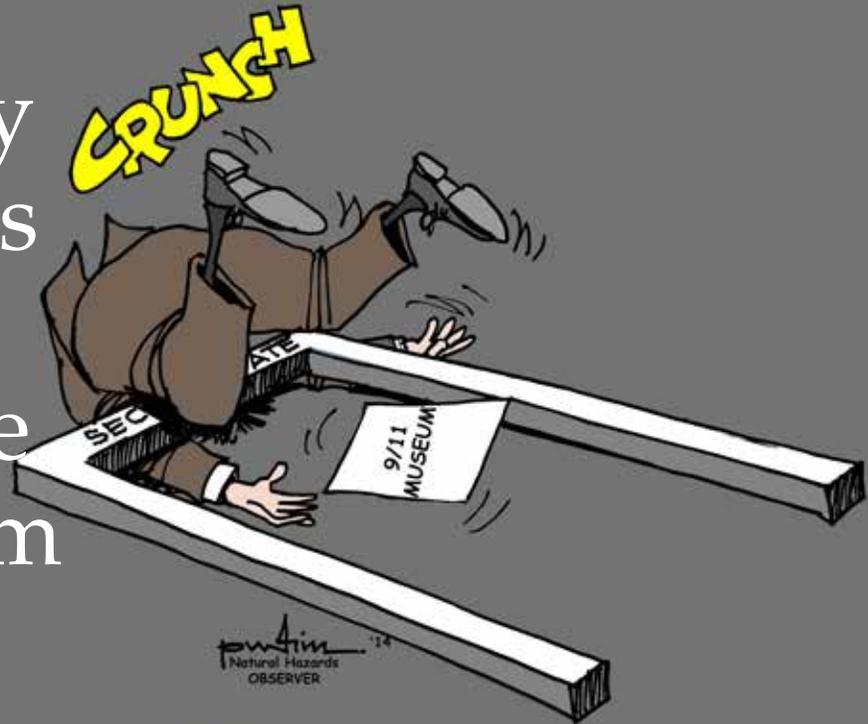


Paying my \$27 respects to sacred space at the 9/11 museum

An invited comment by
Jack Rozdilsky



THE NATION RECENTLY OBSERVED THE 14TH ANNIVERSARY of the tragic events of the morning of September 11, 2001. The impetus for this reflection was my early June 2014 visit to the National September 11th Memorial and Museum located at the World Trade Center in New York City. While the memorial opened three years ago, the museum portion of the site opened to the public on May 21, 2014. After spending a day at the 9/11 Museum, I was left with contradictory feelings—what the psychologists call “cognitive dissonance.”

While the museum is designed for mass tourism, I found that the 9/11 Museum stands apart from the typical New York City spot. It is darker in tone and more complex in interpretation. Upon the museum’s opening, sentiments have been mixed, ranging from those in forums like *The New Yorker’s* critical analysis piece “Stones and bones: The 9/11 memorial and museum” (Gopnick 2014) to more intensely personal distaste of the museum like the criticism posted on the internet media site *Buzzfeed* titled, “The worst day of my life is now New York’s hottest tourist attraction”(Kandall 2014).

This essay springs from my own observations and feelings spurred by visiting the 9/11 Museum shortly after its opening. First, I will address the museum’s implementation, specifically the audience for which museum’s narrative is most appropriate. Then, I will describe three elements of the museum which contributed to my contradictory feelings on the entire museum experience. These elements are the fee for entry, the security theater experience, and the gift shop.

The 9/11 Museum is a mishmash that didn’t allow me to experience the memorialization I was seeking.

A place for reflection?

EACH SEPTEMBER, I NOW FIND IT NECESSARY to teach my students a case study of 9/11 events. To most university freshman, their relationship to 9/11 is getting more similar to mine with the Korean War—a vague recollection. While all of the students know 9/11 took place—they have seen images of planes hitting buildings—many contemporary underclassmen have only limited 9/11 literacy. This is less of a reflection on the college students than it is on the passage of time. The young men and women who start college in fall 2014 were born in 1996, making them five years old in 2001. For the growing segment of the population who will be too young to have any relationship to 9/11, the 9/11 museum does a commendable job of crafting a blow-by-blow narrative of the day. The experience of being at the actual site of mass casualties, seeing the artifacts on display, reading the explanations, and comprehending the timelines would serve any person well who was too young to fully understand what occurred on 9/11.

However, as someone who experienced 9/11 in my own way, I didn’t benefit from the level of detail and the third-party interpretation of what had happened. I was seeking more of

(Please see “Museum,” page nine)



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

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Observer cartoons are drawn by Rob Pudim.

Send items of interest to the Natural Hazards Center, University of Colorado at Boulder, 483 UCB, Boulder, CO 80309-0483; (303) 492-6818, (303) 492-2151 (fax); hazctr@colorado.edu. The deadline for the next *Observer* is **November 30, 2014**.

They Said It ...

“You need to take care of it like you take care of your soul.”—Title of **paper on mosquito net damage, care, and repair in Senegal at *Malaria Journal***.

“The year 2013 set a new record for violence against civilian aid operations, with 251 separate attacks affecting 460 aid workers. Of the 460 victims, 155 aid workers were killed, 171 were seriously wounded, and 134 were kidnapped. Overall this represents a 66 per cent increase in the number of victims from 2012.”—***Unsafe Passage: Road Attacks and Their Impact on Humanitarian Operations, a report by the group Humanitarian Outcomes***.

“In theory, Ebola is easily containable. It has a long incubation period—around a week on average—and cases are typically infectious only after displaying symptoms. This means that isolation of symptomatic patients, contact tracing and follow-up surveillance of all contacts would be sufficient to stop transmission.”—**Adam Kucharski and P. Piot in *Eurosurveillance***.

“If we tell them that it not easy to contract Ebola and that they can protect themselves if they respect some rules, they often understand.”—**Dr. Saran Tata Camara in a World Health Organization release, in Guinea**.

“There is food shortage in the market and the demand is high, and this has urged traders to increase their prices. The situation in the country is getting more difficult every day, and if this [Ebola] virus is not tackled as quickly as possible, many Sierra Leoneans are going to die of hunger, particularly the poor citizens.”—**Freetown resident Alpha Bah, quoted by *ReliefWeb***.

Fear accompanies Ebola outbreak

In mid-September, the United States pledged to send up to 3,000 soldiers to West Africa to try to combat the Ebola epidemic that is spiraling out of control there. At the time of the announcement there had been 4,200 cases resulting in 2,400 deaths from the disease in five countries.

As of October 14, 2014, WHO reported over 8,900 cases, with more than 4,400 deaths from the disease, nearly all in West Africa. There have been cases in the United States and in Spain. For the four weeks prior to October 14, 1,000 new cases per week had been reported.

In early August, World Health Organization Director-General Margaret Chan declared the epidemic a “public health emergency of international concern.” But generally the international community has been slow to respond.

In a report in *The Lancet Infectious Diseases*, a team of Yale University scientists said that unless international assistance is immediately and substantially increased, there could be as many as 171,000 Ebola cases in West Africa and 90,000 deaths by December 15. About half of these cases could be averted if the international community takes immediate, substantial steps, the authors say.

In a September 11, 2014 opinion piece by Meena Ahamed and Michael O’Hanlon at Brookings, the authors said, “So far, the international response to this public health tragedy has been inadequate. Thousands of beds need to be made available, as well as experts who can trace victims to their villages to help protect exposed populations. Proper burial practices are essential. People are dying from a disease that may not have a cure but is containable.

“Yet the initial U.S. offerings included a 25-person mobile hospital—only for health workers who may become infected—and some diagnostic capabilities ... a military-scale operation is needed to contain the epidemic,” they wrote.

Efforts to stop the disease are proceeding on essentially three fronts: logistical, pharmaceutical, and control. The American troops in the affected nations—primarily Liberia, Senegal, Guinea, Nigeria, and Sierra Leone—will build treatment centers, train health care workers and coordinate logistics, according to the *New York Times*. They’ll build “as many as 17 Ebola treatment centers in the region with about 1,700 beds.” They’ll have the capacity to train about 500 health care workers per week.

The mortality rate from the disease in the current outbreak has been about 70 percent, which is actually an improvement over earlier ebola epidemics, which have seen 90 percent of those infected die. This could be a sign of the benefit of early treatment, or it could simply be a statistical anomaly.



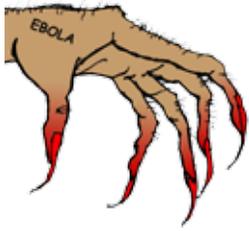
There is no cure for the disease, but early intervention to keep patients hydrated and well rested may have an effect. The fact that the disease occurs in poor African countries with poor public health infrastructures is doubtless a contributing factor to the high mortality rate.

An [article](#) in the journal *Eurosurveillance* by Adam Kucharski and P. Piot from the London School of Hygiene and Tropical Medicine, said, “In theory, Ebola is easily containable. It has a long incubation period—around a week on average—and cases are typically infectious only after displaying symptoms. This means that isolation of symptomatic patients, contact tracing and follow-up surveillance of all contacts would be sufficient to stop transmission.”

Another paper in *Eurosurveillance*, by H. Nishiura and G. Chowell of the University of Tokyo and Arizona State University respectively, estimating the transmission dynamics of the disease, found that the “effective reproduction number” (R_t) for Ebola is between 1.0 and 2.0. If R_t is less than 1.0, the epidemic will die out on its own. “Values of $R_t < 1$ indicate that the epidemic is in a downward trend. By contrast, an epidemic is in an increasing trend if $R_t > 1$. The mean reproduction number for EVD has been estimated at 1.83 for an outbreak in Congo in 1995 and 1.34 in Uganda in 2000 prior to the implementation of control interventions.”

Measles has the highest recorded transmission rate. Prior to 1963, when a vaccine was introduced, one case of measles sparked 17 more. In the 1918-20 Spanish flu epidemic, each infection [produced](#) two to five new cases, according to an Arizona State University researcher, reported in *Slate*.

Sierra Leone and Liberia’s numbers are 1.4 and 1.7 respectively. In the worst case, there would be an additional 77,000



to 277,000 additional cases in 2014. Control of the disease could be attained “by preventing over half of the secondary transmissions per primary case,” authors say.

These rates were confirmed in another [paper](#) in *PLoS Currents: Outbreaks* which found a reproductive rate of between 1.6 and 2.0, consistent with prior outbreaks .

However, “we identified only weak evidence for the occurrence of epidemic control in West Africa as a whole,” the authors write, “and essentially no evidence for control in Liberia ... It is projected that small reductions in transmission would prevent tens of thousands of future infections. These findings suggest that there is an extraordinary need for improved control measures for the 2014 Ebola epidemic, especially in Liberia, if catastrophe is to be averted.”

This kind of containment has not been achieved, however, for several economic and cultural reasons. Whatever the final count is, so far the disease has been underestimated, if anything. The World Health organization [says](#) its official statistics “vastly underestimate the magnitude of the outbreak.”

WHO did say in late September that Ebola infections will reach 20,000 by November, Agence France-Presse [reported](#). “Without drastic improvements in control measures, the numbers of cases of and deaths from Ebola are expected to continue increasing from hundreds to thousands per week in the coming months,” WHO said. “The cumulative number of confirmed and probable cases by November 2 ... will be 5,925 in Guinea, 9,939 in Liberia and 5,063 in Sierra Leone.”

The Centers for Disease Control and Prevention, meanwhile, says there could be 1.4 million cases of the disease by February. *The New York Times* [reports](#), “In the worst-case scenario, Liberia and Sierra Leone could have 21,000 cases of Ebola by September 30 and 1.4 million cases by January 20 if the disease keeps following its current trajectory, without effective methods to contain it. These figures take into account the fact that many cases go undetected, and estimate that there are actually 2.5 times as many as reported.”

A couple of surprising and optimistic drug developments have occurred in the wake of the outbreak. Mapp Biopharmaceuticals tested its new drug ZMapp on macaques, which suggested “impressive efficacy at preventing lethal disease,” according to an article in the *Journal of the American Medical Association* by the University of Pennsylvania’s Steven Joffe. Six health workers and a priest received doses of the drug and apparently benefited from it. But its scarcity makes it unlikely to contribute to preventing an epidemic immediately.

And an article in *Nature Medicine* in early September showed that a “human adenovirus type 5 vectors (rAd5) encoding ebolavirus glycoprotein” vaccine with some modifications provided long-term protection against Ebola.

