Natural Hazards Observer

Volume XXXVIII · Number 4 March 2014

Failing to plan is planning to fail

Chemical Spill in West Virginia

An invited comment by
M. J. Plodinec and Alicia Smith

On January 9, 2014, a chemical leak from a storage and shipping facility ended up contaminating the water supply of over 300,000 West Virginians. While the investigation of the incident is continuing, we know enough to draw some conclusions. Most importantly, the lack of planning on the part of the facility's owner, Freedom Industries, triggered a cascade of consequences that led to the disruption of many lives.

Background

The Kanawha River Valley in West Virginia is home to several chemical companies. It's known locally as Chemical Valley. Unemployment is low (5.3 percent), but wages are relatively low despite the high number of college graduates in the area.

In 2008, at an area chemical plant, two workers died in an explosion. In 2010, one worker died from a release of phosgene.

Freedom Industries, based in Charleston, West Virginia, sells surface-active chemicals to the mining, steel, and cement industries. Its Etowah River Terminal in Charleston along the Elk River is a storage and truck shipping facility with four million gallons of total storage capacity. In general, regulation has been lax due to constraints on funding at both the state and local levels. The primary regulator is the state's Department of Environmental Protection.

One of the products the company sells to the coal mining industry is 4-methylcyclohexyl methanol. MCHM is manufactured by Eastman Chemical. It is stored as a mixture of MCHM and polyglycol ethers. Relatively little is known about the toxicity of MCHM, but it can cause skin and respiratory problems. It is believed not to be hazardous at concentrations less than one part per million.

While MCHM has a strong licorice-like odor detectable at part-per-billion levels, conventional chemical analytical techniques are tedious and require almost an hour to perform. MCHM was stored in a 46,000 gallon steel tank at Freedom's Etowah River Terminal. The tank is more than 50 years old. It had not been inspected by any regulator since 1991. At that time the site was owned by a different company and the tank contained a different chemical.

An independent inspection performed for the company in October, 2013, found that the tank was not in full compliance with industry standards. A cinder block secondary containment wall intended to prevent spills from the tanks at the facility was unlined and—like the MCHM tank—was on porous material (gravel and soil). According to the federal Chemical Safety Board, it "provided very little protection from a possible release." West Virginia American Water is the largest water utility in West Virginia, serving almost 600,000 customers. The water intake to its treatment plant that provides water to about 300,000 customers in the Kanawha River Valley is

(Please see "Spill" page fourteen)

INSIDE ...

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.

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 **March 31, 2014**.

Letters

Dear editor,

The Gaillard et al. invited comment in the January 2014 *Natural Hazards Observer* was timely (again) and one of the few succinct discussions of the several pertinent issues involved. Its clarity is particularly beneficial now as there are indications leading to 2015 of yet another round of reiterated advocacy of institutional dogma which some of us believe is running out of credibility.

I value the fact that your article represents the body of the authors' collective interests and varied experiences. The fact that it was well documented without being overbearing or academically arch should also make it accessible to a much wider readership, so I hope that it can be widely disseminated and noted beyond only "disaster professionals." I would anticipate that with innovative placement it can further the understanding of social dimensions of growing public exposure and communities' vulnerability to accumulating risks.

Terry Jeggle
Independent disaster and risk management consultant

... and follow-up

Anderson family creates disaster mitigation research and education fund

Late sociologist Bill Anderson worked tirelessly in the field of disaster risk reduction and was a great proponent of attempting to understand and address the ways in which vulnerable populations suffer in disaster. His family has announced the creation of a new fund to further those ideals.

The William Averette Anderson Fund for Hazard and Disaster Mitigation Education and Research will help earth scientists, engineers, practitioners, and social scientists to mitigate the impacts of disasters on vulnerable populations in the United States.

