at the same time, says Kyoto University Disaster Prevention Research Institute scientist Haruo Hayashi. The quakes occurred on the interplate boundary of the Pacific and North American Plates at a depth of about 4,000 meters (13,000 feet). The North American plate rose as much as 25 meters (82 feet), which caused the huge tsunami. It was the second largest quake in the 20th and 21st centuries, he says. The shaking lasted for 200 seconds.

The quake “was not unexpected,” Hayashi said. All three quakes had been predicted, but they were not expected to occur at the same time. “The first quake was predicted to have a 99 percent chance of occurring in the next 10 years,” he says. “The northern quake was kind of expected, and the southern part was less expected. What we didn’t expect was the three to occur together. We were prepared for each, but not for three together.”

Hayashi said that an estimated 7.3 million people were affected in 2.6 million households. Tsunami warnings were issued three minutes after the quake, and there was between 30 and 60 minutes of warning. 270,000 houses were inundated.

Early estimates of de-



struction were fairly similar from the World Bank and the Japanese government, at about \$37.5 billion, he says, although total long-term costs for making the population financially whole again may double that amount. An estimated 28,000 people were killed or missing, and 10,000 injured.

One issue highlighted in the crisis has been the elderly and with people with special needs, says Doshisha University's Shigeo Tatsuki. "In reality, what happened in Miyagi, the hazard factor was not fixed. We learned that the hazard that appears on the hazard map is a maximum probable event. We had a 700-year event. What happened was actually a maximum possible event, it created a much bigger tsunami. It was possible but not considered probable. We have to pay attention to the hazard factor."

Tatsuki creates sophisticated maps providing the location and priority needs of people with handicaps in Japanese cities so they can be evacuated and cared for in emergencies. "Four months have passed," he says, "but we do not know the conditions of people with disabilities. This is not well reported, but it is a very serious issue." According to the report *Great East Japan Earthquake: Preliminary Observations* by the Asian Disaster Reduction Center and the International Recovery Platform, 65 percent of the victims of the quake were over 60 years of age.

Very few of the quake deaths were caused by the earthquake itself, however. Ninety-three percent of those killed drowned in the tsunami, the report says. Four percent were crushed in buildings and another one percent died of burns. For two percent of the fatalities, the cause of death is unknown.

The ADRC/IRP report cites the eight meter sea wall, then the "world's largest breakwater," as a major anti-tsunami structural measure taken prior to the quake. This "Great Wall" at Kamaishi City "collapsed and the tsunami reached 6.9 meters to 9 meters high at several points. However ... the tsunami would have reached up to 13.7 meters high and would have caused damage to much wider areas without the wall. The breakwater wall was estimated to have impeded tsunami energy by 40 percent," the report says.



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## Haiti

EVEN BEFORE THE DEVASTATING JANUARY 2010 EARTHQUAKE, Haiti was not a model of effective government. Since then, public confidence in the government has reached new lows. And the refusal of aid organizations and donors to cooperate with the Haitian government is further eroding its credibility, severely damaging the chances for stable long-term recovery in the country.

"I have met the enemy in Haiti," says Claude de Ville de Goyet of the World Health Organization, "and he is us. We are creating a nightmare not for the next ten years, but for the next 25 years."

Florida International University Professor Richard Olson cites figures from several good governance organizations that showed that even before the earthquake, Haiti ranked at the bottom of the scale of governmental effectiveness. In the Human Development Index of 182 countries considered, Haiti ranked 149. Among the Freedom House "Failed State" index, Haiti was 12th from last. (See related story, page eight.)

Haiti is a state "that was never completed," Olson says. "It

was extremely weak, then came the disaster. It was also called the 'republic of NGOs.' ... It's a country dominated in many respects by the NGO community."

Oxfam America's senior policy adviser Angela Bruce Raeburn wrote on August 5, 2011, that she spoke to a 25-year-old unemployed Haitian who said, "Haiti is not a country. It is just a place."

Abby Cordova, Vanderbilt University political science research associate and director of the Latin American Public Opinion Project's (LAPOP) Field Experiment Research on Impact Evaluation, cites data from her group's surveys showing Haiti ranks at the very bottom of life satisfaction surveys among all the countries in the Americas by a wide margin. Haitians scored 35.4 points on the satisfaction scale. The United States scored 58.7. The highest score was Brazil at 71.6.

Since the earthquake, Cordova says there has been a sharp decline in trust in the government among Haitians, closely linked to the way the government handled the crisis. "Confidence in the national government was the lowest in comparison to other institutions," she says. "Foreign NGOs and foreign governments ranked highest in the way they handled the crisis" in polls taken six months after the earthquake.

Despite these low confidence numbers, Haitians have not abandoned democracy, Cordova says. Support for the form of government remains strong, with more than 70 percent of Haitians still committed to it.

But the behavior of NGOs and donor nations is also helping undermine the government. Most aid organizations

continue to do an end run around the government, declining to trust it with coordination responsibilities or funds. For instance, says de Ville, there were more than 400 health organizations attending UN cluster meetings. The Haitian health department asked the organizations to register with it. Only 49 did so.

"The marginalization of Haitian institutions by the international community has weakened their capacity to lead the recovery," says de Ville, who has worked in Haiti since the 1970s. "The cholera outbreak provided an opportunity for the UN and NGOs to maintain ownership in Haiti." Even meetings to coordinate recovery services were held in English, not in French.

Olson says, "Haiti's a sovereign country, at least on paper. So you're looking at a real conundrum of how much you wish to respect the sovereignty of a nation where you're working. It makes things vastly more complicated. The result is stovepipe project reconstruction."

He cautions, however, that we must take a long view. "We're only a year-and-a-half on. We need to chill out and keep all of this in mind. Haiti is still trying to construct a state while reconstructing a capital and surrounding areas with a vast number of donors and NGOs. Cut them some slack. It's not so bad. It's not so great, it's not ideal, but in an odd way, it's doing better than I would have thought. Keep a 10-year

perspective on Haiti's recovery. It's not going great, but at least it's going."

## New Zealand

IN NEW ZEALAND, PLANS HAD BEEN PREPARED FOR earthquakes, but the Christchurch region where the quake struck was not considered a high risk location. The fault in the area "hadn't ruptured in over 20,000 years," says Massey University professor David Johnston. "This was the worst case scenario. The energy was directly at the central business district."

The region was hit with two quakes. The first one occurred on September 4, 2010, about 40 kilometers (24 miles) west of Christchurch. Then on February 22, 2011, a strong shallow quake hit, centered about 10 km (6 mi.) southeast of the city. No one died in the first quake but the second killed 181, 118 of whom were killed in the collapse of a single building the city center. Many other buildings were damaged, but

not destroyed. Economic losses are estimated at US\$15 billion to \$20 billion, about nine percent of the nation's gross domestic product.

Johnston said one lesson from this experience is that "Low risk is not no risk. You have to prepare."

In both New Zealand and Japan, direct losses from the quake could have been much higher without strong building codes.

David Applegate, U.S. Geological Survey associate director for natural hazards, said that while the Japanese quake was a tragedy, only about 200 people died in the shaking. As terrible as it was, Applegate says, it could have been much worse if Japan had not made so many earlier investments in mitigation.

The earthquakes were discussed in three separate plenary sessions at the 2011 Natural Hazards Workshop from July 9 to 12, 2011 held in Broomfield, Colorado.

## Urbanism...

*(Continued from page one)*

lent number of housing units. There also should be more opportunity to avoid hazards and to protect environmentally sensitive areas.