Joffe, however, urged caution in the understandable push to deploy promising but unproven agents to fight the epidemic. “Scientifically and ethically justified use of scarce new agents in the midst of the Ebola epidemic, or any other epidemic for which novel agents hold promise, requires reflection on the understandable desire to rescue imminently dying patients. Clinicians, investigators, and policy makers must deploy novel agents in ways that address pressing scientific questions, prioritize research in populations that will be most

scientifically informative as well as most likely to benefit, ensure valid answers through the use of supportive care controls, and protect critical clinical and public health resources from diversion to longer-term aims. By doing so, they can maximize lives saved in the present epidemic and ensure knowledge gains for the next.”

There are many cultural and economic issues that are slowing the response to the disease. The World Health Organization in Guinea has fielded questions like: will eating raw onions for three days protect me from Ebola? Is it safe to eat mangoes? Can condensed milk prevent Ebola?

Dr. Saran Tata Camara in Guinea said in WHO release, “If we tell them that it not easy to contract Ebola and that they can protect themselves if they respect some rules, they often understand.”

According to the Centers for Disease Control, there are five species of Ebola, four of which occur in humans. The natural reservoir of the virus has not been identified definitively, but it probably is bats. How humans first get it from that reservoir is also unknown, but researchers hypothesize that the infected individual gets it from contact with the animal. The virus is spread via a sick persons blood or bodily fluids, contaminated objects or infected animals.

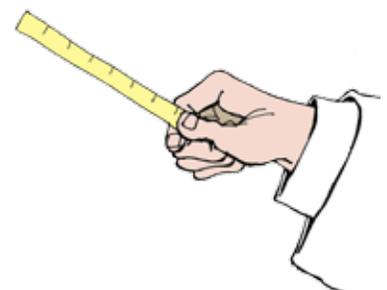
Ebola is having secondary and tertiary impacts on the West African nations its impacting. In Sierra Leone at the end of September, food supplies were running so low that it was feared people would die from hunger, according to Relief-Web. Food prices were “soaring out of control due to the lack of cross-border trade since the borders to Liberia and Guinea closed,” the web site [reported](#).

And eight members of an Ebola education team were killed in a village in southeastern Guinea when they tried to teach villagers in a remote area about the disease. In Kenema, Guinea, *Frontline* producer Wael Dabbous reported that residents rioted when rumors spread that Ebola was a hoax to allow doctors to steal people’s blood.

The International Crisis Group [says](#) that the Ebola health crisis could become a political crisis that unravels “years of effort to stabilize West Africa.” ().

The organization said, “In the three most affected countries—Liberia, Sierra Leone and Guinea—the Ebola epidemic has exposed citizens’ lack of trust in their governments and the grave potential for deep unrest in these already fragile societies. In all three countries, past civil conflicts fueled by local and regional antagonisms could resurface. In Guinea, the government’s poor response has stoked historical tensions between the state and local communities in the forested areas of the south east, where the epidemic started.

“In Liberia, the hardest hit with approximately half of the total deaths, and Sierra Leone, the governments have substituted a largely misguided military response for robust focus on medical needs. This should not come as a surprise. Security has been the main pillar of post-conflict reconstruction and governments are reacting with what is at their disposal: soldiers, not doctors. Before the epidemic, Liberia had just around 45 doctors for a population of 4.5 million; as the virus has spread, half of all health centres have been closed due to lack of medi-



cal staff.”

While the media in the United States focused obsessively on Ebola in Texas, the World Health Organization published an unusual **report** that documented in human terms the track Ebola has taken in poor West African nations, from the first victim—a two-year-old boy in remote Meliandou, Guinea to the exponential increase in cases in Liberia.

The report confirms the seat-of-the-pants observation that in a disaster, it is better to be rich than poor. The WHO report says, “The true number of deaths will likely never be known, as bodies in the notoriously poor, filthy and overcrowded West Point slum, in the capital, Monrovia, have simply been thrown into the two nearby rivers.

“Liberia has only one academic referral hospital, the John F. Kennedy Medical Center in Monrovia. The hospital was severely damaged during the years of civil war; floods and

electrical fires are frequent. As in Sierra Leone, some of Liberia’s ‘medical giants,’ working at that badly equipped hospital, became infected with Ebola virus disease and died.

“The capacity to deliver basic health services has been diminished for many treatment and emergency needs, whether arising from infectious diseases, a chronic condition, or a road traffic injury.”

In its October 1 “road map situation **report**,” WHO said that there had been 7,178 confirmed or suspected Ebola cases, and that there was a downward trend in Guinea, but upward trends in Sierra Leone and probably Liberia.

A few days in Liberia

By Carol Rowe

I arrived in Monrovia, Liberia Oct. 3, as a United Nations volunteer assigned to the United Nations refugee agency. I am one of three international volunteers who came recently to help the agency through the Ebola crisis, including a program associate from Ghana and a Bangladeshi doctor.

While there is a lot of concern about potential exposure to Ebola throughout the city, I consider myself to be at relatively low risk since I am not working in a health care setting. There is vigilance in hygiene practices, both at UN facilities as well as supermarkets, banks, and other places where business is conducted.

Each facility has a hand-washing station outside where everyone must wash their hands in chlorinated water before entering. Most also use laser thermometers to take each person’s temperature without touching the skin before allowing them to enter. So I have my temperature taken five or more times each day. I’d know immediately if I were to develop a fever, the first sign that a person could be contagious if they have Ebola. On top of these measures, touching other people has become taboo in a society where a hug and kiss on the cheek was a common form of greeting.

And there are two UN medical clinics here, one near my office and the other near my home. With the current conditions, there is also a push to expand the UN clinics with more staff and a bigger facility to open 24/7. Disaster response teams are coming in from the United States and European Union, along with a group of Cuban doctors and teams from other nations, to staff and train additional health care workers.

I am working as a public information officer for the UN High Commissioner on Refugees, whose main mission during the outbreak is to try to maintain the health of some 39,000 refugees who are in the country from other parts of Africa. Most of these individuals came here from the Ivory Coast during that country’s 2010 post-election violence. They live in three refugee camps along Liberia’s eastern border. So far, none of the refugees living in these camps have contracted Ebola, but there are cases in one community approxi-

mately 15 kilometers from the camp. So vigilance is being exercised and there are a number of campaigns by UNHCR and its various NGO partners to raise awareness, implement best practices for water, sanitation and hygiene, and construct community care centers where potential Ebola patients could be isolated.

There are also some refugees living in Monrovia and other smaller communities who are under the watch of our agency. A handful have contracted Ebola. One heartbreaking story of this week concerns a Ugandan refugee who fled his country some time back, came to Liberia and was supported in his desire to attend medical school. He received his degree a decade ago, and was practicing medicine at a Monrovia hospital. He contracted Ebola and has now died.

Meanwhile, economic conditions continue to be very rough for the average Liberian, who earns around one dollar a day. The current squeeze on travel in and out of the country has led to higher prices on most things, and a number of Liberians have lost their source of income due to restrictions on movement.

A can of soup costs \$4, and apples are \$6 per pound. But I am grateful to have electricity around the clock, with only brief outages mostly caused by the management changing from one generator to another. The capital city was damaged in the civil war a decade ago and the system has not been fully rebuilt. So large sections of the city are powered by generators and many landlords turn off the power for several hours each day because of the high cost.

Carol Rowe is the former director of communications for the College of Engineering and Applied Science at the University of Colorado Boulder. She retired in 2013.



Is this epidemic like the last one?

By Joe Scanlon

In 1918, a deadly strain of influenza—known incorrectly as the “Spanish flu”—started in rural Kansas and then spread around the world, eventually killing between 30 million and 50 million people worldwide. It’s estimated that 675,000 Americans and between 30,000-50,000 Canadians.

(All those figures are estimates and all are probably way too low: no adequate records were kept; the flu was not always reported as the cause of death; and flu was initially not a reportable disease in 1918.)

The flu spread largely by train across the United States and later Canada. In both countries it was carried largely by soldiers. It spread so quickly that within days, perhaps a week, it left hundreds or thousands of people ill and dying in every community. It created not so much two national emergencies but hundreds of thousands of local emergencies in each country, all at the same time. Mutual aid was almost impossible: communities had to rely on their own resources.

Today there is a new threat. The director general of the World Health Organization Margaret Chan has called Ebola “unquestionably the most severe acute public health emergency in modern times.”

Is the experience of 1918 of any value? Clearly, there are many differences between now and 1918.

MOST COMMUNITIES REACTED THE SAME WAY to the flu epidemic. After first downplaying the seriousness of the flu—the medical health officer in Ontario said it was “not a bit more serious than measles”—most local boards of health ordered schools, churches and other public gathering places closed. They opened emergency hospitals and appealed for women to volunteer as nurses. Since in 1918 many flu victims could not afford to go to hospital, they arranged for women to make visits to homes where people were ill and for others—like police—to deliver supplies to those homes.

All these responses were ad hoc. In 1918 there was no emergency planning of any kind, let alone for a health emergency. There were no protocols advising health care workers how to protect themselves. Many volunteers looked after flu patients after an hour or two of lectures. There was also no attempt to trace how the flu spread from person to person. In some places, homes with the flu were placarded but that had little effect. No one prevented those living in those homes who were not ill from going to work.

There was also no real knowledge of how the flu spread—the fact it was a virus was not established until much later. Newspapers were filled with advertisements for remedies to protect one from the flu. It is now known that the incubation period for the flu is about three days. People with the disease are most contagious 24 hours before the first symptoms appear—meaning it’s spread by persons who feel fine. That made it virtually impossible to monitor.

Neither U.S. President Woodrow Wilson nor Canadian Prime Minister Robert Borden played much of a role. Wilson’s main involvement was to agree soldiers would be shipped overseas, knowing some would die of the flu en route. Borden convinced his cabinet to send troops to Russia to fight the Bolsheviks. They travelled from east to west spreading the flu as

they went. In the United States, Rupert Blue, head of the U.S. Public Health Service, started a public education campaign, but his statements were seen as advisories not mandates. State and local health authorities made their own decisions. In Canada there was no federal health agency. Each province issued its own guidelines—often ones that contradicted those issued by other provinces.

THE INCUBATION PERIOD FOR EBOLA is between two and 21 days, meaning someone who contracts the disease could travel extensively and have hundreds of contacts before the first symptoms occur. However Ebola is not contagious until those symptoms appear. That should make it easier to deal with than the flu, if persons with symptoms report immediately to hospitals. But it means—as has already happened—persons who have had contact with the disease have been traveling on commercial flights and holidaying may be unaware they are ticking disease bombs.

Today, unlike in 1918, there is planning at the federal, state (provincial) and local levels both by government and by health authorities and hospitals. Medical staff have been told what to do if someone is a potential Ebola victim. Those protocols are usually being followed (although not always successfully).

As this is being written, there have been Ebola cases in Norway, Germany, the United Kingdom, Spain and the United States as well as in West Africa. Only three cases outside West Africa resulted from local contact with someone with the disease. Because there are—so far—so few cases, health authorities have been able to move quickly to isolate those cases and to identify and monitor their contacts.

At a small hospital in Belleville, Ontario, for example, when a soldier who had been in West Africa came into emergency with Ebola-like symptoms, he was in isolation and cared for by properly robed staff within four minutes. (He did not test positive.) However, the guidelines are always thoroughly applied. The Texas case involved someone who traveled by commercial air before the first symptoms appeared.

THINGS WILL CHANGE DRAMATICALLY if the disease starts to spread and scores, hundreds, or thousands, become ill. Mutual aid will become impossible. Resources such as those at the Centers for Disease Control and Prevention in Atlanta or the Public Health Agency in Winnipeg can only be stretched so far. Communities and hospitals will have to cope on their own—and they will quickly realize that while they may have one or two or perhaps several rooms prepared for such patients, their resources are not sufficient for dozens desperately ill. The teams announced by President Obama and being set up in Canada will be successful if Ebola shows up only in a few places.

In 1918, most communities recruited volunteers to nurse the sick. That seems less likely to work today. For one thing, dealing with Ebola victims is so risky it is doubtful medical authorities would want untrained persons dealing with those victims though, judging from television reports, that is happening in West Africa. For another, there were three main sources of volunteers in 1918: single women teachers (they became available when the schools closed); skilled women (such



as former nurses) who had stopped working when they married; and members of religious orders. Today most teachers are not single women, skilled women are not as likely to stop working when they marry, and religious orders have become smaller and smaller.