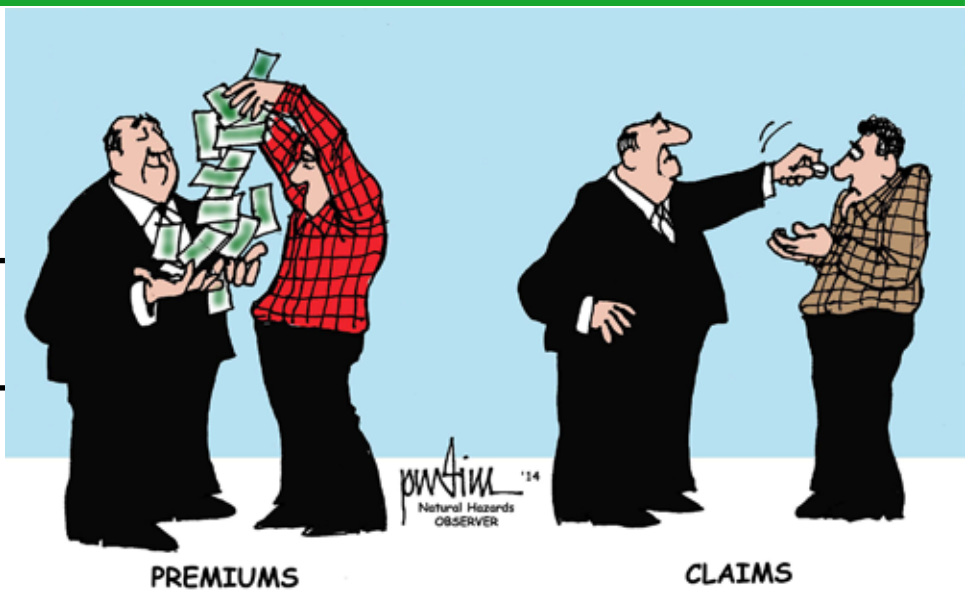
"As I considered how best to honor Bill, my thoughts were immediately directed to his deep commitment to promoting the study of women, children, African Americans, persons of color and of other vulnerable populations in disaster hazard mitigation," his wife Norma Doneghy Anderson wrote.

Anderson passed away unexpectedly on December 29. For more than two decades, Bill served as the National Science Foundation program officer for the Natural Hazards Center, providing invaluable guidance and support. His distinguished career included positions at the American Sociological Association, NSF, the World Bank, and the National Academies.

Those interested in learning about the fund or making a contribution can visit the fund Web site or check in on a Facebook page that's been created to help promote the effort.

2013 not so bad for insured disaster losses

Global losses last year were lower than 2012, and lower than ten-year averages.



Disaster-wise, 2013 was a little less catastrophic than recent years, and pretty good for insurance companies.

There were a slightly more disasters—"loss events" in insurance parlance—in 2013 than the ten-year (2003-2012) average, but there were considerably fewer fatalities during the year—20,000 compared with a ten-year average of 106,000, **according** to insurance giant Munich Re.

Munich Re says global losses totaled $125 billion in 2013, considerably lower than 2012's losses of $173 billion. Insured losses were also much lower than the ten-year average, at $20 billion compared to an average of $106 billion for 2003-2013. Munich Re said there were 880 "events," lower than the 2012 figure of 920, and more than the ten-year average of 790.

Using different criteria, AON Benfield **found**, "Global natural disasters in 2013 combined to cause economic losses of $192 billion, 4 percent below the ten-year average of $200 billion." The losses were generated by 296 separate events, compared to an average of 259. The disasters caused insured losses of $45 billion, 22 percent below the 10-year average of $58 billion and the lowest total since 2009.

Most of the disaster headlines were grabbed by Typhoon Haiyan in the Philippines, which resulted in 8,000 deaths, $13 billion in total losses, and $1.5 billion in insured losses. But the costliest disaster was actually the flooding Central Europe last summer, which resulted in $22 billion in overall losses and $5.3 billion in insured losses. There were relatively few deaths, however—a total of 25.