With every disaster, the United States sets a new record for losses. A major driver of this trend has been that the sprawling metropolis model has fostered a massive buildup in hazardous areas during the second half of the twentieth century. That expansion—coupled with extreme climate-related weather events (droughts, floods, and heat waves) and the degradation of critical ecosystem services (wetlands, forested watersheds)—leaves a legacy which will further intensify these trends.

One thing the New Urbanism alternative could do in theory—but doesn't in practice—is plan ahead to reduce the community's susceptibility to hazards. Despite the attractiveness of New Urban design, there is concern about placing compact urban forms in harm's way. High-density developments place more people, residential and commercial buildings, and infrastructure at risk than conventional low-density development on equivalent hazard-exposed land unit. New Urbanism can pose a greater risk to people and property than low-density sprawl if hazards are not anticipated and hazard mitigation is not promoted.

The question, then, is whether the promise of New Urbanism has translated into more disaster-resilient urban development. Our research reveals that, so far, New Urbanism planning is an opportunity lost for hazard mitigation.

## The study

IN 2003, WE INITIATED A FOUR-YEAR STUDY supported by the National Science Foundation to examine the degree to which New Urban developments accounted for hazard mitigation. Our study was motivated by concern that urban planners and designers of New Urban developments might be paying insufficient attention to natural hazards.

We considered this to be particularly important for New Urbanism because of the increased density development standards. At the time of the start of our study, the widely publicized model New Urban design codes addressed goals relating to community character, sense of place, and pedestrian

movement, but had no specific design standards for natural hazard mitigation (Calthorpe 1993; Congress of New Urbanism 2002).

The theoretical advantages of New Urban subdivision design for reducing risks had not been evaluated in practice. To explore the connection between New Urban design and vulnerability, we sought to answer the following questions:

- What percentage of all New Urban developments in the United States that are complete or under construction are at least partially within floodplains?
- Are there any differences between New Urban and conventional developments with respect to the incorporation of flood hazard mitigation techniques?
- If there are differences between New Urban and conventional developments with respect to the incorporation of flood hazard mitigation techniques, are these differences a result of subdivision design type (i.e., New Urban or conventional) or are they the result of other factors?

We concentrated on floods, a common and costly type of hazard. The National Floodplain Insurance Program floodplain mapping provides a readily available nationwide data set on where floods are most likely to occur. New Urban design should be used to avoid areas known to be flood prone.

We first identified all New Urban developments in the United States that were: (1) complete or under construction as of December 2003; and (2) located at least partially inside the 100-year floodplain. Using a subset of these developments, we

One thing the New Urbanism alternative could do in theory—but doesn't in practice—is plan ahead to reduce the community's susceptibility to hazards. Despite the attractiveness of New Urban design, there is concern about placing compact urban forms in harm's way.



also developed a set of 33 matched pairs of New Urban and conventional developments. We then surveyed the local government land use planners primarily responsible for reviewing each of the developments on behalf of his or her respective local government, asking each planner to provide detailed information regarding how the developments were designed, including whether or not each development incorporated specified flood hazard mitigation techniques.

### The promise of New Urbanism

NEW URBAN DESIGN has several theoretical advantages over conventional low-density subdivision design in incorporating four categories of flood hazard mitigation techniques:

- **Stormwater best management practices (BMPs)** stores runoff, reducing on-site and downstream flooding. Examples include constructed ponds, wetlands, and detention basins.
- **Environmentally sensitive area protection** prevents development in floodplains and protects flood mitigation services provided by floodplain ecosystems, upland wetlands and natural drainage systems. Examples include minimizing fill and grading in floodplains and wetlands, and preserving native vegetation.
- **Stream channel modification** modifies stream channels in or near the development site to facilitate conveyance of stormwater off the site as quickly as possible. Examples include deepening or widening streams and stabilizing stream banks.
- **Structural protection** reduces structural vulnerability to floods if development is located in or near the floodplain. Examples include using fill to elevate buildings and building flood control dams on streams.

We identified three features of design we expected to affect the frequency of integration of these techniques into New Urban developments relative to conventional developments:

- **Higher Density:** Higher net densities than those of conventional developments are expected to create more opportunities for using nonstructural mitigation techniques. By permitting higher net densities, smaller lots accommodate an equivalent number of housing units as in a conventional development in return for open space within the New Urban development site or the surrounding area. High net density provides more opportunities for creating common open spaces to locate BMPs, avoiding development in environmentally sensitive areas, and reducing reliance on structural protection techniques. It also reduces pressure to build on hazardous parts of a development site that would require structural protection.
- **Stream channels:** Higher net density increases the likelihood of using stream channel modification tech-



niques (e.g., widen and deepen, stabilize, and clear debris) since compact development patterns concentrate stormwater runoff rather than spreading runoff across the landscape. While these modifications induce conveyance of on-site runoff and reduce on-site flooding, they increase runoff volume and velocity, which causes stream channel scouring and erosion, destruction of stream ecology, and increased downstream flooding.

- **Pedestrian orientation:** New Urban design de-emphasizes automobiles, which may benefit flood mitigation and ecological protection. Compared to conventional development designs with wide, straight streets to facilitate traffic flow, New Urban design includes narrow streets in layouts that spread out and calm traffic. Narrow streets have less paved surface area, offering protection for sensitive areas. On-street parking also provides more room for open spaces and stormwater BMPs. This New Urban design feature slows the flow of traffic and civilizes streets by creating not only a buffer between moving cars and the sidewalk, but also reducing demand for spaces in parking lots and large driveways. Narrow streets and on-street parking reduce need for structural protection using less space on a given site, offering more opportunities to avoid hazard areas.

- **Greenways:** Greenways are another key feature of New Urban designs that provide pedestrian and bike-way connections among residential, commercial, and civic areas, while also offering opportunities for protecting sensitive areas and installing stormwater BMPs. Pedestrian-oriented design may also encourage use of stream channel modifications. Narrow streets and on-street parking reduce the footprint of the New Urban development projects, which leads to more concentrated urban stormwater runoff and the need for rapid conveyance of runoff.

## Case study: Sunset Island



Photo by Mark Stevens

Sunset Island development is located in Ocean City on Maryland's Eastern Shore. The project covers 35 acres. Containing 590 residential units, Sunset Island is located entirely in the 100-year floodplain—obviously a dangerous location subject to sea level rise and coastal storms.

In coordination with the Ocean City government, the developers of Sunset Island were effective in incorporating a wide range of building mitigation practices into the project, including preservation of floodplain buffers, on-site wetlands, structurally strengthened buildings, permeable landscapes and parking areas, fill to elevate buildings and infrastructure, and stormwater detention basins.

While this site effectively incorporates mitigation, both property and life are still at risk given the dangers posed by the location.

As evident in recent disasters, notably Hurricane Katrina: (1) design limits can lead

to structural failure because extreme events are larger than the structures' capacity; and (2) design flaws and construction and maintenance shortcomings can lead to failure of protective works when they cannot stand up to the forces exerted by extreme events.

- **Mixed use:** By mixing land uses, New Urban design presents an alternative to conventional developments that segregate uses and separate homes from schools, shopping from jobs, rich from poor, and owner from renter. Mixed uses reduce the footprint of paved areas needed for automobiles, which creates more opportunity for sensitive area protection and stormwater BMPs and less need to use structural protection controls.