There will be even more pressure on nurses. It is nurses who today—as in 1918—will be the health care workers most at risk. Then, as now, nurses were often the first to greet a patient to assess her condition. Nurses had the most contact with ill patients. It will not be surprising if more nurses become ill. That inevitably means there will be a shortage of trained personnel when the need is greatest.

When there is a lack of preparation, it shows. When the flu struck, Canadian Army Medical Corps nurses had been long since integrated in the medical system since Canada was in the fifth year of war. The United States had just entered the war. American nurses suddenly thrust into nursing sick—rather than injured—patients were unprepared. The death rate among U.S. nurses was six times as high as the death rate among other Allied nurses.

THERE IS AN ALTERNATIVE TO HOSPITALIZATION—home quarantine. That might become necessary but it raises several issues. How is it to be enforced? In 1918, communities placarded homes where influenza had been identified but nowhere were there sufficient resources to make sure those quarantine orders were obeyed. If the orders are obeyed, it will be necessary to make sure those being quarantined have the supplies necessary to care for themselves. More important, there would need to be a massive education program to prevent all those

in a home with an Ebola victim catching the disease. That's because there is a major issue with Ebola that did not exist with the flu in 1918.

While influenza is a highly contagious disease, once a person dies from the flu his or her body is no longer contagious. It can safely be handled. (During the flu pandemic, funerals were banned not because the dead were a threat but to stop people gathering.) In contrast, the body of an Ebola victim is a disease carrier. Those who come in contact with a body's fluids after death may contract the disease. Although there were some problems in handling bodies in some U.S. cities in 1918, our research showed disposal of the dead caused no major problems in most communities: there was a small graveside service and bodies were buried usually within 24 to 48 hours. That will not be the case for Ebola. The handling of the dead will create major issues if Ebola becomes widespread in Europe or North America.

It's not just the dead that are and will cause problems.

There are concerns that the clothing worn by Ebola victims may carry fluids and that these are not safe to handle. Such issues did not arise in 1918-20 though these did arise on occasion with other diseases: when an outbreak of smallpox occurred, the clothes of those who contracted the disease were usually burned. Already massive efforts are required to clean out the home of even a few Ebola victims.

WHILE THE ABOVE SCENARIOS ARE WORST CASE, there is one lesson from 1918 and from research since is that there is a great deal of difference between fear and panic. In 1918, the pre-impact strategy of health authorities was to downplay the threat. But the newspapers carried reports of what was happening in other communities and it would have been easy to see that the flu was moving steadily from community to community by rail. Once the flu struck there were so many sick and so many funerals no one could have been unaware of the extent of the problem. That will certainly also be true today if Ebola spreads. Neighbors will realize something is wrong when crews—dressed in protective gear—show up at the residence of a suspected Ebola victim.

In 1918, most people carried on and many volunteered to help treat those ill. Panic was non-existent. There is every reason to be frightened of such a severe threat. But fear can convince people to take protective action—and can be positive not negative—provided that fear or concern is based on accurate information. The first case of Ebola in the United States and the first one in Canada were both followed by transparency. But one continual message is there is no need for panic. Clear-

ly, the health authorities have not grasped one of the major findings of half a century of sustained disaster research—that ordinary people perform very well in emergencies and that panic is so rare it is difficult to impossible to study.

Now it appears health authorities have not been completely forthcoming. U.S. authorities did not reveal there was a second suspect case in Texas until that person actually tested positive. Admittedly, it makes no sense to call a news conference every time someone arrives at hospital with Ebola-like symptoms but if a person who has been in contact with a known Ebola victim shows such symptoms—and one health worker at that same hospital has tested positive—that surely calls for transparency. Once any information is kept back, people start to wonder what else they have not been told. The lesson from 1918 is: complete openness is best.

There is one further issue which has already surfaced in West Africa—and that is whether medical personnel will be willing to deal with Ebola patients. Disaster research suggests that no matter what people say, emergency personnel including physicians and nurses will stay on the job during an emergency. But published reports say that this did not always happen during SARS. Already some volunteers and nurses in West Africa and Spain—and later in the United States—have protested about the lack of proper protective gear and training. If Ebola does spread rapidly outside of West Africa, there will be a great more data about what Sociologists call “role

abandonment.”

Joe Scanlon is with the Emergency Communications Research Unit at Ottawa's Carleton University.

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Winners of student paper award

The winners of the 2014 student paper awards presented by the Natural Hazards Center are:

Graduate Winner: Autumn Lotze, University of British Columbia

Paper Title: Connecting research and practice: Business earthquake vulnerability in North Vancouver

Undergraduate Winner: Melanie Gracy, Mount Royal University

Paper Title: Canada's Love Canal: An analysis of social class, race, and gender in Nova Scotia's steel industry

For further information about the award, and to read the abstracts of the papers, please go to <http://www.colorado.edu/hazards/awards/paper-competition.html>

Museum ...

(Continued from page one)

an opportunity for reflection and understanding than one of summarization.

Commodification of sacred space

AS THE 16-ACRE FOOTPRINT of the Lower Manhattan Ground Zero site can be defined in many ways, one of those ways would be defining it as the sacred space that is associated with a site of mass death. In fact, during the opening ceremonies for the museum, President Barack Obama called it "a sacred place of healing and of hope" that captures both the story and the spirit of heroism and helpfulness that followed the attacks (Associated Press, 2014).

My trepidation in commenting on the use of this 9/11 sacred space in ways that are not consistent with healing or hope was lessened upon my receiving the credit card statement for my visit. Those costs included the \$24 entry fee plus \$3 service fee to enter the 9/11 museum. At a total of \$27, my consumption of the experiencing of sacred space was influenced by my consumer tendencies to get my money's worth. I found that getting my money's worth of 9/11 was both a physically and emotionally exhausting task. The fact that the operation of the museum has led me to ascribe to it the commodification of the sacred space is troubling.

Is the cost justified? The National September 11 Memorial & Museum at the World Trade Center Foundation, Inc. is a 501(c)(3) tax exempt organization that is the entity responsible for the construction and operation of the museum. In January 2014, the foundation's trustees approved the \$24 admission fee noting the need to maintain a \$63 million yearly operational budget with zero state or federal government support for operation and maintenance costs. (Maloney 2014). I was annoyed to pay an additional fee to see the 9/11 Museum at the actual site of the disaster.

Security theater at the museum

WHILE I WAS WAITING IN LINE to cross from the World Trade Center's exterior plaza into the museum, The airport-style security checkpoint created a bottleneck. During the slow march through the maze of plastic crowd control stanchions, the term "security theater" came to mind. Kline defined security theatre as systems "leveraging anti-terrorism techniques that appear high tech and effective, but in reality are highly flawed" (Kline 2008). Few would disagree that some forms of security are necessary, but in the decade following 9/11 there are many public policy questions related to the motives, methods, tradeoffs, and implications of post-9/11 security trends that remain

unresolved. In the end, the checkpoint experience rated no better or worse than the dozens of checkpoints I had already submitted to as a traveler in New York City.

Like the fee for entry, the security checkpoint experience circumstance contributed to my cognitive dissonance. On one hand, I definitely want some form of security at the exact location of two (1993 and 2001) high profile terrorist attacks. On the other hand, with the imposition of the security measures, I was not feeling the human dignity referenced in the museum's mission statement. After partially disrobing in public, exposing the contents of my pockets to all, unzipping my bags for strangers, and submitting to commands of private security contractors, I felt safe from the threats of pocket knives and metal beverage containers in the museum. I still didn't feel safe from commandeered aircraft used as weapons.

Security was a museum curation opportunity squandered. The underutilized space around the security line could be used for museum-style exhibits on post-9/11 security lines



and checkpoints. For example, pillars topped with glass boxes containing all of the dangerous weapons confiscated at this security checkpoint could be displayed—proof of effectiveness. A placard with a graph showing the increase in magnetometer sales or the increase in employment in the homeland security industrial complex in the decade following 9/11 could be shown. The outer coverings of the x-ray machines could be transparent to explain their inner workings.

In Gopnik's review of the museum, he commented on the security as "a terrorist planning to commit an atrocity at a museum devoted to the horrors of terrorist atrocities might seem unduly biddable to his enemies' purpose, but then perhaps the security apparatus is itself an installation"(Gopnik 2014).

In October 2002, Dynes commented, "The New York experience with 9/11 should provide an excellent opportunity for learning, the subsequent discussion about 'homeland security' does not provide the base for much optimism"(Dynes 2002).

I would take Dynes' lack of optimism a step further, fearing that if I would have submitted recommendations to use the 9/11 Museum's security as a part of the museum's learning experience, the museum's authorities would likely put me on their equivalent of the no fly list. At the end of the day, I guess I should leave as a satisfied customer since no realistic 9/11 Museum experience would be complete without suffering through the indignities of post-9/11 security theater.

Please exit through the gift shop

AFTER SPENDING THE AFTERNOON in the 9/11 Museum, I continued my museum experience in the gift shop. That experience again contributed to my contradictory feelings. One of the components of the ground zero site is that in addition to the memorial and the museum, located inside of the museum itself is the New York City Office of Chief Medical Examiner's 9/11 Human Remains Repository. To be clear, while physically located in the museum, tourists cannot enter the repository or actually see inside of it.

The gift shop was tastefully presented. The multitude of *objets d'art* with 9/11 themes, trinkets, books, t-shirts, hats, stuffed animals (i.e. search and rescue dogs) were not necessarily offensive, given the purpose of the museum. While waiting in the long gift shop line to purchase my 9/11 trinkets, I noted multiple instances where the final receipts of shoppers in front of me tallied in the hundreds of dollars. Such funds are likely important to the museum's financial sustainability.

In the museum, the human remains repository location is in plain view but not highlighted. On a wall in the museum's Memorial Hall panels of blue representing the color of the sky on the morning of the attack serve as the backdrop for letters fashioned out of World Trade Center metal debris reading, "No day shall erase you from the memory of time—Virgil". In addition, the attentive observer can find a small plaque on the bottom left of the wall reading, "Behind this wall are the remains of many who perished at the World Trade Center site on September 11, 2001." Off of the beaten path between exhibits, there is a highly secure door to the remains repository. It is guarded by a uniformed New York City police officer who was displeased that I was standing in that portion of the museum, although it was not marked as off limits.

The offensive point to me is that New York City's 9/11 human remains repository exists within the confines of a privately run museum in the proximity of the gift shop. Having a gift shop on the exact point of mass death and in the same complex as the human remains repository is a blatant example of the museum having misplaced priorities. I completed my 9/11 Museum experience by purchasing my own pieces of 9/11 to take home. However, after reflecting upon my purchases, and reflecting more about the circumstances of the juxtaposi-

tion of the gift shop with the remains repository, I regret my action of supporting the gift shop and perhaps even regret supporting a museum which makes such choices.

Conclusion

IN THE IMMEDIATE AFTERMATH of the September 2001 attacks, art critic Debra Solomon compiled thoughts from artists and architects on what should eventually happen at the site of the fallen World Trade Center buildings. There were divided opinions on how recovery should take place, ranging from rebuilding bigger and better to preserving a void space. One comment from sculptor Joel Shapiro was "I think leaving the space empty would be the most effective remembrance. It's like Berlin. You see the devastation."(Solomon, 2014) Thirteen years later, the opposite approach has been taken.