"The 2013 floods showed that flood control can work. After all, the parameters such as duration and volume of rainfall would have led one to expect even more serious flooding than in 2002," said Peter Höppe, head of Geo Risks Research at Munich Re. "Nevertheless, it also demonstrated that flood control has to cover the whole course of a river and cannot just consist of dykes. Rivers need space to spread out when there are floods, so that those living downstream are not hit even harder when protective measures are taken in the upper reaches. This requires efforts comprising the whole catchment area of a river, which therefore often have to be internationally coordinated."

One noteworthy thing is what didn't happen—no major hurricane struck the United States. "No hurricanes struck the U.S., as the country extended its record streak without a major (Category 3+) hurricane landfall to eight consecutive years," says AON Benfield's report. "The previous record was set between September 1900 and October 1906." 2012's Hurricane Sandy, which was the second costliest hurricane in U.S. history, was a Category 2 storm when it hit the Northeast. Only 2005's Hurricane Katrina was costlier.

Natural disasters are on the radar of the World Economic Forum, but not as much as potential economic problems. In its *Global Risks 2014*, the forum **ranks** "fiscal crises in key economies" as its risk of highest concern. "Failure of climate change mitigation and adaptation" comes in fifth, and "greater incidence of extreme weather events (e.g., floods, storms, fires)" ranks sixth.

"The risks considered high impact and high likelihood are mostly environmental and economic in nature: greater incidence of extreme weather events, failure of climate change mitigation and adaptation, water crises, severe income disparity, structurally high unemployment and underemployment and fiscal crises in key economies," the report says. "Female respondents perceived almost all global risks as both more likely and more impactful than did males, especially in the environmental category. Younger individuals gave higher scores for the impact of almost all of the risks, particularly environmental risks, such as water crises, greater incidence of natural catastrophes, the loss of biodiversity and greater incidence of extreme weather events."

Heat and floods forcing migration

In Bangladesh, it's flooding. In Pakistan, it's heat.

There are about a billion people on the move each year around the world. About 250 million of them cross international border. Whether more people will migrate as the effects of climate change take hold is becoming more of an issue.

Immigration is always an issue fraught with emotion and political turmoil. If climate change is going spur new bursts of population movements, these fault lines will likely get wider.

Bangladesh, for instance, could have between 16 million and 26 million internally displaced migrants by 2050 in response to the impacts of sea level rise—storm surges, worse flooding, river bank erosion, and other impacts.

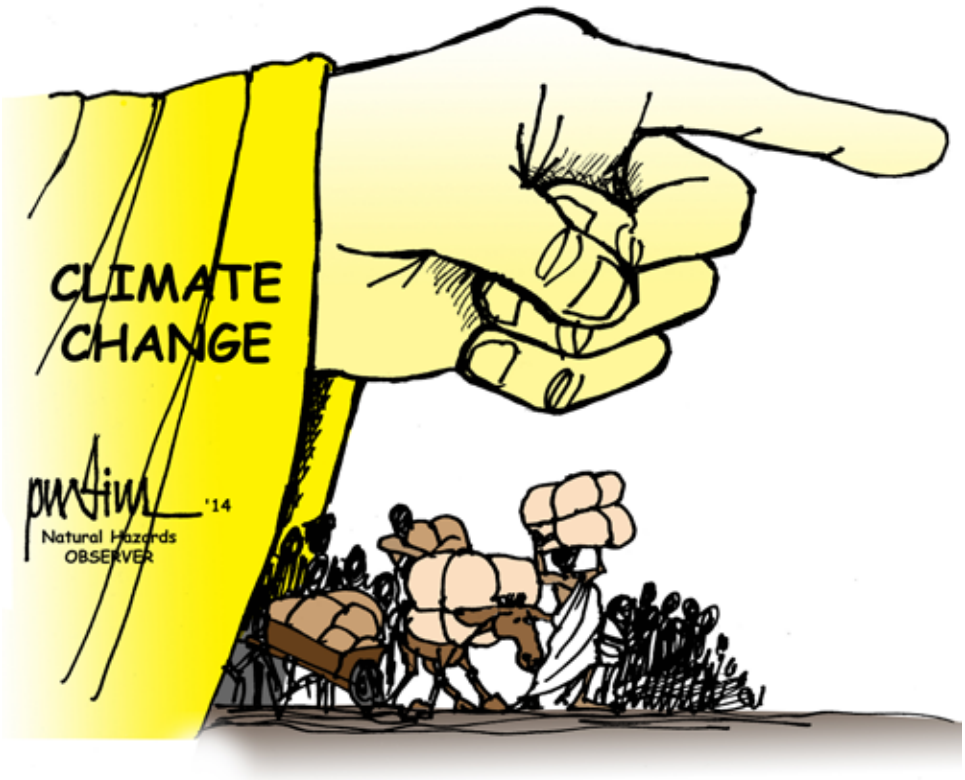
In Pakistan, it appears to be heat—not flooding—that inspires people to move. This is the result of "negative effect on farm and non-farm income," according to a study published online on January 26, 2014 in *Nature Climate Change*. Surprisingly, despite frequent and severe impacts form flooding, this hazard doesn't inspire as much movement as heat stress.