- **Civic and business use:** Placement of businesses and civic uses next to residences increases pedestrian accessibility, relieving parking pressure. Demand for parking can further be reduced by locating land uses with different peak-hour parking times near each other (e.g., movie theaters next to daytime offices), which allows joint use of the same parking spaces. Mixing complementary use also generates multipurpose trips wherein a single parking space can serve several trip purposes, decreasing demand for spaces and offering more room for sensitive area protection and stormwater BMPs. It also creates more opportunity to avoid on-site floodplain development, reducing the need for structural protection. Because this design feature encourages compactness in urban forms, it may induce greater use of stream channel modifications due to higher concentrations of runoff.

### Findings

USING UNIVARIATE, BIVARIATE, AND MULTIVARIATE statistical techniques to analyze the survey data, we found that:

- 35.8 percent (114) of all New Urban developments completed or under construction as of December 2003 (318) contain floodplains within their boundaries (Song, Berke, and Stevens 2009);
- The number of best management practices and envi-

ronmentally sensitive area protection techniques between New Urban and conventional developments are not significantly different (Berke et al. 2009; Song, Berke and Stevens 2009);

- New Urban developments incorporate significantly more stream channel modification techniques and structural protection techniques (Berke, Stevens, and Song 2009; Song, Berke, and Stevens 2009);

- Development type (New Urban vs. conventional) does not make a difference explaining use of any of the four categories of flood mitigation techniques when controlling local agency capacity, assistance services provided by the local government to the developer, whether or not citizens raised natural hazard-related issues during site plan review, community flood history, acres and units in the project, and proportion of the project site in the floodplain (Stevens, Berke, and Song 2010);

- The degree of assistance by the local planning agency provided during the review of both types of developments is the most important predictor of hazard awareness. Assistance included: one-on-one consultation during plan reviews; official predevelopment conference; a checklist of items to be included on site plans; workshop(s) to explain code provisions; newsletters or bulletins; and audio or video tapes (Stevens, Berke, and Song 2010).

In sum, findings reveal that New Urban design's potential for promoting resilience to natural hazards and environmental sustainability has not been completely fulfilled. New Urban developments are not taking advantage of the New Urban site design features that allow for greater avoidance of the floodplain when compared to conventional site design. Compared to conventional developments, New Urban devel-

opments rely more on structural protection than avoidance of floodplains, protection of environmentally sensitive areas, and installation of BMPs.

A partial explanation of the lack of performance may be inadequate attention by local planning agencies to mitigation. Since performance in incorporating hazard mitigation depends more on individual planning agency attention to mitigation during the development review process than the presence of site design advantages of New Urban developments, it is likely that planners are not fully aware of and trained to take advantage of site design features offered by New Urban design.

By virtue of their position at the interface between the private sector and government, planners are in a central position to make significant discretionary decisions in dealing with developers seeking permits. But because land use plans and development guidance ordinances often do not support mitigation planners, many communities are not taking advantage of their position. They could—but often don't—actively shape mitigation policy outcomes by interpreting local government rules.

Another explanation is related to New Urban design rules that do not account for mitigation. These findings justify our initial concerns regarding the lack of design standards for natural hazard mitigation included in New Urban design



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Planners are in a central position to make significant discretionary decisions in dealing with developers seeking permits ... They could—but often don't—actively shape mitigation policy outcomes by interpreting local government rules.

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codes, and cast doubt on the potential of New Urban design for reducing flood risks and protecting environmentally sensitive areas. New Urban design codes have apparently not directed project designers' attention to natural hazard issues. They have not inspired designers to address natural hazards on the project site.

However, recent revisions to New Urban design codes give us reason to be more optimistic about the future performance of New Urban subdivisions with respect to reducing flood risks.

In October of 2005, the prominent New Urban design firm Duany Plater-Zyberk & Company released the first New Urban design guidelines for natural hazard mitigation, in a document entitled "SmartCode Modules" that supplements *SmartCode 9.0* (the model development code for New Urban design).

## Recommendations

- LOCAL GOVERNMENTS SHOULD take a stronger role in proactive planning and management to create more disaster resilient development. High-quality land use plans pro-

duce several benefits: they draw attention to hazard mitigation issues that are likely to be ignored otherwise during development permit reviews; they incorporate land suitability analyses based on the best available scientific information to support decisions about which types of development patterns (e.g., low or high density) are best for which locations; they advance vulnerability reduction by integrating mitigation with other more established and well-known land use planning activities (conservation of open spaces, infill and redevelopment); and they provide a legal justification for regulation of development.

- States should adopt legislation mandating that local governments develop and implement comprehensive land use plans with hazard mitigation elements. Research indicates that state planning mandates offering clear guidance for incorporating mitigation into local plans foster better-quality plans (e.g., Burby and May 1997). States mandates should also require internal consistency between plans and development management ordinances and standards to improve prospects for local plan implementation. Without the formalized hazard mitigation elements in the comprehensive plans, developers might easily disregard hazard mitigation requirements—especially if mitigation plans are poor quality, development and infrastructure design regulations are lax, or staff capacity in implementing plans and regulations is inadequate. Endorsement of hazard mitigation elements by comprehensive plans can persuade local politicians, citizens, and developers to take responsibility for building hazard resilient communities.

- State and local government officials and planning practitioners should review and require that plans and development management ordinances include relevant features of the mitigation standards and guidelines in the most recent version of the *SmartCode* (Duany Plater-Zyberk & Company 2009), or create equivalent for more stringent standards that best fit their circumstances.

- Local land use planners should take a stronger role in informing public policy debates and educating the public, developers, and policy makers regarding how best to create more disaster-resilient communities. Planning researchers observe that planners can exercise substantial discretion, even within the formal guidelines of the project permit review process, determining how particular features of development management programs (including those relating to natural hazard mitigation) should be applied.

Despite its emphasis on high densities, New Urbanism holds considerable promise for reducing vulnerability caused by development in dangerous locations. Mitigation techniques may allow New Urban developments to become a more compatible alternative to sprawl for creating disaster resilient communities. The proliferation of New Urban development offers living laboratories for testing new ideas on how best to integrate mitigation initiatives into urban form. Urban planning and design practitioners should carefully evaluate these experiments as they evolve, and educate the public, developers, and decision makers to advance disaster resiliency.

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## References

Berke, Philip R., Yan Song, and Mark Stevens. 2009. Integrating hazard mitigation into New Urban and conventional developments. *Journal of Planning Education and Research* 28: 441-55.

Burby, Raymond J., and Peter J. May, with Philip R. Berke, Linda C. Dalton, Steven P. French, and Edward J. Kaiser. 1997. *Making Governments Plan: State Experiments in Managing Land Use*. Baltimore: The Johns Hopkins University Press.

Calthorpe, Peter. 1993. *The Next American Metropolis: Ecology, Community, and the American Dream*. New York: Princeton Architectural Press.

Congress of New Urbanism. 2002. *Charter of New Urbanism*. [www.cnu.org/charter.html](http://www.cnu.org/charter.html) (accessed January 14, 2009). Duany Plater-Zyberk & Company. 2009. *SmartCode Version 9.2*. Miami, FL: Duany Plater-Zyberk & Company.

Song, Yan, Philip R. Berke, and Mark R. Stevens. 2009. Smart developments in dangerous locations: A reality check of existing New Urban developments. *International Journal of Mass Emergencies and Disasters* 27:1-24.

Stevens, Mark R., Philip R. Berke, and Yan Song. 2010. Creating disaster-resilient communities: Evaluating the promise and performance of New Urbanism. *Landscape and Urban Planning* 94: 105-15.