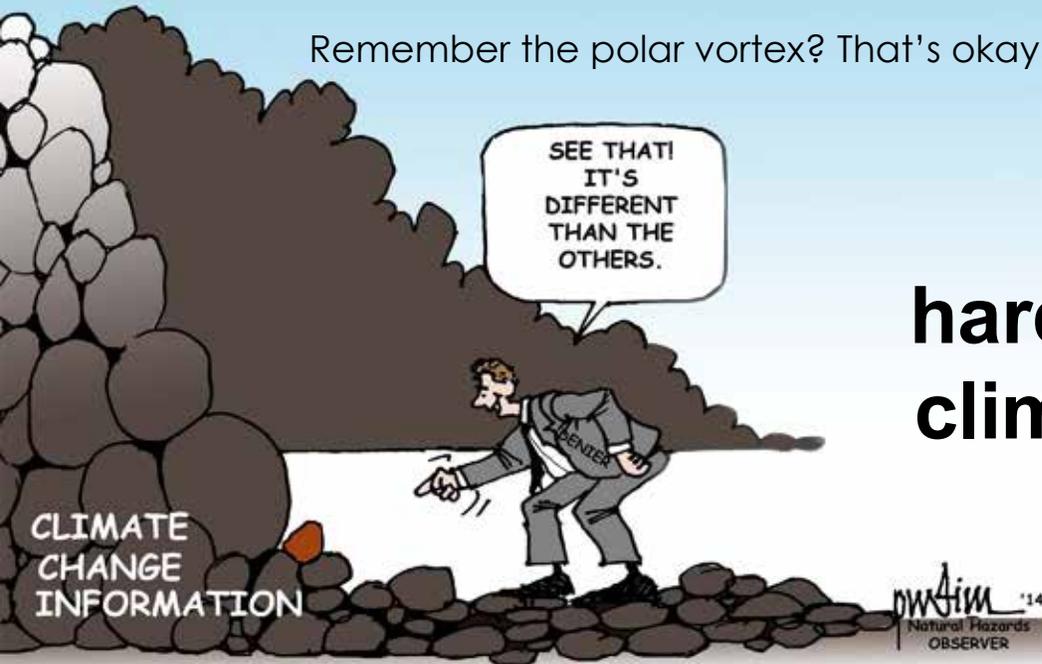
While many creative forms of commemoration and memorialization were proposed for ground zero, choices have been made to create a mass tourism site that attempts to serve every possible purpose, short of having an on-site fast food venue. Ground zero is now one of New York City's most popular tourist attractions. While I viewed aspects of the devastation presented to me by the museum, the methods by which the museum was administered figuratively limited my ability to find a space for reflection. In my past travels to Berlin, I actually saw the devastation from World War II in the preserved ruins. In my visit to New York City, I was prevented from actually seeing the devastation related to the global war on terror due to the development of a mass tourism site at ground zero.

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Remember the polar vortex? That's okay. Neither does anyone else.



Why is it so hard to focus on climate change?

By Dan Whipple

It's hard to remember during these palmy days of autumn, but the term "polar vortex" stormed into the American vernacular last winter after the visitation of a frigid Arctic whirlwind paralyzed cars, pipes and people from Maine to Texas in early January. It was followed by another Arctic storm later in the month, then a third one in mid-February that dropped ice and snow on the southern states.

This weather outburst also brought out the best in the global warming deniers, who professed to be astonished that it was cold in January.

The most severe cold snap in 20 years—in much of the United States, anyway—found the usual skeptics being skeptical. Donald Trump was **moved** to capital letters on Twitter, writing, "We are experiencing the coldest weather in more than two decades—most people never remember anything like this. GLOBAL WARMING anyone?" Conservative webmeister Andrew Breitbart pronounced once again that global warming is a **hoax**. And Republican presidential hopeful Sen. Ted Cruz **said**, "It's cold. Al Gore told me this wouldn't happen."

And—let's face it, Cruz was right—it was cold. Remember? Well, no, you probably don't. Parts of the Midwest hit -40 degrees Fahrenheit (which is also, conveniently, -40 degrees Celsius, if you're keeping score at home). It hit -16 degrees F here in Boulder, +4 degrees F in New York City, -23 degrees F in Minneapolis, Atlanta +6 degrees F ... and so on. If you were anywhere east of the Rockies and north of Florida, it was very cold. And who could fail to be mesmerized by the gridlock in Atlanta when the ice formed on the highways and trees during two of the big storms.

So the weather on the U.S. East Coast was ferocious. But wait, did all this prove climate change was a hoax? That's *global* warming, isn't it? In parts of Australia, temperatures set new records at +120 degrees F. Melbourne and Adelaide had temperatures of +113 degrees F. During tennis's Australian Open, plastic water bottles melted on the rubberized court. Canadian player Frank Dancevic said he **saw** the Peanuts character Snoopy before collapsing in the heat. Maybe it was the MetLife blimp. A late January 2014 **paper** in *Geophysical*

Research Letters found that the temperature in places on Baffin Island in the Canadian Arctic are warmer than at any time in at least the last 44,000 years. The U.S. National Climatic Data Center said that globally the winter was the eighth warmest on record—counting from the beginning of December 2013 to the end of February 2014.

The list of emerging climate impacts is long and impressive. Five independent groups of researchers studying the Australian heat wave **concluded** that it couldn't have happened without a boost from human-caused climate change. And a research group from Stanford has **concluded** that the historically unprecedented drought in California is "very likely linked to human caused climate change." The persistent ridge of high pressure over the Pacific—which meteorologists have named the Ridiculously Resilient Ridge—is more likely to occur with modern concentrations of greenhouse gases.

2013 as a whole was either the seventh, fourth, or fifth warmest year since 1880, depending on who's measuring (NASA, the National Oceanic and Atmospheric Administration, and **Cowan and Way**, respectively).

This astonishment of the punditocracy seems to happen every winter. About ten years ago, when I covered climate science for United Press International, I got a call from my Washington D.C.-based editor ordering me to go back to my sources to find out whether global warming had been called off because there was a cold snap in the nation's capital. I was instructed to waste the time of some of America's smartest scientists because my editor was cold. I mean, hey, it's January. It gets cold in January nearly every year.

Once again, hard on the footsteps of the polar vortex, journalists called up the experts so the experts could explain what everyone ought to know already. It's winter weather. It's not even particularly unusual winter weather. Weather is different from climate. Weather is what happens here today. Climate is (sort of) the average of weather over many years.

This climate/weather debate has got to be the dullest of the many dull controversies gripping the nation. It is manufactured entirely by people who don't seem to care how stupid

they sound. A few cold days—or weeks, or months—don't disprove global warming any more than 39 degrees F in early December 2013 in Prudhoe Bay north of the Arctic Circle—the highest since 1968—**proves** it.

And yet ... and yet ...

In addition to its effects on water pipes and pundits, whatever the latest weather has been affects the way Americans view the issue of climate change. And this yo-yo of opinion in turn affects the ability of the leadership to do anything about it. This is the real impact of the weather/climate seesaw.

Some large number of activists around the world—maybe 350,000 in New York City alone (estimates vary, depending on who is counting)—took to the streets to demand action on climate in late September 2014. But the history of opinion about climate casts considerable uncertainty on whether a sustained political movement can be achieved on this issue. Renewed apathy may be just a polar vortex away.

In the wake of Hurricane Sandy in October of 2012, a panel at the American Association for the Advancement of Science annual meeting in Boston **called** Sandy a “game changer” for people’s perceptions about climate change. “It brought climate impacts and climate risk into the conversation in ways they had not [been considered] before,” said Andrew Freedman, a senior science writer for *Climate Central*.

And Harvard professor James McCarthy said, “Sandy connected the dots for a lot of people. The U.S. public is there in a way that it was not five or ten years ago. Now the issue is to convey that support to decision makers.”

An **article** published in the journal *Psychological Science* in November 2013 showed that New Jersey residents after Sandy were more accepting of environmentally friendly policies, and more accepting that climate change was real if they had been

negatively affected by the bad weather. “Prior to the storms,” the authors wrote, “participants automatically favored a politician opposed to climate-protective policies, whereas immediately after the Hurricane Sandy, participants drawn from the same population favored a green politician ... We found evidence that people’s implicit attitudes were affected by the storms.”

But—guess what—as soon as their local weather calmed down, people forgot about those “game changers.” Climate lessons are short-lived.

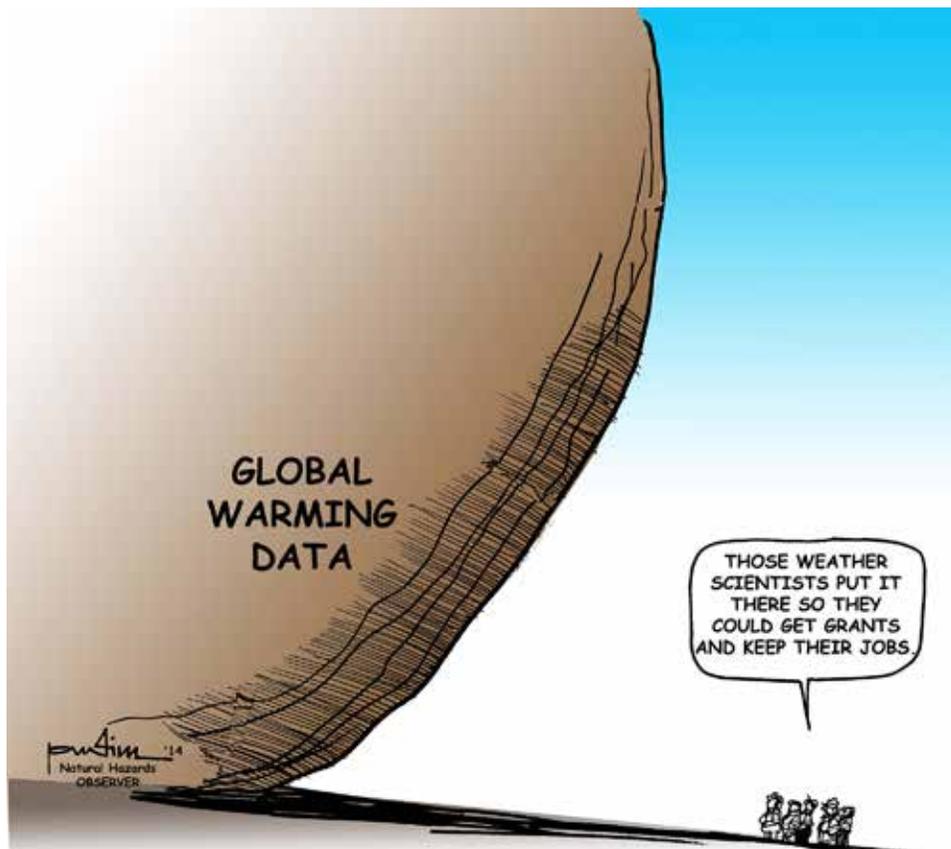
In a **paper** from the journal *Climatic Change*, published online on February 5, 2013, two Canadian researchers delved into the question of why American attitudes about climate change vary as the weather does. They found, “The fraction of respondents to national polls who express ‘belief in’ or ‘worry about’ climate change is found to be significantly correlated to U.S. mean temperature anomalies over the previous three to 12 months. In addition, the fraction of editorial and opinion articles which ‘agree’ with the expert consensus on climate change is also found to be significantly correlated to U.S. mean temperature anomalies at seasonal and annual scales.”

In a news release put out that month—February is another month in which the weather is often cold—Donner virtually predicted the Trump/Breitbart/Cruz reaction to the cold weather a year later. “Our study demonstrates just how much local weather can influence people’s opinions on global warming,” Donner is quoted saying. “We find that, unfortunately, a cold winter is enough to make some people, including many newspaper editors and opinion leaders, doubt the overwhelming scientific consensus on the issue.”

In a “News and Views” commentary in the January 29, 2014 *Nature Climate Change*, Patrick Egan and Megan Mullin wrote, “The evidence for the effect of weather on public opinion regarding climate change is now overwhelming. Belief in climate change and concern about its consequences is more likely among those who perceive the weather to be warmer and among those who, according to weather data, have actually experienced unusually hot weather prior to being interviewed.”

A special science section on climate change published on September 23, 2014, two days after those ballyhooed marches, *The New York Times* reported a *Times*/CBS News poll that found—leaving partisan differences aside—ten percent of Americans don’t think global warming is real. This merely demonstrates that, no matter what the issue, ten percent of Americans are immune to facts. In addition, 52 percent think it either won’t have an impact until some time in the future (28 percent) or that it won’t have a serious impact at all (24 percent).

This inability of the public to stick to the topic has real-world implications for dealing with this problem. In America, at least, it usually takes a vigorous and consistent message reaching the ears of legislators to move them. This



kind of squeaky-wheel-and-grease effort is why we now have health care reform and a growing consensus in favor of gay marriage and we don't have effective gun control laws. If people change their minds about climate change every time the temperature rises or drops a few degrees, policy makers are going to get mixed messages. And mixed messages don't result in action.

It's been a goal in the climate community to hold the increase in average global temperatures at or below 2 degrees Celsius (about 3.5 degrees F). A [paper](#) in the January 3, 2013 journal *Nature* by Joeri Rogelj of ETH Zurich and colleagues says, "Despite all of the uncertainty in the geophysical, social and technological aspects, our analysis indicates that the dominant factor affecting the likelihood and costs of achieving the 2 degrees C objective is politics."