The East and Horn of Africa—already poor and stressed by drought and conflict—"is projected to be one of the regions of the world most negatively affected by climate change," according to the UN report *Climate Change, Vulnerability and Human Mobility: Perspectives of Refugees from the East and Horn of Africa*.

While the reasons for this migration are complex—civil conflict, drought, and so on—"Many refugees … had perceived discernible shift in weather in their home countries in the past 10-15 years." But where movement occurred as the result of climate variability, it was a measure of last resort.

Bangladesh has been "facing gradual onset climate stresses and sudden shocks, including water shortage, cyclone, floods and coastal/delta erosion" since at least 1991, according to *Policy Analysis: Climate Change and Migration in Bangladesh*, a report by the universities of Dhaka and Sussex.

The *Policy Analysis* report addresses making this migration an effective adaptation to climate change. "A growing body of scientific evidence posits migration as an effective adaptation strategy that offsets the impacts of environmental shocks and stresses," the report says. "Migration could offset the vulnerability to the impact of climate change. This could be done by enhancing it adaptive capacity by improving access to resources, livelihood strategies, social networks, and accessibility."



The estimates of "environmental refugees" have varied considerably over time. University of Oxford's Norman Myers, in a paper in the *Philosophical Transactions of the Royal Society B*, estimated 25 million environmental refugees, compared with 27 million "traditional refugees"—those fleeing politics or religious persecution, ethnic troubles and so on. In a 1989 lecture, Sir Crispin Tickell estimated that between 60 million (one percent of an estimated world population of six billion) and 300 million people would be migrating as the result of environmental factors. "Even 60 million would represent a problem of an order of magnitude which no one has ever had to face," he said at the time.

Exploring the all-important beer/volcano nexus

Foaming beer predicts volcanic gas behavior

Disaster research has finally taken us where no one has gone before—the intersection of volcanos and beer.

Spanish researchers at the Universidad Carlos III de Madrid say that the way beer foams as the result of an impact may help predict the quantity of gasses produced by a volcanic eruption.

"The idea for this research came about at the bar of a tavern when it was observed that the foam of one beer spilled over when somebody jokingly hit the neck of one bottle against the base of another," according to a news release on the research.