## Resources

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

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

### CLIMATE CHANGE

**Distributional Impacts of Climate Change and Disasters: Concepts and Cases.** Matthias Ruth and María E. Ibararán, eds. 2009. ISBN: 978-1-84844-037-1. 216 pp. \$93.90 (hardcover). Edward Elgar Publishing. [www.e-elgar.com](http://www.e-elgar.com).

It's no secret to those paying attention that the impacts of global climate change will not be evenly distributed. The United States is expected to suffer relatively little, while many developing countries in Africa and Asia may feel severe impacts. But even in the United States, some areas will feel more effects than others. The desert Southwest, for instance, is expected to see considerably less moisture in many already parched areas.

This book looks at these differing global impacts using many measures, from relative warming to gender differences to across cities. This is a field that is still plagued with uncertainties—especially since fine scale model predictions of climate impacts remain imprecise—but it is an expanding area of interest and research. The papers produced in this book make a good start at examining this complex topic.

### WILDFIRES

**Fire Monks: Zen Mind Meets Wildfire at the Gates of Tassajara.** By Colleen Morton Busch. 2011. ISBN: 978-1-

59420-291-9. 256 pp. \$25.95 (hardcover). The Penguin Press. [us.penguin.com](http://us.penguin.com).

Tassajara in California is probably the best known Buddhist monastery in the United States, if only because nearly everyone has had the *Tassajara Bread Book* on their bookshelf at one time or another. *Fire Monks* puts disaster response into the Tassajara legend along with bread and contemplation. The monastery was threatened by wildfire in June of 2008 as thousands of fires broke out in California.

In addition to its contemplation of wildfire, Zen, and nature, the book is something of a study of the “leave early or stay-and-defend” that is a controversial component of wildfire fighting strategies. Several of the monks at Tassajara remained behind to try to save the buildings. It may be that a contemplative life is a good basis for the detailed preparations needed for a successful wildfire defense.

### FLOODS

**Clumsy Floodplains: Responsive Land Policy for Extreme Floods.** By Thomas Hartmann. 2011. ISBN: 978-1-4094-1845-0. 153 pp. \$124.95 (hardcover). Ashgate Publishing. [www.ashgate.com](http://www.ashgate.com).

Thomas Hartmann has himself a great title here, but what does it mean exactly? He says, “Even the series of extreme



flood events in the past 15 years could not change human activities in the floodplains: still values are going to be accumulated, destroyed, rebuilt and extended in riparian floodplains. This is clumsy.”

Persistent patterns of human activity have resulted in more and more money invested in flood protection. Even so, every year, extreme river floods cause enormous and increasing damage. Hartmann notes that the new paradigm for flood control is “flood risk management,” not “flood protection.” Recent history—or maybe all history, dating from the floods on the Tigris and Euphrates—have shown that people can’t be completely protected against every possible eventuality.

“This paradigm,” Hartmann writes in his chapter on extreme floods, “moves from the ideology that flood protection must guarantee the security of humans, flora, fauna, and economic values by defending the floods and ‘keeping the water out’ to an ideology of managing floods and asking citizens to ‘make space for water.’”

But getting people to step aside and make room for water is easier said than done. Hartman offers a very interesting game theory analysis to upstream-downstream flooding along a river. The actions of the two players, Upstream and Downstream, are dependent upon each other. Expanding on this approach, he offers a LATER strategy—Large Areas for Temporary Emergency Retention.

*Clumsy Floodplains* offers innovative approaches to the persistent floodplain problem.

**Rising Waters: The Causes and Consequences of Flooding in the United States.** By Samuel D. Brody, Wesley E. Highfield, and Jung Eun Kang. 2011. ISBN: 978-0-521-19321-4. 195 pp. \$99 (hardcover). Cambridge University Press. [www.cambridge.org](http://www.cambridge.org).

“The little-known fact is that, among all natural hazards, floods pose the greatest threat to the property, safety, and economic well-being of communities in the U.S.,” this book says on its first page. More property is lost and more people die from flood events than from tornados, earthquakes, and wildfires combined.”

Thus begins an exploration of the flood hazard in the United States, but focusing primarily on Texas and Florida as bellwethers of the hazard. The book, packed with data and maps, is directed to advanced students and researchers in hazards, but it also contains a wealth of information for the interested layman.

As in many books before this one, the authors recommend the greater use of nonstructural solutions to the flood hazard. “Land use-based measures may significantly reduce observed property damages from floods by guiding development away from flood-prone areas. Time and time again, using multiple statistical procedures, we have shown the value of this approach for enhancing the resiliency of coastal communities.”

## TSUNAMI

**The Asian Tsunami: Aid and Reconstruction after a Disaster.** By Sisira Jayasuriya and Peter McCawley in collaboration with Bhanupong Nidhiprabha, Budy P. Resosudarmo, and Dushni Weerakoon. 2010. ISBN: 978-1-84844-692-2. 273 pp. \$100.53 (hardcover). Edward Elgar Publishing. [www.e-elgar.com](http://www.e-elgar.com).

This joint project of the Asian Development Bank Institute and Edward Elgar Publishing is based on “the idea that

national researchers in Asia should be provided with an opportunity to critically examine the emergency relief, humanitarian response, and reconstruction efforts in their respective countries to the great Asian tsunami of 2004.”

An ambitious goal. The book offers a cautionary tale. “One of the main lessons of the delivery of assistance following the 2004 Asian tsunami is that much confusion and conflict is inevitable in the immediate aftermath of such situations,” the authors write. “Local emergency institutions in poor countries are almost always greatly over-stretched in crises of this kind. The international community rarely responds much better either.”

So what is one to do? “The policy implication,” the book says, “is that within the extremely limited funding available to support emergency relief measures in poor countries, much greater priority needs to be given to strengthening *local preparedness* rather than funding delayed responses in the aftermath of the event.” (Emphasis in original.)

## ALL HAZARD

**Cross-Training for First Responders.** By Gregory S. Bennett. 2010. ISBN: 978-1-4398-2653-9. 263 pp. \$69.95 (hardcover). CRC Press. [www.crcpress.com](http://www.crcpress.com).

When someone says “cross-training,” we usually think about lacing up the Nikes, running a couple of miles, then hitting the weight room, maybe a little yoga thrown in. A strenuous workout to be sure, but not as tough as the cross-training program that Gregory Bennett envisions in his book. Bennett wants a cross-training program that allows emergency first responders to talk to each other, understand each other, and be able to act effectively on the information exchanged.

The communications difficulties experienced in disasters have been well-documented. The classic example in the popular mind is the inability of New York City fire and police departments to communicate with each other on Sept. 11, 2001. But in many cases Bennett is talking about even a more basic level of communication. “Police cruisers” are pretty much the same all over the United States. Okay. How about a fire truck? A fire truck and fire engine are not the same thing. A “bus” might be a school bus, or in some jurisdictions it’s a vehicle used to transport the sick and injured.

Bennett says that on the West Coast a “tanker” is a fixed wing aircraft used to collect and drop water and retardant on wildfires. The same plane is called a “fixed wing aircraft” on the East Coast.

Bennett wants professional and volunteer first responders to get on the same page on these issues and more sophisticated ones as well. The National Incident Management System is making some strides in this direction, he says, but it will take some years before its effects are felt extensively. *Cross-Training for First Responders* explains the kind of training necessary to overcome the emergency response communications gap.