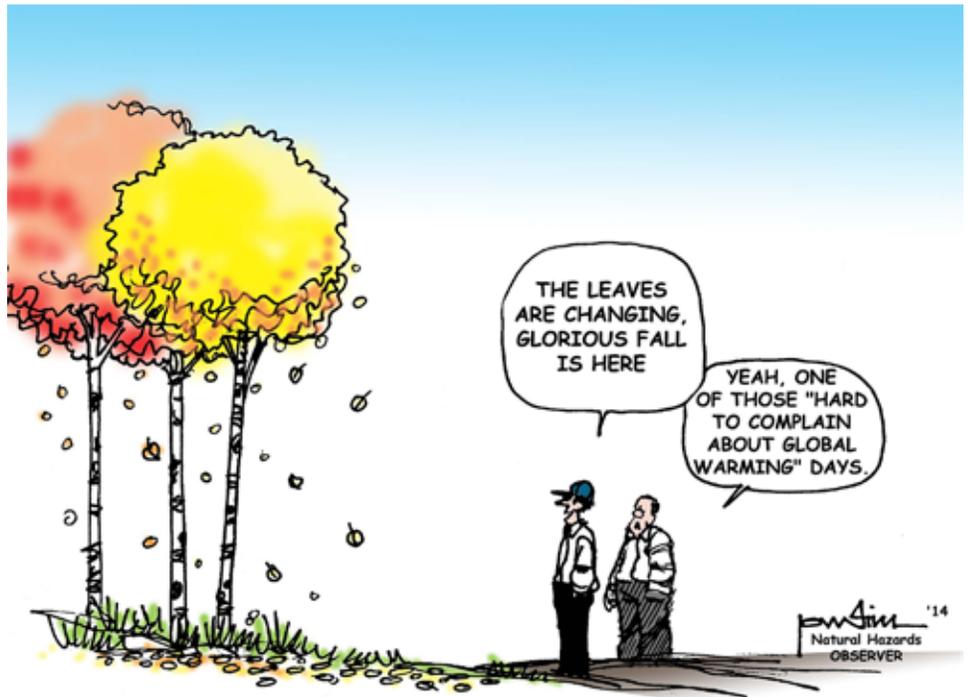
If the temperature is to be kept down, immediate, globally coordinated action is necessary. "We find that the effect of global mitigation action delayed by two decades is much more pronounced than the consequences of uncertainty surrounding mitigation technology availability and future energy demands, and renders even the geophysical uncertainties almost irrelevant." Geophysical uncertainties refer to the unknown ways the climate system will react to continued high greenhouse gas emissions.

Study co-author Keywan Riahi says, "With a twenty-year delay, you can throw as much money as you have at the problem, and the best outcome you can get is a fifty-fifty chance of keeping temperature rise below two degrees."

A draft United Nations [report](#) covered in the January 16, 2014, *New York Times*, agrees that delay is costly. Another delay of 15 years to deal with the issue will make it virtually impossible to halt. "Delay would likely force future generations to develop the ability to suck greenhouse gases out of the atmosphere and store them underground to preserve the livability of the planet, the report found," according to the *Times* story.

Depending on your criteria—per capita or total emissions—the United States is first or second in the greenhouse gas emissions race. It has the highest CO2 emissions per capita, but is second to China in total emissions. Between the two of them, they produce a little over 40 percent of global CO2 emissions (China 24 percent; U.S., 18 percent), with the European Union a distant third.

A January 2014 paper in *Environmental Research Letters* found that only seven countries—the United States, China, Russia, Brazil, India, Germany, and the United Kingdom—were responsible for more than 60 percent of the pre-2005 warming. The study assigned a temperature change value to each nation. That is, it calculated how much each country's emissions had raised the global temperature. The U.S. wins the contest handily, responsible for a global temperature increase of 0.15 degrees C—about 20 percent of the observed warming. What these seven countries decide to do about their emissions matters a lot to the future climate. The U.S., in the shifting winds of its electorate, has done little.



The kind of climate skepticism that says it shouldn't be cold in January because Al Gore said so, or that global warming is a hoax, is rare in the world. It's limited, in fact, to two countries—the United States and the United Kingdom. It is no surprise that these are two of the largest greenhouse gas emitters. In the *Environmental Research Letters* mentioned above, the UK was second to the United States in the "degrees of temperature increase."

A [study](#) published in 2012 in *Environmental Research Letters* by James Painter of Oxford University and Teresa Ashe of the University of London looked at climate skepticism published in the print media between 2007 and 2010 in six countries—the United States, Brazil, China, France, India, and the United Kingdom. They found "news coverage of skepticism is mostly limited to the USA and the UK; that there is a strong correspondence between the political leaning of a newspaper and its willingness to quote or use uncontested skeptical voices in opinion pieces; and that the type of skeptics who question whether global temperatures are warming are almost exclusively found in the US and UK newspapers. Skeptics who challenge the deed for robust action to combat climate change also have a much stronger presence in the media of the same two countries."

There's less information about the way broadcast media covers the skeptics. It is instructive that *Media Matters for America* [published](#) a study in mid-January 2014, showing that news coverage of climate on America's four largest broadcast networks—CBS, NBC, ABC, and Fox—peaked in 2009. This was the year of Climategate—and who doesn't love a good scandal?—when more than a thousand emails were stolen from the University of East Anglia's computers. Critics alleged that they showed that climate data had been improperly manipulated. Climate skeptics trumpeted the emails to support their assertions that global warming is a hoax.

Well, never let the facts get in the way of a good story, as we say in the news business. At least seven independent investigations—the UK House of Commons Science and Technology Committee, a UK Science Assessment Panel, Pennsylvania State University, the U.S. Environment Protection

Agency, and others—all found that there was no improper manipulation of data or any other flaws in the science. They did find some embarrassing emails that people wish they hadn't sent. But, hey, science is a rough-and-tumble affair. If you can't stand the heat ... and so on.

The politics on this issue is tribal, however, immune to facts. The *Conservapedia* entry's lead paragraph on Climategate says, "Climategate is said to have revealed the biggest scientific hoax in world history as the worst scandal of this generation." The entry does concede later "an independent analysis cleared the scientists involved of any wrongdoing, and, in 2011, a study conducted by global warming skeptic Richard A. Muller, largely funded by the oil industry, confirmed the results of the scientists involved in climate gate, concluding that 'Global warming is real.' However, the study makes the baseless conclusion that just because the Earth is warming, humans are causing it ('anthropogenic global warming' versus 'global warming'), falling victim to the old liberal 'bait and switch' technique." (Why bait-and-switch is an especially liberal technique must be left to explanation from future generations of scholars.)

An April 2, 2013 [poll](#) by the Pew Research Center for People & the Press found that 69 percent of Americans think there is "solid evidence the earth is warming." But only 42 percent think that the warming is caused by humans. This figure is down from 2006, when 77 percent and 47 percent, respectively, answered these questions positively. As the case for anthropogenic global warming gets stronger, the acceptance of that evidence by Americans gets weaker.

Scientists who study climate change are almost unanimously convinced that anthropogenic climate change is real and becoming more obvious. But when asked in a Yale-George Mason University poll whether "most scientists think global warming is happening," only 39 percent agreed. Forty percent agreed with the statement: "There is a lot of disagreement among scientists about whether or not global warming is happening."

"Media tend to balance statements with opposing views, which is fine with matters of opinion," wrote Stefan Rahmstorf of the Potsdam Institute for Climate Impact Research, "But this tendency to 'quote the other side' then gives the public the erroneous concept of there being 'two equal camps' in science, as the poll cited above shows. The late Steven Schneider ... used to say that this is as if with each report of a satellite launch, someone from the Flat Earth Society was quoted for balance."

Politics—which several of our authors have fingered as the current villain of the climate piece—is a many-headed beast. There is the ill-informed electorate. There is semi-committed president, whose interest seems to have a short half-life. There is the majority of the Congress that knows the facts about the issue but remains indifferent. And then there are the willfully obstreperous. It doesn't help that several of these are on science-related congressional committees.

The best known of these is former chairman of the Senate Environment and Public Works Committee, Senator James Inhofe (R-Okla.), who has called global warming "the greatest hoax ever perpetrated on the American people."

Inhofe is not beyond encouraging a little scientific illiteracy to drive home his "hoax" theory. In the summer of 2007, Inhofe staffer Marc Morano cited a paper by Ka-Kit Tung and

colleagues on surface warming and the solar cycle as one of a few "very recent inconvenient developments for proponents of catastrophic man-made global warming." Coincidentally, I had just done a story on solar cycle contributions to climate change for the journal *Nature Climate Change*. Tung emailed me that his paper was being misused. "It is surprising to me how a scientific result can be misread so much," he told me in a 2007 email.

But Inhofe isn't alone in Congress. Dana Rohrabacker (R-Calif.), a senior member of the House Science Committee, told a town hall meeting in 2013 that global warming is plot by liberals to "create global government to control our lives."

As reported by *The Nation*, Rohrabacker said, "Just so you know, global warming is a total fraud and it is being designed by—what you've got is you've got liberals who get elected at the local level want state government to do the work and let them make the decisions. Then, at the state level, they want the federal government to do it. And at the federal government, they want to create global government to control all of our lives. That's what the game plan is. It's step by step by step, more and bigger control over our lives by higher levels of government. And global warming is that strategy in spades ... Our freedom to make our choices on transportation and everything else? No, that's gotta be done by a government official who, by the way, probably comes from Nigeria because he's a UN government official, not a U.S. government official."

One can only conclude from this that Rohrabacker has not met very many United Nations officials. The ones I know seem uninterested in ruling the world. They'd rather play golf.

New York University's Patrick Egan—coauthor of the *Nature Climate Change* [article](#) mentioned above—said in an interview with the *Observer*, "The climate change challenge has a lot of pieces that make it a really, really difficult one to tackle politically. The biggest one is that the costs for solving the problem are up front while the impact of that problem is far down the road. We're starting to see some impacts of climate change here and there, but we're really talking about forestalling the big widespread disasters due to climate change that might not happen for a while.

"I'm in my forties. I teach undergraduates who are in their teens and early twenties. One thing I like to say to them is I'm probably going to be dead before this is the kind of widespread and irreversible disaster that is being foreseen by climate scientists.

"These kind of problems all have to be put in that perspective which is: Are current generations willing to give up some aspect of living standards—that's really what we're talking about, the living standards that come with consumption and burning of fossil fuels—in order to improve the living standards of future generations?" he says.

"Right up there along with it is that there still isn't a national consensus that this is something that needs to be addressed. Democrats and Republicans agree that we need clean air and good schools. They don't agree that climate change is happening and they certainly don't agree that if it's happening it's due to human activity. Without that kind of consensus, climate change just gets embroiled in the partisan and ideological battles that define our political age. That just ends up being a huge barrier to arriving at the kinds of costly solutions that are going to be necessary to address this big problem," Egan says.

Whether democratic government offers a bright prospect

vis a vis climate change mitigation is matter of concern. Political scientist Anna Petherick, **writing** in *Nature Climate Change*, says, "When political scientists ask whether democracy is conducive to attenuating or adapting to climate change, the answer from both theory and data—however urgent it may seem—is less than certain." Politicians in democracies can place a higher priority on short-term priorities than long-term ones.

She concludes, though, "On balance, the message from the data is that the world can realistically expect more political assertiveness on climate change to follow from more democracy. And perhaps eventually, more action."

Not long ago, I was having dinner in a neighborhood restaurant, sitting on the patio on a warm summer night because our dog is allowed to accompany us there. At the next table were three oilmen who talking enthusiastically about various policies of the day, occasionally reaching over to pet the dog. Learning I was a science journalist, one of them asked, "So is global warming real?" in a tone of voice that indicated he already a preferred answer.

"Yes," I said. They waited for qualifiers, but I didn't offer any.

"Well what I want to know is why nobody ever says anything about the good things that are going to happen with global warming."

I'm one of those people who think of the great retort about a half hour later. What I should have said was that good or bad is a relative thing, depending on whose ox is being gored. Most papers on climate report the varying consequences of the topic under study. There will probably be more

snowfall at higher elevations in the Rockies, for instance, less snow at lower elevations, and an earlier snowmelt. This is will make for a shorter ski season, so it's probably bad for ski areas, some of which will get less or zero snow, depending on their elevation, and most of which will have to open later and close earlier.

It may be good for places in the upper reaches of the river basins, because there should be be more runoff, which they may be able to capture because there is an existing infrastructure of dams and reservoirs. But downstream, this infrastructure is often missing, so earlier runoff may mean late season shortages, or expensive infrastructure costs to capture it. Good? Or bad?