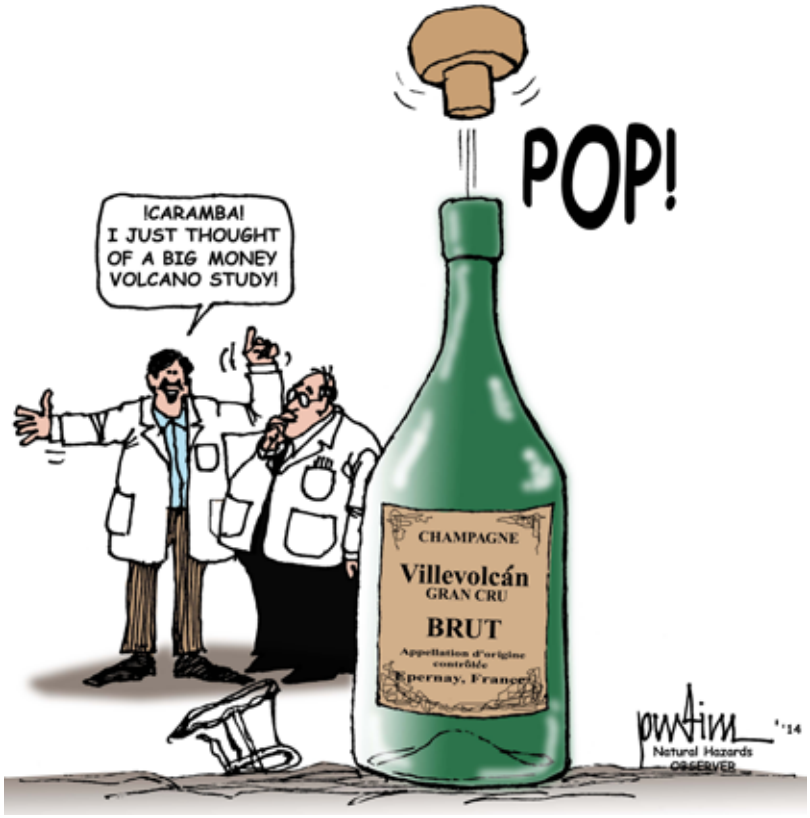
"We all began to propose hypotheses and theories about the cause of the phenomenon, but none of them convinced us, so we decided to take it to the laboratory to do research using controlled experiments in well-defined conditions to analyze which physical phenomena are behind the appearance of that foam," said Javier Rodríguez, a professor in UC3M's Department of Thermal and Fluids Engineering.

The process occurs in three phases, the researchers

discovered from slow motion study (which is often the effect beer has on us here, as well). With 50,000 photos from a high-speed camera, they were able to detail the process of cavitation. This occurs when the pressure in liquid drops.

"One of applications is the prediction of the quantity of gasses produced by the eruption of a volcano," says another of the researchers, Daniel Fuster, of the Institute D'Alembert. In fact, in 1986, Lake Nyos in Cameroon, which lies on top of a volcano, released between 100,000 and 300,000 tons of CO_2 in an explosion-like phenomenon. The gas expanded at a speed of 100 km/h, expelling the oxygen in a 25-kilometer radius, causing 1,700 fatalities among the population and killing thousands of animals due to asphyxiation.

It also helps the rest of feel that our lives in the taverns haven't been entirely wasted. You can see a video of the beer foaming inspiration here: http://www.youtube.com/watch?v=WCnbs0NXF_4.



A sad tale of disaster fraud

Misuse of L'Aquila, New York disability funds probed.

While the New Jersey Hurricane Sandy relief contretemps between Hoboken Mayor Dawn Zimmer and the administration of New Jersey Gov. Chris Christie excited the most attention in January, it's not the only issue of alleged financial mismanagement associated with recent disasters.

As if the misguided attempts to punish geologists for their earthquake warnings aren't bad enough, eight people in L'Aquila, Italy, are being investigated for the misuse of about $2.3 million in earthquake recovery funds.

A Mw 6.3 earthquake hit L'Aquila on April 6, 2009, killing at least 297 people. Six scientists and one government official were convicted of manslaughter after they allegedly downplayed the risks prior to the quake. That verdict has been roundly denounced by the scientific community.

Now, however, eight people are under investigation for bribe taking or false accounting related to $2.3 million in earthquake relief and recovery funds.

In a November 2013 report, A European Parliament official Soren Bo Sondergaard, issued a report with allegations that some L'Aquila recovery funds went to contractors connected to organized crime.