**Catastrophes! Earthquakes, Tsunamis, Tornados, and other Earth-Shattering Disasters.** By Donald Prothero. 2011. ISBN: 978-0-8018-9692-7. 326 pp. \$30 (hardcover). The Johns Hopkins University Press. [www.press.jhu.edu](http://www.press.jhu.edu).

This book fits neatly under the “all-hazards” heading because it’s about, well, all hazards—except maybe epidemics. I didn’t see much about epidemics. But it has the rest of the bases covered. Prothero is an engaging writer, who frames his book in the context of geology, beginning with the contentious issue of catastrophism and uniformitarianism. They

were contentious in the 18th century, anyway, and they echo some of their romance still, especially in the popular debates about evolution.

Prothero combines the anecdotal and scientific in his pursuit of knowledge about the world's perfidy. He looks at the 1906 San Francisco earthquake ("The Birth of Modern Seismology"), the Indian Ocean tsunami of 2004, the 1902 eruption of Pele, and many other famous disasters.

He also makes a bow to the changing climate, a mention of which is essential in any modern study, whether catastrophist or uniformitarian.

One topic Prothero examines that is often omitted from books like this is a discussion of mass extinctions. Because they have so far affected mostly non-human animals, most disaster researchers don't pay much attention to extinction. Prothero casts some welcome cold water on the recent trend to blame all or most of the mass extinctions on impacts from extraterrestrial bodies.

**Risk and Crisis Management: 101 Cases.** By Akira Ishikawa and Atsushi Tsujimoto. 2009. ISBN 978-9-8142-7389-3. 277 pp. \$58.00 (hardcover). World Scientific Publishing. [www.worldscientific.com](http://www.worldscientific.com).

Plunging right into its promised case studies on page three, *Risk and Crisis Management* updates the 1999 version of the book, which was published under a slightly different title. The first study looks at Internet usage following the 1995 Great Janshin-Awaji Earthquake, proceeding into communications strategies for disasters. Most of the case studies are only two or three pages long, and focus on the Japanese experience.

There's a little something here for every disaster taste, from dealing with supply chains, utilizing volunteers, and guarding against computer viruses to avoiding terrorist bombings and dealing with intruders in a hotel room. The book is based on the sound premise that self-help is the best help in a disaster, and this can only be achieved by a commitment to planning and preparation.

**Building Community Disaster Resilience Through Private-Public Collaboration.** By the Committee on Private-Public Sector Collaboration to Enhance Community Disaster Resilience, Geographical Science Committee, National Research Council. 2011. ISBN: 978-0-309-16263-0. 142 pp. \$34.95 (softcover). National Academies Press. Free download at [www.nap.edu/catalog.php?record\\_id=13028](http://www.nap.edu/catalog.php?record_id=13028).

In the current climate, the public sector alone can't be expected to shoulder all the burdens in emergencies. Collaborative arrangements with the private sector are always desirable and often essential to enhance a resilient response to stress. "Collaborative arrangements emerge when key public- and private-sector actors recognize that individual and community goals cannot be effectively achieved through independent efforts alone," this report says. "The private and public sectors each have resources, capabilities, and access to different parts of the community. Through their collective efforts to identify interdependencies, needs, and resources in advance, a community can significantly improve its disaster resilience."

The report identifies several key topics for research: why collaboration works or fails; ways of accounting for different outcomes that result from alternative partnership-building strategies; predicting partnership legitimacy, effectiveness, mainstreaming, and institutionalization; and appropriate metrics for quantifying the costs and benefits from collabora-

tion and resilience-building efforts.

## MEDIA

**The Shock of the News: Media Coverage and the Making of 9/11.** By Brian A. Monahan. 2010. ISBN: 978-0-8147-9554-5. 272 pp. \$70 (softcover). New York University Press. [nyupress.org](http://nyupress.org).

It is a truism that the way news is presented to the audience affects the narrative that the audience constructs. Brian Monahan contends in this book that America's mainstream news media is showing a "disturbing trend ... in which media resources and audience attention are becoming more and more oriented toward news that is fashioned in to long-running 'serialized dramas' that bear greater resemblance to popular fiction than to journalism."

Monahan calls this "public drama." He uses the maturing narrative of the September 11, 2001, terrorist attacks in New York as his focus, but he is tuned in to the other "public dramas" that have ripped through the headlines in the last 20 years or so: O.J. Simpson; JonBenet Ramsey; Laci and Scott Peterson; Natalee Holloway; and so on.

In the case of 9/11, television was the source for most of the news that people consumed about the tragedy. Monahan's analysis is most relevant to the electronic media, and especially to the broadcast media. He argues that television especially helped to frame the "responsibility and retaliation" question. Fox News stories, he writes, "Portraying America as the innocent victim of an unwarranted attack created a context in which retribution was necessary to complete the melodramatic transformation from victimhood, giving the Bush administration a moral ground to respond militarily." He says that CNN also led the charge toward a military response to the incidents.

You can't help feeling, though, that Monahan's emphasis on the electronic mass media as the story framer for 9/11 has limited use in assessing the future reception of important news stories. Since 2001, news coverage and delivery has become much more decentralized as a result of the proliferation of news and commentary on the Internet. It is true that "old media" have retained influence, but the Internet's day is young yet.

# Contracts and Grants

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

**Establishing radionuclide levels in the Atlantic and Pacific oceans originating from the Fukushima Daiichi nuclear power facility.** National Science Foundation grant #1136693. One year. \$157,626. Principal investigator Ken Buesseler, Woods Hole Oceanographic Institution, kbuesseler@whoi.edu.

The March 11, 2011 earthquake in Japan and the subsequent tsunami damaged and disrupted cooling systems at the Fukushima Daiichi nuclear power facility. Contamination of land and seas surrounding the site, as well as food supplies and drinking water, is being reported. Small but measurable quantities of radioactivity have been detected in the atmosphere over the United States, including aerosol samples collected at the Woods Hole Oceanographic Institution, where Iodine-131 was seen to increase to detectable levels as of March 21-22, and is continuing to increase.

Investigators at Woods Hole will establish a baseline radionuclide data set for the Atlantic and Pacific using an east to west network of sampling stations where they have the ability to sample regularly. The sites where the principal investigator has thus far made contact and has arrangements for sampling assistance include: Bermuda, WHOI, Santa Barbara Channel, Hawaii, Midway, Guam, and closer to the site in collaboration with Japanese scientists.

Establishing early activities after an accidental release of man-made radionuclides is key to understanding both the magnitude of the release and public health issues, as well as setting the stage for the use of the longer lived radionuclides as tracers in subsequent studies by the community to understand ocean processes. To put the total potential Fukushima Daiichi source in perspective, all of the atmospheric weapons testing in the 1950's and 60's released 36 million Curies of cesium-137, Chernobyl one million to three million curies, and Three Mile Island only 10 curies. At Fukushima, the potential source of Cs-137 in the reactor cores is 67 million curies and 180 million curies in the spent fuel ponds.

[www.nsf.gov/awardsearch/showAward.do?AwardNumber=1136693](http://www.nsf.gov/awardsearch/showAward.do?AwardNumber=1136693).

**GPS measurements and earthquake cycle modeling of the Mexico subduction zone.** National Science Foundation grant #1114174. Two years. \$281,163. Principal investigator Dennis DeMets, University of Wisconsin-Madison, chuck@geology.wisc.edu.