For the last 10,000 years or so, the climate—at least as measured by global temperatures—has varied within a relatively small band of upper and lower bounds. This is the period that has allowed humans civilizations to develop and expand. Climate has already burst through those traditional boundaries. No one knows what the consequences of this will be, though an unpleasant picture is developing, based on projections of scientific work. The issue now is how much risk humans want to take.

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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.

CLIMATE

Climate Change and Catastrophe in Cuba and the Atlantic World in the Age of Revolution. By Sherry Johnson. 2011. ISBN: 978-0-8078-3493-0. 307 pp., \$45 (hardcover). University of North Carolina Press. http://www.uncpress.unc.edu/browse/book_detail?title_id=2586.

Big changes seldom happen for a single reason. Sherry Johnson has provided some powerful arguments that in the many changes occurring in the tropical New World in the 18th century, there was a strong environmental component mixed in with all the bureaucracy, politics, murder, and empire-building of the period.

Johnson's focal point is Cuba and the waxing and waning of Spanish empire. She says that many of the political changes came on the heels of disasters—famine, hurricane, earthquake.

"The timing of all the revolts throughout the Caribbean basin suggests that they were launched when the conspirators felt that they had the greatest chance for success. Indeed, such a conclusion conforms to rebellion theories that gained popularity in the 1980s and early 1990s. More important, however, the timing of the rebellions is consistent with a recent trend in post-disaster theory that demonstrates a strong correlation between the destabilizing effect of disaster and the propensity for political unrest. In the aftermath of disaster such as hurricane, all state systems are strained, and people who see themselves as oppressed tend to take advantage of a vacuuming authority to change their oppressed status."

Johnson carefully weaves the complex environmental, political, economic, and—not least—bureaucratic factors affecting the Caribbean and Atlantic empires to create a comprehensive and spellbinding tale. "Lessons learned" is an all-too-common phrase in the disaster lexicon. This book may make you wonder whether people ever actually learn anything from experience.

Climate Change, Forced Migration, and International Law. By Jane McAdam. 2012. ISBN: 978-0-19-958708-7. 319 pp., \$140 (hardcover). Oxford University Press. <http://bit.ly/1rE9u3D>.

The international legal issues surrounding migration as a result of climate are very much undecided, as this volume makes clear. While environmentally inspired migration is almost certain to increase in the coming decades, parsing out the causes of this complex phenomenon is not a straight-ahead affair.

While there is nearly unanimous agreement that global temperatures are being driven higher by human activity, it does not necessarily follow that humans are being driven from their homes by global temperatures. Climate change is seldom the sole cause of human movement.

"Studies reveal that decisions to move or stay are influ-

enced by the overall socioeconomic situation of those concerned," McAdam writes. "For example, studies have shown that droughts in parts of Africa resulted in decreases in international and long-distance migration, with food scarcity and increased food prices forcing people to spend money on basic needs rather than moving. By contrast, short-distance migration increased as women and children sought work to supplement household incomes through remittances ... the poorest or most vulnerable may not have any choice but to stay put."

Legally—which is the milieu of this book—there is no category of "climate migrant" or "environmental refugee." The author offers a deep, sophisticated look at climate change and human rights law in chapter three. To introduce this multifaceted investigation, she writes, "Although existing jurisprudence does not preclude climate change impacts from being recognized as a source of inhuman treatment, it would need to be substantially developed before such harms would fall clearly within the scope of this concept." (Emphasis in original.)

Another nontrivial issue the author covers early is the question of how many people might actually be set on the road by climate change. The estimates are controversial. Social scientist Norman Myers says it could be as many as 270 million. "In December 2010, *The Observer* [of London] ran an article 'Climate Change will Cost a Billion People Their Homes, Says Report.'" This turns out to be a spectacular misreading of one of the papers in said report. A billion people shifting their position on the planet might be enough to tilt the earth off its axis slightly.

The book is particularly concerned with disappearing states, statelessness, and relocation. In chapter five, McAdam looks at the situation in some small islands—especially Kiribati and Tuvalu—which may disappear under rising seas. What happens to a citizen when her state ceases to exist?

McAdam seems to think that the issues surrounding environmental migration can be dealt with effectively under the current framework of international law. "Climate change impacts will certainly affect mobility in some parts of the world, but there is insufficient evidence to suggest that they will radically alter, rather than replicate or build upon, existing patterns of movement," she writes in her conclusion. "Empirical evidence to date suggest that most increases in movement will be within countries rather than across international borders, and temporary, rather than permanent."

Adapting to Sea Level Rise in the Coastal Zone: Law and Policy Considerations. By Chad J. McGuire. 2013. ISBN: 978-1-4665-5980-6. 222 pp., \$69.95 (hardcover). Taylor & Francis Group. <http://www.taylorandfrancis.com/books/details/9781466559806/>.

Hazards mitigation and adaptation is an exercise in planning in the face of uncertainty. And one of the major

long-term uncertainties facing the world is sea level rise. How much? How soon? How costly?

If you follow the science of climate change—and who doesn't?—it's no surprise that there are a lot of unknowns surrounding the future of sea level. There has been, for instance, about a 30 percent slowdown in sea level rise over the last ten years, compared with the rate in the 1990s, when it rose at a mean rate of about 3.1 millimeters per year. Research published recently in *Nature Climate Change* found, however, that when the data was corrected for inter annual variability resulting from the El Niño-Southern Oscillation, the difference disappeared.

But wait. The American Geophysical Union's *Geophysical Research Letters* published research showing that Antarctica's glaciers "are moving faster than they did 40 years ago, causing more ice to discharge into the ocean and global sea level to rise. The amount of ice draining from six glaciers "increased by 77 percent from 1973 to 2013 ... If melted completely, the glaciers' disappearance would raise sea levels another 1.2 meters (four feet)."

But wait. A survey of expert assessment of sea level rise published in the January 15, 2014 *Quaternary Science Review* found that most scientists expect more sea level rise than the estimates provided in the Intergovernmental Panel on Climate Change's fifth assessment report. The "unmitigated warming scenario"—which, alas, seems to be the way we're heading, policywise—will see a range of rise between 0.7 meters and 1.2 meters by AD 2100 "calling into question the future survival of some coastal cities and low-lying island nations." (The IPCC estimated a 52-98 centimeter SLR estimate by 2100.)

So, plenty of uncertainty. What to do? What to do?

Chad McGuire offers some legal and policy ideas about dealing with sea level rise and the uncertainty accompanying it. McGuire starts with a lengthy and detailed chapter on the science of SLR, focusing especially on the places it will impact. His second chapter, on policy options, urges win-win solutions, which he describes as using discounting "to look at the goal of the policy to see if a particular policy option can serve multiple objectives, some of which contain guaranteed benefits today while also protecting against a likelihood of risk sometime in the future. This kind of tool is referred to here as a *win-win* policy orientation, identifying a conceptual framework that focuses on both short-term and long-term goals." (Emphasis in original.)

Discounting is an economics tool to provide the present value of a good at a future date. The trouble with it in climate change is that using a common discount rate—say, 10 percent—it almost always says that it isn't worth it. As I wrote in a story for UPI a few years ago, "The discount rate is a way of measuring the present value of money in the future. If you win a \$1 million in the lottery, but it is paid out over 20 years at the rate of \$50,000 a year, it really is worth considerably less than \$1 million. If the interest rate is 10 percent, the discounted value of your lottery ticket is less than \$450,000."

So, by nearly any economically sensible discount rate, climate change mitigation is not a worthwhile investment. The algebra of discount rates has led some researchers to conclude "that catastrophic losses far in the future have almost no value to present-day decision-makers if conventional discount rates are used to evaluate their costs and benefits," according to a paper by Irving Mintzer and David Michel in the *International Journal of Global Environmental Issues*.

"The unfortunate reality of the discount rate is that if you

use any discount rate that makes sense in the short term, it turns out that in the long term, the world isn't worth saving," Mintzer told me in an interview at the time. "Even if it rational to think that your children should have a world to live in, it is probably not rational to think that your grandchildren should have a place to live in. That turns out to be not an especially informative insight."

Nonetheless, McGuire makes a serious effort to deal with the unknown and changing uncertainties from sea level rise.

He makes a powerful contribution to the legal issues around the issues of regulating private property and sea level rise. "There are serious implications for coastal policy makers when the impact of proactive adaptation strategies toward coastal land use are viewed through the regulatory lens of government power as interpreted by the U.S. Supreme Court ... a major cause of this problem seems to be based on a foundational premise being accepted by the majority of the bench, specifically that real property rights are pre-political in nature and thus exist outside of societal expectations."

In a legal climate where property rights always trump societal interest, there are considerably fewer options for planners and regulators to deal with the problems caused by the rising seas.

Justice for Future Generations: Climate Change and International Law. By Peter Lawrence. 2014. ISBN: 978-0-85793-415-4. 227 pp., \$114 (hardcover). Edward Elgar. http://www.elgar.com/bookentry_main.lasso?id=14450.

"Why should I do anything for posterity? What has posterity ever done for me?" Answering this flippant question in the context of international law and dealing with climate change is the goal of this book. Lawrence does it in a deep and thoughtful way.

How much do we owe to the future, to the generation that follows us and to generations yet unborn. Most people will probably agree that we owe something to our children, and probably to our grandchildren, but planning for further down the line than that can get pretty mushy. Is the future our repository of hope? Or is it an enemy nation?

Lawrence takes an "interest-based approach to human rights" to explore the ethical, legal, and practical approaches to our responsibilities. He writes, "Climate change threatens: (1) *the right to life*, by storm surges and heat stress leading to human deaths; (2) *the right to health*, by increased incidence of certain diseases; and (3) *the right to subsistence*, through impacts on agricultural production." (Emphasis in original.) Lawrence also explores the issues of "responsibility for harm" and "capacity to pay." That is, who is causing the warming by excessive emissions of carbon dioxide, and who can afford to address the problem.

Lawrence might be classified as an optimist about dealing with climate change. In his final chapter he writes, "My aim is to show that it is practically possible to incorporate justice principles in an agreement that is politically feasible, albeit dependent on strong political leadership."

Contracts and Grants

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

Quantifying the effects of a catastrophic flood on ecosystem components of Colorado mountain streams. National Science Foundation grant #1445615. http://www.nsf.gov/awardsearch/showAward?AWD_ID=1445615. One year. \$61,330 to principal investigator James McCutchan, University of Colorado Boulder, james.mccutchan@colorado.edu.

A rainstorm of unprecedented magnitude caused widespread flooding in Colorado during September, 2013. In addition to loss of life and damage to homes and roads, the flooding caused severe disturbance to stream ecosystems. These ecosystems include the natural range of the endangered greenback cutthroat trout and are important for water supplies and recreation. Understanding the consequences of the 2013 flood on stream ecosystems is particularly important given the expected increases in the frequency of extreme precipitation events as a result of climate warming. This project will assess the impacts of the 2013 flood on stream beds, stream algae, and stream food webs. Current interest in the flood presents an opportunity for outreach activities related to flood-safety awareness, climate variability, and the role of disturbance in stream ecosystems. This project also will help scientists and managers understand the short-term and long-term effects of the 2013 flood on stream ecosystems.

The 2013 flood offers a unique opportunity to study the effects of severe and infrequent disturbance events that are outside the normal range of selective forces driving assembly of stream communities. By combining approaches from fluvial geomorphology (e.g., quantification of bed movement, riparian disturbance) and stream ecology (e.g., measurements of biomass and production for periphyton and benthic consumers, estimates of trophic position and basal food resources from stable isotope ratios), the investigators will test the hypothesis that the effects of severe flood disturbance are driven by changes in stream geomorphology associated with flooding. Specifically, the project tests the hypothesis that streams in which riparian zones and watershed hill slopes are altered will show long-lasting effects of the flood on flow of carbon and energy across trophic levels, whereas communities will recover rapidly following flood disturbance that affected only surface sediments in the stream channel. The project also tests the generality of the Telescoping Ecosystem Model for stream ecosystems, which could serve as a template for the study of disturbance across diverse ecosystems. Preliminary field studies indicate that sediment transport and alteration of bed stability have reduced periphyton production at some locations, suggesting that flood-induced structural changes have cascading effects on higher trophic levels long after recolonization occurs. In addition to quantifying recovery of ecosystem processes during the first year following severe flooding, the proposed research will provide a foundation for long-term studies of recovery in these severely flooded streams. The working hypotheses will be tested at multiple locations on tributaries of the South Platte River in Colorado, at stations that span a range of disturbance intensity associated with the extreme precipitation in September, 2013. St. Vrain Creek and other tributaries of the South Platte River have been studied

extensively by the investigators over a range of hydrologic conditions, thus providing an important point of reference for the 2013 flood.