This project will continue a long-term GPS-based study of the seismically hazardous Mexico subduction zone (MSZ), where rapid plate convergence rates, the proximity of the trench to the coast, short earthquake recurrence intervals, and nearly flat subduction afford exceptional opportunities to measure and model all phases of the subduction earthquake cycle. The proposed work moves beyond their previous work in this region in several important respects. All the Mexican investigators who operate significant numbers of GPS stations in mainland Mexico have agreed to collaborate on an integrated study of the MSZ earthquake cycle, making this the first study to integrate GPS observations from the entire 1600-km-long MSZ, where all phases of the earthquake cycle have been recorded two or more times by GPS. They will use

newly available single-station ambiguity-resolution feature and new satellite products (due in mid-2011) to reprocess the pooled GPS data from 80 continuous stations and more than 100 campaign sites.

The expected reductions in the station coordinate noise will permit more detailed studies of episodic transient slip, interseismic strain, and afterslip than were previously possible. The researchers will test and apply a new inverse procedure to estimate and isolate the contributions of interseismic elastic strain, episodic transient slip, coseismic rupture, postseismic fault afterslip, and postseismic viscoelastic rebound to GPS station time series. Specific hypotheses regarding the stationarity and depth limits of transient slip will be tested and viscoelastic modeling will be done to understand present deformation in coastal and interior areas of Mexico.

In the Jalisco/Colima region of western Mexico, large subduction thrust earthquakes in 1995 and 2003, fault afterslip triggered by those earthquakes, and recently discovered non-volcanic tremor offer an exceptional opportunity to determine rigorously where these three processes originate along the subduction interface and what they reveal about the factors that determine down-dip changes in the frictional state along a subduction interface.

[www.nsf.gov/awardsearch/showAward.do?AwardNumber=1114174](http://www.nsf.gov/awardsearch/showAward.do?AwardNumber=1114174).

**Multi-frequency studies of lightning initiation and propagation.** National Science Foundation grant #1110030. Three years. \$710,646. Principal investigator Thomas Marshall, University of Mississippi, marshall@olemiss.edu.

Lightning is one of the worst natural hazards, killing more people in the United States on average than hurricanes or tornadoes and causing substantial damage to property and sensitive equipment. In spite of decades of study, we still do not understand exactly what physical mechanism causes the first spark of a lightning flash, how that spark grows into a conducting path (the lightning "channel"), or how the channel moves through cloudy and clear air.

The enhanced observational scheme for this project will use eight systems to observe lightning processes: (1) "slow" antennas; (2) "fast" antennas; (3) a network of seven crossed-loop magnetic sensors; (4) the KSC electric field mill network; (5) the KSC Lightning Detection And Ranging system; (6) the KSC Cloud-to-Ground Lightning Surveillance System; (7) high-speed video cameras (at 54,000 frames/second); (8) VHF radio emissions; and (9) fast electric field changes. All nine sensors look at electromagnetic changes caused by lightning as it accelerates and moves charge; the sensors operate across a wide and partially overlapping range of electromagnetic frequencies.

The various sensors respond to different parts of a flash: some parts are only a few meters in length while others are as long as a several thousand meters. There are two key features of the sensor array that will be especially useful in this new lightning investigation. First, the array will be able to determine the previously unknown locations of the long, fast electromagnetic pulses that occur during the initiation of both

in-cloud and cloud-to-ground lightning flashes. Second, the high-speed video images of a propagating lightning flash will literally give us visual pictures to combine with and compare with the data from the other 8 sensors.

[www.nsf.gov/awardsearch/showAward.do?AwardNumber=1110030](http://www.nsf.gov/awardsearch/showAward.do?AwardNumber=1110030).

**When online is off: Communicating in disaster following the February 22, 2011 Christchurch, NZ earthquake.**

National Science Foundation grant #1138901. One year. \$29,237. Principal investigator Jeannette Sutton, University of Colorado at Colorado Springs, [suttonj@colorado.edu](mailto:suttonj@colorado.edu).

The February 22, 2011 earthquake in Christchurch, New Zealand, an aftershock of a larger earthquake in September 2010, caused significant infrastructure and economic damage, and loss of life, in a modern city with similar population characteristics as U.S. metropolitan communities. In the days and weeks following the earthquake, various risk communication strategies were used to reach individuals affected by the ongoing aftershocks, including online networked communications.

This project examines the effects of reliance on online communications on individual coping ability and community recovery, and on the role of networked online communication among those directly affected by disaster. These questions will be examined through a series of focus groups and a household survey in the disaster-affected area.

The project will address the effect of networked communications, and its absence, on coping post disaster and has the potential to inform policy at the local, state, and national levels and to improve resiliency in U.S. communities.

[www.nsf.gov/awardsearch/showAward.do?AwardNumber=1138901](http://www.nsf.gov/awardsearch/showAward.do?AwardNumber=1138901).

**Tornado hazard perception and warning for the April 27, 2011, tornado in Tuscaloosa, Alabama.** National Science Foundation grant #1138894. One year. \$35,041. Principal investigator Jason Senkbeil, University of Alabama Tuscaloosa, [jcsenkbeil@bama.ua.edu](mailto:jcsenkbeil@bama.ua.edu).

This project will perform an in-depth layered analysis of risk perception and communication in multiple socioeconomic groups where severe damage occurred during the April 27, 2011 EF-4 tornado events in Tuscaloosa, Alabama. We will compare the use of social media with traditional outlets as information sources about the impending event. The tornado destroyed poorer sections of town that housed African-American and Hispanic neighborhoods. The research will investigate how these vulnerable socioeconomic groups and older residents reacted compared to the more mobile and younger populations at the university and what forms of communication they used during the event. Computer-based survey methods (using iPads for those remaining in shelters) with closed and open-ended questions will help illuminate the communication lines used by these various groups and the impacts of previous severe weather event "close-calls" on the behavior of residents during this disaster.

The project will investigate how differences in socio-demographic groups may drive the need for diverse methods of warning communication.

[www.nsf.gov/awardsearch/showAward.do?AwardNumber=1138894](http://www.nsf.gov/awardsearch/showAward.do?AwardNumber=1138894).

**Post-Disaster Structural Data Collection Following the 11 March 2011 Tohoku, Japan Tsunami.** National Science

Foundation grants # 1138710 and #1138699. One year. Two grants. \$28,835 to principal investigator Ian Robertson, University of Hawaii, [ianrob@hawaii.edu](mailto:ianrob@hawaii.edu) and \$13,688 to principal investigator Michael Olson, Oregon State University, [michael.olson@oregonstate.edu](mailto:michael.olson@oregonstate.edu).

The tsunami triggered by the March 11, 2011 magnitude 9.0 earthquake off Tohoku, Japan, created widespread structural damage in cities along the Japanese coastline. Careful documentation of flow depth and structural response resulting from this tsunami will provide data that can be used to validate tsunami inundation models and corresponding methodologies for calculating structural response due to the inundation.

This research will collect time sensitive impact data in Japan from this tsunami that will soon be lost, as buildings and infrastructure in the affected areas are repaired or demolished. The study will focus on collecting detailed, localized data in several of the most severely damaged areas of the coastline in the Miyagi and Iwate prefectures, rather than a general survey of all of the inundation areas, which has been undertaken by other local and international reconnaissance teams.

The reconnaissance team will collect high resolution, ground based LIDAR data. The LIDAR data will be used to generate virtual models that can be queried for measurements such as flow depths, observed maximum run-up, and scour depths at key sites. These will be complemented with manual measurements and analysis of videos and photographs. The LIDAR data will also provide detailed dimensional data for the structures to be studied.

The focus in specific areas of study will provide the data needed for validation of the tsunami inundation model. Furthermore, the structural properties of both damaged structures and undamaged structures will be used to determine hydrostatic, hydrodynamic, and impact forces applied during the tsunami inundation. This field reconnaissance will help resolve several key questions in the tsunami design provisions regarding flow velocities and momentum of tsunami bores and/or wave surges over land and scouring, as well as gain information on overarching questions on risk-based design criteria and the ultimate capabilities of structures to resist a maximum credible tsunami.

[www.nsf.gov/awardsearch/showAward.do?AwardNumber=1138710](http://www.nsf.gov/awardsearch/showAward.do?AwardNumber=1138710).

**The role of fluids in earthquake initiation and suppression: Models of fluid-grain interaction in fault zones.** National Science Foundation grant #1114235. One year. \$215,234. Principal investigator David Sparks, Texas A&M Research Foundation, [sparks@geo.tamu.edu](mailto:sparks@geo.tamu.edu).

Earthquakes represent a significant natural hazard in many inhabited areas of the world. Yet, despite much study, the conditions that control the stability and nature of the slip on faults are still poorly understood. An important control on fault stability arises from the fact that faults zones are often filled with granulated rock and the interstices of these grains are filled with groundwater. Variations in the pressure of this fluid have been observed to trigger movement on faults.

This research will provide a better understanding of the basic physics behind slip on faults, in particular the coupling between solid stresses and fluid pressures in the fault zone. The insight gained from this work will contribute to the efforts to assess the seismic hazard associated with individual

faults, and the risk of triggering earthquakes by natural or man-made changes in local groundwater levels. This work should also add to the understanding of saturated granular flows, such as landslides and offshore turbidity flows (both of which constitute significant natural hazards to lives and structures).

The saturated gouge-fault block system includes several coupled mechanisms that may control fault stability and determine the conditions under which faults creep, slip slowly (slow earthquakes), or accelerate into earthquakes. Increases in fluid pressure reduce the effective stress across a fault, which weakens the fault and promotes sliding, while the dilation that accompanies the onset of slip will lead to pressure reductions that can strengthen the fault. Fluid flow into and out of the fault will mute pressure fluctuations, but is highly dependent on permeability in both the granular fault gouge and in the confining wall rock, which in turn can vary greatly with gouge dilation and stress-induced damage. We will study this system using a grain-scale numerical model.

This model couples together the discrete element method for granular dynamics with a continuum finite-difference solution for fluid flow through permeable media.

[www.nsf.gov/awardsearch/showAward.do?AwardNumber=1114235](http://www.nsf.gov/awardsearch/showAward.do?AwardNumber=1114235).

**Liquefaction and its effects on buildings and lifelines in the February 22, 2011 Christchurch, New Zealand earthquake.** National Science Foundation grant #1137977. One year. \$99,554. Principal investigator Jonathan Bray, University of California-Berkeley, [bray@ce.berkeley.edu](mailto:bray@ce.berkeley.edu).

This award provides funding to investigate the effects of liquefaction on the built environment during the 22 February 22, 2011, magnitude 6.1 Christchurch, New Zealand, earthquake and the September 4, 2010, magnitude 7.0 Darfield, New Zealand, earthquake to capture perishable data leading to the development of enhanced analytical procedures for evaluating the hazard holistically. The intense ground shaking and resulting soil liquefaction from the Christchurch earthquake damaged many buildings, lifelines, and engineered systems. The Central Business District of Christchurch is still in ruins.

The February 22 event is particularly meaningful, because it occurred just five months after the Darfield earthquake, the epicenter of which was approximately 40 kilometers from the CBD. Whereas the latter event killed almost two hundred people, the September quake resulted in no deaths. Additionally, although the September 4 event caused widespread liquefaction-induced damage in the Christchurch area, it did not produce significant liquefaction-induced damage within the CBD.

The magnitude and distances of these two earthquakes are two of the scenarios often considered in U.S. cities. Capturing details of lateral spreads and the impacts of liquefaction on well-built structures, such as office buildings and their interconnecting buried utilities, are critically important. Understanding how local geologic conditions influenced the observed damage patterns is also important. Field reconnaissance is focusing on capturing perishable data and characterizing the subsurface conditions through: (1) trenching of liquefaction features; (2) performing dynamic cone penetration tests; and (3) measuring shear wave velocities.

[www.nsf.gov/awardsearch/showAward.do?AwardNumber=1137977](http://www.nsf.gov/awardsearch/showAward.do?AwardNumber=1137977).

**Disasters, resilience, and vulnerability of fishing communities in post-tsunami Japan.** National Science Foundation grant #1137856. One year. \$249,948. Principal investigator Bonnie McCay, Rutgers University New Brunswick, [mccay@aesop.rutgers.edu](mailto:mccay@aesop.rutgers.edu).

This research will study the rebuilding efforts in Japanese coastal fishing towns damaged by the recent earthquake, tsunami, and nuclear power crisis. The focus will be on how combined natural and human disasters affect community responses. Previous research on the relationships between disasters, vulnerability, and resilience have led in different directions, depending on whether the disasters are understood as caused by human or natural agency. In these accounts, natural disasters encourage communities to work together to develop better systems in the future, while human-made problems, such as air and water pollution, disproportionately affect vulnerable communities and limit their ability to rebuild. Building upon and contributing to social scientific theories on resilience, vulnerability, and nature-culture relationships, this project will investigate the cultural and political outcomes of dual (natural and human-caused) disasters. The research will comprise historical and ethnographic fieldwork, including archival research, open-ended and semi-structured interviews, and participant observation, in two Japanese fishing towns for which the researchers have baseline data.

By addressing the responses in coastal Japan over five months shortly after the disaster, with follow-up research several months later, this project will be sensitive to any changes that may occur as time passes. It will investigate early and middle-term responses to the extraordinary disaster as a way to shed light on the complex relationships among "natural" and "human" hazards, resilience, and vulnerability, offering important lessons for researchers and policy makers.

[www.nsf.gov/awardsearch/showAward.do?AwardNumber=1137856](http://www.nsf.gov/awardsearch/showAward.do?AwardNumber=1137856).

**Extreme weather events and emergency medical services: A discrete optimization modeling framework.** National Science Foundation grant #1054148. Five years. \$427,375. Principal investigator Laura McLay, Virginia Commonwealth University, [lamclay@vcu.edu](mailto:lamclay@vcu.edu).

This research investigates how to provide, timely resource allocation in emergency medical service (EMS) systems, namely, how to provide a coordinated EMS response to medical emergencies during extreme weather events, integrating two types of hazard mitigation problems that have been addressed separately in the literature.

In particular, this research investigates how to optimally dispatch medical units to geographically dispersed patients, as well as how dispatching policies change during normal and extreme weather events. Emergency medical dispatching protocols are typically designed for systems operating under normal weather conditions.

These new models and algorithms can be used to provide fundamental insights into the design and operation of EMS systems in response to medical emergencies that arise during extreme weather events. Challenging extensions investigate how to simultaneously locate and dispatch medical units and investigate game-theoretic aspects of emergency medical dispatch using principal agent problem models.

[www.nsf.gov/awardsearch/showAward.do?AwardNumber=1054148](http://www.nsf.gov/awardsearch/showAward.do?AwardNumber=1054148).