The American Fire: Evaluating the ecosystem impact of a master variable. National Science Foundation grant #1450144. http://www.nsf.gov/awardsearch/showAward?AWD_ID=1450144. One year. \$39,932 to principal investigator John Battles, University of California-Berkeley, jbbattles@berkeley.edu.

The ecology and management of wildfire in the American West poses a daunting challenge. This project takes advantage of a unique opportunity to directly measure the impacts of wildfire on forest health in the forests of the western United States.

In 2013, the American Fire burned through 43 square miles of the Tahoe National Forest in California. In the process, it coincidentally burned through an existing research study that was designed to evaluate the effectiveness of fuel management on tree survival, new seedling establishment, ground vegetation, wildlife, and water quality and quantity after a fire, where the fire treatments were to be imposed later in a small-scale experimental mode. In fact, all the pre-fire measurements had just been completed on an extensive network of tree and fuel inventory plots that were both untreated and treated when the American Fire broke out.

We will remeasure all the plots immediately after the wildfire, but before planned salvage logging operations begin to test whether the fuel management treatments in fact moderated the fire effects and reduced the damage to the forests. This research will be conducted in the context of the prevailing management regime for National Forests in the West. And since it will be done in partnership with local federal and state forest managers, the results will immediately inform the future management of these forests.

Wildfires in the forests of the Sierra Nevada Mountains tend to burn more intensely and larger than they have in the past. The consequences on ecosystem structure and function can be transformational. At the same time, harvest and thinning operations that could reduce fire risks raise concerns about impacts on forest health. Fire is a landscape level process that is most often studied with smaller-scale experiments, field-parameterized models, or retrospective field studies. It is very rare when there are opportunities to empirically test wildfire effects and fire treatments with the level of control offered by a paired watershed study with a before-after-control-impact design, as presented in this circumstance.

Damage and instability detection of civil large-scale space structures under operational and multi-hazard environments based on change in macro-geometrical patterns/shapes. National Science Foundation grant #1455709. http://www.nsf.gov/awardsearch/showAward?AWD_ID=1455709. Three years. \$314,262 to principal investigator Grace Yan, Missouri University of Science and Technology, gyan@utep.edu.

Civil structures such as sports stadiums, arenas and auditoriums are usually built for venues where hundreds or

even thousands of people assemble. A possible collapse of roof dome of this type of structure may risk many lives. This research focuses on an automatic structural health monitoring system for large domes that can provide early warning of structural problems from instability or damage to structural members resulting in collapse. Early warning can facilitate decision-making on repair or demolition, leading to worry-free structures for both the general public and the owners. The system has potential use to protect historical structures (e.g., cathedrals), to verify the appropriateness of repairs of dome structures, and to evaluate the health condition of these structures after an earthquake or a strong wind event.

The objective of this research is to develop innovative yet practical approaches to detect damage and instability in space structures under operational or multi-hazard environments. This research objective will be achieved through three research tasks: (1) develop an approach to detect damage based on the status of fractal patterns of structural member configuration using fractal geometry; (2) develop different approaches to detect instabilities, including individual members buckling, nodal snap-through instability or dynamic instability; and (3) integrate these approaches through a wireless sensor network with multi-metric measurements (tilt angles, strains and/or accelerations) to form a structural health monitoring system.

The goal is to achieve automatic early-warning of damage, instability and potential collapse. Although projected approaches work on the shape/pattern changes of the structure, no direct displacement measurements will be required. The shape/pattern changes are strategically reflected in tilt angles, strains and accelerations, which can be measured easily. These approaches also do not require baseline response data. The developed structural health monitoring system can detect instability and can work under multi-hazard environments.

Race, class and social capital in devastated neighborhoods. National Science Foundation grant #1434602. http://www.nsf.gov/awardsearch/showAward?AWD_ID=1434602. One year. \$11,189 to principal investigator Nan Lin, Duke University, nanlin@duke.edu.

This research is an innovative multi-method qualitative field study of two post-disaster neighborhoods in New York City, after Hurricane Sandy. Although these neighborhoods are similarly impacted by a natural disaster and receive similar types of aid through a large non-governmental organizations and the Federal Emergency Management Agency, the racial and economic characteristics of these neighborhoods are quite different. The researcher will examine the social processes through which race and class shape whether and how residents strike close and informal connections with disaster responders. The research in particular focuses on how the type and quality of relationships formed, affects sharing of non-official disaster support and information. This focus on these newly formed connections is particularly important in this environment, where people's usual social connections were severely compromised. The research adopts a theory of network resources, social capital, which expects that assistance in the form of information or resources are informally and indirectly accessed through these interpersonal connections and that social position of one's connections and the quality of their relationship matter in this process.

We will conduct fieldwork in disaster relief and warming centers and surrounding devastated areas of two urban neighborhoods that are proximate to each other. Beginning only ten

days after the hurricane and through 8 subsequent visits to the field site over the course of several months, the researcher interviewed 120 participants, including impacted residents, local community and out-of-town responders and volunteers. The data for this project is collected in three ways: (1) in-depth unstructured interviews, (2) semi-structured follow-up interviews, (3) and ethnographic participant observation. These are substantiated with documentary evidence of material culture including video and photographs of devastation, signs, flyers, and other print informational materials at relief sites. Through interviews and observations, the research will examine how cross-race and cross-class interactions, and community racial and class dynamics, impact the extent and kind of disaster support residents receive.

Observations and inquiry will be used to first identify, then explain the relationships among (1) the types and strength of relationships forged among impacted-residents and disaster responders and volunteers; (2) the types of disaster-related information and resources shared across these connections; (3) the racial and class content of resident and volunteer conversations, accounts and interactions and (4) the aspects of local disaster response that structure interpersonal relations and resident participation.

Ultimately, the project contributes to four fields of sociological research: social capital theory, race relations, poverty, and disaster research. The unique design of the study allows for distinguishing the mechanisms linking the entire process of social capital to pinpoint at what stage social capital inequality occurs in the non-routine context of disaster. This emphasis differs from current research in this tradition, which explores one leg of the process in routine contexts such as job-finding. The research also addresses a key substantive debate on how urban poor blacks and other minorities end up in the "wrong networks" whether it is through choice or opportunity.

Beyond its theoretical contribution of examining social capital and social inequality outside routine contexts, this research has tremendous social significance as it informs practitioners of the interracial and interclass dynamics of "networking" in devastated neighborhoods and the consequence for accessing available resources.

An interdisciplinary approach to modeling multiple stakeholder decision-making to reduce regional natural disaster risk. National Science Foundation grant #1433622. http://www.nsf.gov/awardsearch/showAward?AWD_ID=1433622. Three years. \$50,132 to principal investigator Jamie Kruse, East Carolina University, krusej@ecu.edu.

Natural disasters create enormous costs for the United States. Despite many private sector and public policy efforts over decades, the current system of managing natural disaster risk is not working well for the government, the insurance industry, or homeowners. Previous research has resulted in a lot of knowledge about how individuals and organizations make risk-related decisions, the strategic behavior of individual insurers and the insurance market as a whole, as well as natural disaster risk itself and ways to physically reduce it. Nevertheless, efforts to understand how the choices of the different participating groups or stakeholders interact as a system have been limited. The project will result in a new framework of interacting mathematical models that can be used to better understand, design, and evaluate government natural disaster risk management policies, such as providing funds to help

homeowners strengthen their homes, requiring homeowners to buy natural disaster insurance, or offering to buy high-risk homes.

By supporting improved design and evaluation of public policies, the project will help the country better manage its risk. By considering the individual, sometimes competing stakeholder points-of-view up front, as an integral part of the analysis, the new framework will make it easier to identify those win-win system-wide solutions that are most likely to be put into action and to be effective. The framework is designed to be consistent with the whole community approach promoted by the Federal Emergency Management Agency, which encourages involving all parts of the community in helping to address the challenge. Engaging representatives of the relevant government agencies and insurance and home building industries as partners at the beginning of the project will help ensure that the research offers usable results that can be put into practice as quickly and effectively as possible.

To achieve these benefits, we propose to develop a new framework that will include five interacting mathematical models of: (1) government decisions about what regulations to introduce and/or incentives to offer; (2) insurer decisions about what to charge for insurance policies and what reinsurance to buy; (3) competition among insurers; (4) individual homeowner decisions about whether to buy insurance and/or strengthen their homes; and (5) regional natural disaster losses.

It will make use of an existing first version of the framework that includes interacting insurer-homeowner and loss models but will improve on that effort substantially through five tasks: (1) identifying categories of homeowner decision types and a homeowner decision model that is based on data describing how homeowners actually make these decisions in real life; (2) extending the framework to include the way decisions and information change over time; (3) including situations in which the stakeholders do not have perfect or the same information; (4) developing and incorporating a model of government decisions; and (5) demonstrating the framework in a full-scale case study applied to residential hurricane risk in North Carolina.

Heterogeneous rupture of great Cascadia earthquakes inferred from coastal subsidence estimates. National Science Foundation grant #1419846. http://www.nsf.gov/awardsearch/showAward?AWD_ID=1419846. Three years. Three grants. \$101,712 to principal investigator Andrea Hawkes, University of North Carolina at Wilmington, hawkesa@uncw.edu; \$122,836 to principal investigator Simon Engelhart, University of Rhode Island, engelhart@uri.edu; and \$129,503 to principal investigator Benjamin Horton, Rutgers University New Brunswick, Benjamin.Horton@mariner.rutgers.edu

Of the major subduction zones worldwide, Cascadia has not experienced rupture in the historical period. For example, each of the Alaska, Chile, Sumatra, Kamchatka, and Japan/Kurils subduction zones experienced multiple megathrust ruptures greater than magnitude 8.5 during this time. A critical step toward understanding Cascadia's rupture patterns is reconstructing its land-level history over the past few thousands of years, a history that is linked to past earthquake cycles. This project uses a novel statistically-based microfossil (foraminifera and diatoms) analysis coupled with computer modeling to quantify coseismic subsidence in Cascadia tidal sediments to determine the rupture patterns of the Cascadia

subduction. This project will produce data that is important to the assessment of seismic and tsunami hazards along the Pacific coast of North America, as well as for sites subject to teleseismic tsunamis produced by this region.

Wetland sediments fringing estuaries at the Cascadia subduction zone harbor a record of plate-boundary earthquakes during the past 5,000 years. These are inferred from stratigraphic evidence of interbedded peaty and muddy sediment beneath tidal wetlands that are used to reconstruct land-level changes. However, the precision of past measurements of land-level changes at Cascadia is low and the measurements are spatially limited. This makes past measurements insufficient for determining which hypotheses of plate-boundary deformation are most valid. This project will redress this deficiency by applying recently developed statistical transfer functions to microfossils to reconstruct Cascadia's rupture patterns and timing and magnitude of strain release over several thousands of years.

This technique will be employed to test three hypotheses regarding the nature of rupture during the AD 1700 and three earlier megathrust earthquakes: (1) Coseismic subsidence varied spatially and temporally during past Cascadia plate-boundary earthquakes; (2) Estimates of coseismic subsidence can differentiate between wide and narrow rupture widths; and (3) More precise dating of earthquake evidence allows more direct evaluation of megathrust segmentation. Field, laboratory, computational, and theoretical investigations will focus on four earthquake events from six estuaries from southern Oregon to northern Washington. These carefully selected sites also include a strike-normal transect. A combined approach of stratigraphic description of buried soils, AMS ¹⁴C dating and multi-proxy microfossil transfer functions, supported by testate amoebae and geochemistry, will result in the construction of land-level changes. A 3D dislocation model with the 3D megathrust fault geometry will be used to compare coseismic deformation to with paleoseismic estimates.

Testing Arctic ice sheet sensitivity to abrupt climate change. National Science Foundation grants #1417675 and #1417783. http://www.nsf.gov/awardsearch/showAward?AWD_ID=1417783. Three years. Two grant. \$157,311 to principal investigator Jason Briner, SUNY at Buffalo, jbriner@buffalo.edu; and \$367,658 to principal investigator Nicolas Young, Columbia University, nicolas@ldeo.columbia.edu.

A team of investigators will investigate the response of the Laurentide and Greenland Ice Sheets to two short-term cooling events (several decades to a few centuries in duration) that occurred 9,300 and 8,200 years ago. Assessing the sensitivity of ice sheets to short term climate variability is at the forefront of the scientific community's and the public's interest because short term ice sheet change will drive 21st century sea level rise. Thus a central question of the proposed work is whether ice sheets react abruptly to climate forcings, or are multi-millennial-scale trends in climate required to elicit a large-scale ice sheet response?