# Conferences and Training

**September 8, 2011**

**Risk Crisis Communications Seminar**  
Center for Toxicology and Environmental Health  
Little Rock, Arkansas

Cost: \$250

The seminar is designed to help first responders, state and local agencies, and medical personnel effectively communicate emergency information to the public, as well as internally. Topics include new media strategies, best practices for communicating in high stress situations, perspectives on transparency, and case studies from real life crises.

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

**September 19-21, 2011**

**Mountain Hazards 2011**  
United Nations Development Programme  
Dushanbe, Tajikistan

Cost: \$413

This conference is part of an ongoing effort to collect data, build international cooperation, and develop future projects that address the increasing mountain hazards created by climate change. Topics will include Central Asia geohazards, climate risk management, international climate change collaboration, and natural hazard research.

[www.mountainhazards2011.com](http://www.mountainhazards2011.com)

**September 23-25, 2011**

**Disaster Response Challenge**  
British Red Cross  
London, England

Cost: \$900

This two-day hypothetical disaster will provide first-hand knowledge of the issues and decisions experienced by Red Cross units when responding to a major incident. Each team will act as an independent emergency response unit and develop their own disaster response plan as the scenario unfolds in real time. Specific modules dealing with logistics, communications, first aid evacuation, and security will be included.

[www.redcross.org.uk/Get-involved/Events/Challenge-and-social-events/Adrenaline/Disaster-response-challenge](http://www.redcross.org.uk/Get-involved/Events/Challenge-and-social-events/Adrenaline/Disaster-response-challenge)

**September 25-29, 2011**

**Dam Safety 2011**  
Association of State Dam Safety Officials  
Washington, D.C.

Cost: \$700

This conference will look at the latest trends in safety and technology for dams and levees as well as provide training and networking opportunities. Session topics include cost-effective spillways, lessons learned from dam and levee failures, safety technical response teams, and the effect of National Flood Insurance Program mapping on levee safety.

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

**October 3-9, 2011**

**Second World Landslide Forum**

**International Program on Landslides**

Rome, Italy

Cost: \$430

Attendees will focus on how to better expand landslide research, technology, education, and decision making. Topics to be discussed include, landslides and global change, advancements in hazards and mapping assessments, and landslide awareness. This forum continues a conversation that started with the 2008 Landslide Forum in Tokyo.

[www.wlf2.org](http://www.wlf2.org)

**October 4-7, 2011**

**NEMA Emergency Management Policy and Leadership Forum**  
National Emergency Managers Association  
Austin, Texas

Cost and Registration: \$850, closes September 11

This forum will focus on national issues that impact emergency management and homeland security. Topics to be discussed include state models for private-public partnerships, cybersecurity, lessons learned from recent disasters, and defining terrorist threats.

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

**October 5-6, 2011**

**Road to Restoration**  
Auburn University Center for Governmental Services  
Orange Beach, Alabama

Cost: \$60

This conference will gather individuals able to play a role in the restoration of the environment and economy of Gulf Coast communities affected by the Deepwater Horizon oil spill. Session topics will include environmental impacts, impacts on education, business continuity and survival, and human health issues.

[www.auburn.edu/outreach/cgs/restore/documents/brochure\\_web.pdf](http://www.auburn.edu/outreach/cgs/restore/documents/brochure_web.pdf)

**October 11-13, 2011**

**Emergency Management Expo and Conference 2011**  
IAEM Europa  
Munich, Germany

Cost: \$500 for IAEM members; \$613 for nonmembers

Billed as a networking event "for all involved in civil protection and management," EMEC-Europa also has an impressive schedule of information session, including social media issues, the military perspective, business continuity and other topics.

[www.emec-europa.com](http://www.emec-europa.com)

**October 13, 2011**

**Buildings at Risk: Earthquake Loss Reduction Summit**  
Structural Engineers Association of Southern California  
Los Angeles, California

Cost: \$95; registration limited to 200 participants

The inaugural event of an anticipated annual series, Buildings at Risk is set up as a precursor to the Great Shake-Out event schedule for October 20. The goal of the meeting

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

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

is to increase the awareness of seismic risk, and to highlight the importance of the structural engineer in risk mitigation.

[www.seaosc.org/events\\_bar.cfm](http://www.seaosc.org/events_bar.cfm)

**October 22-26, 2011**

**The 5th International Mine Rescue Conference and the 3rd China International Forum & Exhibition on Workplace Emergency Management**

State Administration of Work Safety, Peoples Republic of China  
Beijing, China

Cost: Not available

Covering all aspects of mine rescue, this meeting bring together professionals, policy makers, researchers and media. Sessions include laws and regulations, emergency management structure for rescue operations, equipment, case studies and more. The meeting will be held in both Chinese and English, with simultaneous translation provided.

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

**October 24-28, 2011**

**Climate Research in Services to Society  
World Climate Research Programme**

Denver, Colorado

Cost: \$430

This meeting will be a comprehensive overview of the changing climate, from an assessment of research to strategic input into the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. The program "represents an exclusive opportunity to assemble the international scientific community working to advance understanding and prediction of variability and change of the Earth's physical climate system on all space and time scales."

[www.wcrp-climate.org/conference2011](http://www.wcrp-climate.org/conference2011)

**October 29-30, 2011**

**Constructed Environment Conference 2011**

Common Ground Publishing

Chicago, Illinois

Cost: \$450

In the wake of the cluster of earthquakes recently, issues surrounding the built environment have come to the forefront of disaster policies. This meeting explores all aspects of the form and function of the constructed environment "during a time of dramatic and at times disruptive change." It's intended for an interdisciplinary audience,

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from architects to anthropologists, economists to engineers.  
[constructedenvironment.com/conference-2011](http://constructedenvironment.com/conference-2011)

**October 31-November 2, 2011**

**IRDR Conference 2011**

Integrated Research on Disaster Risk

Beijing, China

Cost: Not available

The theme for this year's conference is "Disaster Risk: Integrating Science and Practice." Sessions will focus on characterization of hazards, understanding decisionmaking, and reducing risk through "knowledge-based actions." No one discipline can address these issues, the conference materials say, so it hopes to launch an interdisciplinary approach to practical disaster reduction.

[www.irdrinternational.org/conference2011.php](http://www.irdrinternational.org/conference2011.php)

**November 17-18, 2011**

**International Workshop on Innovation, Diversity and Sustainable Development in Areas of Social Vulnerability**

Center for Rebuilding Sustainable Communities After Disasters  
Boston, Massachusetts

Cost: \$200

This workshop will discuss strategies for empowering socially vulnerable populations and implementing public policies that support sustainable development in areas where the poor are at risk. Workshop topics will include some strategies for sustainable development, research and indicators for public policy changes, and how to train leaders for sustainable development.

[www.rebuilding.umb.edu](http://www.rebuilding.umb.edu)

**November 28-December 1, 2011**

**National Floodproofing Conference V**

Association of State Floodplain Managers

Sacramento, California

Cost: \$325

Local and national experts will share their techniques for state-of-the-art structural and nonstructural floodproofing, including riverine, coastal and levee protection issues. The meeting will also discuss measures that remove structures from flood-prone areas. The conference will build on the previous work from earlier triennial floodproofing conferences held from 1999 to 2008.

[www.floods.org/index.asp?menuID=739](http://www.floods.org/index.asp?menuID=739)



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**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](http://www.colorado.edu/hazards/about/contribute.html)

Or contact Ezekiel Peters at [ezekiel.peters@colorado.edu](mailto: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.

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