The investigators propose an intensive field-based research program capitalizing on their newly published work reconstructing ice sheet change using high-precision beryllium-10 dating to test the hypothesis that prominent moraine systems marking former ice extents in West Greenland and Baffin Island record the synchronous advance of the Greenland and Laurentide ice sheets driven by the abrupt cooling events.

Pilot data reveal that portions of the ice sheet margin that are in contact with the surrounding ocean are able to respond rapidly to a short-lived climate perturbation. To test whether these documented changes were restricted to solely the most sensitive marine-terminating ice sheet sectors, or whether ice sheets are capable of a larger scale response to centennial-scale climate change, well-constrained chronologies of ice sheet change are needed from other regions. The investigators' research objectives are to: (1) establish how land-terminating regions of ice sheets, which are more representative of broader ice sheet margins, respond to abrupt climate change; (2) further evaluate the role that oceanic forcing plays in modulating ice sheet response to short-lived climate perturbations; and (3) reconstruct the early Holocene behavior of mountain glacier systems (a proxy for summertime temperature) to evaluate what climatic conditions influenced the ice sheets.

Quantifying disaster resilience of critical infrastructure-based societal systems with emergent behavior and dynamic interdependencies. National Science Foundation grants #1441224 and #1441209. http://www.nsf.gov/awardsearch/showAward?AWD_ID=1441224. Three years. Two grants. \$1.45 million to principal investigator Elise Miller-Hooks, Univer-

sity of Maryland College Park, Elise Miller-Hooks elisemh@umd.edu; and \$1.05 million to principal investigator Judith Mitrani-Reiser, Johns Hopkins University, jmitrani@jhu.edu.

This project will create a way to measure the resilience of critical infrastructure-based societal systems (CISSs) that are necessary for community functioning. A CISS is comprised of interdependent buildings that together serve a community function and that are dependent on networks of critical lifelines (water, wastewater, power, natural gas, communications and cyber-communications, and transportation). They are a family of structures linked by occupancy type, people, policies, geographic location, and/or building services, and thus also rely on human, organizational, political, and cyber links.

The project will incorporate public policy, organizational policy, and risk communication into an assessment of disaster resilience data. An integrated approach will be used to describe the role of adaptation (organizational behaviors) and human interventions in interdependency dynamics. The project will seek to understand and model how organizational behaviors emerge and evolve during a disaster event. Moreover, it will study how cyber systems increase the impact of damage, resulting vulnerabilities to follow-on attacks, and approaches to prevent such escalation.

Conferences and Training

November 5-7, 2014
Conference on the Gender Dimensions of Weather and Climate Services
 World Meteorological Organization
 Geneva, Switzerland

Cost: Invitation only, see website

This conference will examine the gender nuances of climate variability and climate change adaptation and seek to develop climate and weather services that build climate resilience. Topics include food security, water management, health, and disaster risk reduction. Conference outcomes will inform the post-2015 development agenda and the Global Framework for Climate Services.

<http://www.wmo.int/genderconference/about>

November 12-14, 2014
III International conference on ENSO
 Instituto Nacional de Meteorología en Hidrología, International Research Centre on El Niño)
 Guayaquil, Ecuador

Cost: \$300

The theme of this conference is "bridging the gaps between global ENSO science and regional processes, extremes and impacts." There has been significant progress in the ability to observe, understand and predict ENSO because of the application of new theoretical approaches, significant advances on physical parameterizations of subgrid-scale processes, and a further strengthening of the technological processes. The conference will synthesize progress on ENSO research with a detailed view of the climate-society relationship, and to share experiences in vulnerability assessment methodologies used by the climate impact studies community.

<http://www.ciifen.org/>

November 13, 2014
Annual Conference on Fire-Related Research and Developments
 The Institution of Fire Engineers
 Gloucester, United Kingdom

Cost: \$300

This conference will look at fire-related research and practice from a variety of disciplinary perspectives and international viewpoints. Topics include wildfire threat analysis, optimizing communication, large industrial fires, community fire safety, firefighter resilience and family support, and addressing arson.

<http://www.ife.org.uk/Home>

November 17-18, 2014
Risk Information Management, Risk Models, and Applications
 CODATA-Germany
 Berlin, Germany

Cost: \$263

This workshop will discuss methodological problems in modeling disaster risk from an information systems point of view. Topics will include cartographic issues, risk modeling for infrastructure, urban neighborhood risk modeling, risk communication, risk-related databases, and risk information processes and applications.

<http://rimma2014.net/index.shtml>

November 19-20, 2014
Disaster Relief Summit
 Aid and International Development Forum
 Washington, D.C.

Cost: \$150 to \$599

This conference will look at ways to enable quicker

and better response during crises and catastrophes in a more effective, sustainable, and cost-efficient way. Topics include effective communication and humanitarian social networks, field personnel safety, sustainable resource planning, products for onsite disaster relief, and information and communication technology for disasters.

<http://disaster-relief.aidforum.org/#countdown>

November 19-21, 2014
Annual FLASH Conference
Federal Alliance for Safe Homes
Orlando, Florida

Cost: \$400

This conference will focus on best practices, lessons learned and innovations in disaster safety with an emphasis on resilience. Topics include climate resilience and disaster safety, resilience in residential construction, science and communication strategies, volunteer organizations, and resilient building codes.

<http://www.flash.org/2014meeting/index.php>

November 20-21, 2014
Global Crisis Communications Conference 2014
Intelectasia

Kuala Lumpur, Malaysia

Cost: \$1,100

With participation of more than 750 public relations professionals, policy makers, academicians, key thought leaders in the areas of crisis communications, top management/c-suite executives from the Asia Pacific, USA, Europe and Australasia region, GC3 promotes broad global exchange of tried and tested crisis communications strategies through a case-study approach and various panel sessions. The recent MH370 incident has underscored the importance of a good crisis communications strategy whether it's for an organization or a country. Malaysia was at the centre of global attention. As the crisis was unfolding, many quarters questioned the country's capability in managing the crisis. It is important to note that now the country is taking a step forward. GC3 is indeed very timely and serves as a unique platform for us to share our experiences and to learn from others.

<http://www.gc3.intelectasia.com>

November 25-28, 2014
INTERPRAEVENT International Symposium
INTERPRAEVENT International Research Society
Nara, Japan

Cost: \$240

This symposium will examine the increase in the intensity and frequency of sediment-related disaster caused by floods, climate change, typhoons, and earthquakes. Topics include field observation and modeling of natural disasters, catastrophic disaster triggers, crisis management, socioeconomic impacts of recovery, and sustainable land use management.

<http://interp्राevent2014.com/>

November 28-29, 2014
Reframing Disaster
Arts and Humanities Research Council
Leeds, England

Cost: Not posted

This year marks the 30th anniversary of Bhopal disaster in India, the 20th anniversary of the Rwandan genocide, and the 10th anniversary of the South Asian tsunami. While much attention is being paid to the centenary of World War I, we would like to counterpoint this by considering the politics of remembering, commemorating, and supporting long-term recovery in relation to a range of compound catastrophes that have deep colonial roots. Given that Bhopal, Rwanda, and the tsunami have all generated significant media interest alongside diverse forms of creative response (from art to social activism), this conference will explore how these and other postcolonial disasters have been defined and represented following the initial event. It will examine the particular challenges posed by different forms of disaster (industrial, environmental, social), and connect these with aid and reconstruction work across multiple sectors.

<http://postcolonialdisaster.com/conference/>

December 4-12, 2014
Disaster and Hazards Mapping Summit 2014
Resource Recovery Movement
Manila, Philippines

Cost: Not posted

The Disaster and Hazards Mapping Summit 2014 will develop better approaches to mapping risks and dangers to communities in the Philippines and other countries with tropical climates. The databasing, mapping and full coordination of efforts towards use and sharing of a full function GIS on hazards, volcanoes, water, flood, forests in the Philippines and Asia, vulnerability areas, liquefaction potential, crisis and hot spots is long due because of the long-running phenomenon of climate change in the planet. This is also significant in that the Philippines, among other countries, lies in the Pacific Rim of Fire where a large number of earthquake faults lie.

<http://summit.hazmapping.org/>

December 10-11, 2014
Advancing and Redefining Communities for Emergency Management Conference
Emergency Management Community Collaborative, Veterans Emergency Management Evaluation Center, and others
Los Angeles, California

Cost: \$275

This conference will look at evidence-based approaches that address challenges to public health preparedness and emergency management. Topics include hospitals and health systems, global health preparedness, children and families, and workplace readiness.

<http://www.arc4em.org/>

January 14-16, 2015
Tokyo Conference on International Study for Disaster Risk Reduction and Resilience
Science Council of Japan
Tokyo, Japan

Cost: Not posted

We will make proposals, as a product of the conference, for establishing close coordination between sustainable development and disaster risk reduction at all aspects

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<http://ibs.colorado.edu/hazards/subscribe>

of policy-making, planning and programming of infrastructure and social systems, human resources mobilization, and for creation of structures and mechanisms to implement disaster risk reduction at all levels of society, and for incubating innovative science and technology that would guide us in all phases of disaster management cycle. Organizers invite world leaders and top scientists to our Tokyo conference prior to the Third UN World Conference on Disaster Risk Reduction to discuss and formulate how the science and technology could help in disaster risk reduction and hence fostering sustainable development.

http://monsoon.t.u-tokyo.ac.jp/AWCI/TokyoISDRRR_Jan2014/index.htm

January 15-17, 2015
2015 UN-Water Annual International Zaragoza Conference
UN-Water
Zaragoza, Spain

Cost: Invitation only, see website

The conference will deal with some of the main implementation challenges related to some selected topics for each of the five main targets recommended by the UN-Water proposal on the global goal for water. These are: (1) Achieve universal access to safe drinking water, sanitation and hygiene; (2) Improve by (X percent) the sustainable use and development of water resources in all countries; (3) All countries strengthen equitable, participatory and accountable water governance; (4) Reduce untreated wastewater by X percent, nutrient pollution by Y percent, and increase wastewater reuse by Z percent; (5) Reduce mortality by (X percent) and economic loss by (Y percent) from natural and human-induced water-related disasters.

<http://www.un.org/waterforlifedecade/waterandsustainabledevelopment2015/index.shtml>

February 10-12, 2015
International Disaster Conference & Expo
Federal Emergency Management Agency
New Orleans, Louisiana

Cost: \$450

IDCE engages the public and private sectors to improve planning, response, and recovery when catastrophic events occur anywhere in the world. IDCE attendees include decision makers who shape the global landscape of best-practices according to the lessons learned and new challenges in each region, territory, state and municipality.

<http://internationaldisasterconference.com/>

March 14-18, 2015
3rd World Conference on Disaster Risk Reduction
UNISDR

Sendai City, Japan

Cost: Not posted

This conference is the major venue for international disaster risk reduction to complete the assessment and review of the implementation of the Hyogo Framework for Action and to review the experience obtained in regional and national programs. The conference will adopt a post-2015 disaster risk reduction framework.

<http://www.preventionweb.net/wcdrr/>

June 24-25, 2015
Critical Infrastructure Protection and Resilience Asia
KNM Media LLP and Torch Marketing
Bangkok, Thailand

Cost: Not posted

Southeast Asia has seen a rise in insurgency-related attacks and terrorist activities, creating uncertainty and insecurity on critical national infrastructure. Climate change has also seen more extreme weather patterns, creating additional hazardous, unseasonal and unpredictable conditions and a severe strain on infrastructure. Cyber security is also becoming more important. Critical Infrastructure Protection and Resilience Asia will bring together leading stakeholders from industry, operators, agencies and governments to collaborate on securing Asia. The conference will look at developing existing national or international legal and technical frameworks, integrating good risk management, strategic planning and implementation.

<http://cip-asia.com/>

July 9-10, 2015
SECED 2015 Conference
Homerton College
Cambridge, England

Cost: Not posted

The conference will bring together experts from a broad range of disciplines, including structural engineering, nuclear engineering, seismology, geology, geotechnical engineering, urban development, social sciences, business and insurance; all focused on risk, mitigation and recovery. Themes for discussion will range from geotechnical earthquake engineering to social impacts and community recovery.

<http://www.seced.org.uk/index.php/seced-2015>



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

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

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

To find out more about these and other opportunities for giving, visit: www.colorado.edu/hazards/about/contribute.html

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