Sondergaard also found that housing built for the victims was of poor quality. Dozens of families were evacuated because the structures were "dangerous and unhealthy," according to the report. One home caught fire because of a bad electrical system, and others have had troubles with sewers, water and walls. Regarding the quality of houses, L'Aquila Mayor Massimo Cialente told the BBC, "Some of the houses built have never-ending issues and we spend lots of money repairing them."

The European Commission originally dismissed Sondergaard's findings.

At that time, on the subject of whether funds were misused, Cialente said, "I am inclined to exclude the possibility."

In January, however, when he fraud investigation was announced, Cialente—who was not implicated—told the BBC he felt "betrayed … I've always urged the utmost transparency and respect for the law."

And in New York, 80 former firefighters, police and other associates have been charged in a suspected disability scam in which dozens of people allegedly falsely claimed to have been traumatized by the September 11, 2001 attacks. In all 106 suspects were charged in the allegations.

Manhattan District Attorney Cyrus Vance said the scheme goes back to the 1980s. He told Reuters, "The total amount stolen from taxpayers could reach $400 million."

"Since at least 1988, these men are charged with coaching hundreds of individuals on how to convince the Social Security Administration that [they] are unable to work at any job because they suffer a psychiatric condition and are, therefore, entitled to monthly disability payments," Vance said.

New York Police Commissioner Bill Bratton said he could only "express disgust" at the actions of the suspects. He said he was especially distressed that the perpetrators used the 9/11 airline hijackings that destroyed the World Trade Center and killed nearly 3,000 people to perpetrate the fraud.

Resilience or myopia?

Compromising Palestinian lives for Israel's security

An invited comment by Ghazi-Walid Falah

(*The article on resilience and security in Israel by Meir Elran in the November 2013 issue of the* **Natural Hazards Observer** *kicked up quite a storm in some sectors of the hazards community. So we asked the University of Akron's Ghazi-Walid Falah to provide a Palestinian perspective.*)

Meir Elran's comment on "resilience" in Israeli society raises what is a kind of mythology dominating Israeli consciousness and government policy, namely the litany of Israeli "security," surrounded by its myriad "enemies." That litany is grounded in a national mythology of existential threat, inculcated and reproduced by the Israeli schools, the media, and the Zionist national narrative.

Another element in this narrative of threat is bound up with the Holocaust: "In 1969, Israel's legendary diplomat Abba Eban warned that withdrawal from the territories his country occupied in June 1967 would be a return to 'Auschwitz borders.' Since then, some Israeli politicians have used these provocative words to attack almost anyone who defies them" (Abunimah 2008). Jewish history in the Diaspora as a "school for resilience" is conjured up by the cartoon on page 12.

Elran systematically portrays Israel as a victim, never admitting Israel is an occupying power. In the eyes of most Palestinians—and a growing number of Jews, especially outside Israel—the fateful error of Jewish statehood in the 20th century was (and remains) the attempt to build an exclusive settler state in someone else's country, expelling much of its indigenous population (Pappe 2013). Instead of speaking about a just solution to the conflict and a path forward, Elran maps out a notion of "resilience" built on a complex architecture of state security and community mobilization, stating that a "resilient system … is one that can absorb the aftermath of a major challenge, resuming its designated mission." He does not analyze the roots of the "challenge" nor does he spell out the insidious ideology driving what he terms the "designated mission." What he describes as the "quick return to normal functionality" as a bounce-back feature of "societal resilience" is in fact part of the problem in Israeli society and mentality—"normal functionality" as a kind of social and political schizophrenia in regard to the real nature of the conflict.

Aware and unaware

As Palestinians, we are reminded of a phrase from the Talmud (Berakoth 1952) that perhaps every Israeli drafted into the army internalizes and may be ordered to put into actual practice under certain circumstances: "*haba lehargikha hashkaim ve hargo*" ("If a man comes to kill you, rise early and kill him first"). This phrase can be seen as a tactical maxim and geopolitical code for the Israeli military establishment, consistent with the spirit of what Prime Minister Benjamin Netanyahu told ministers gathered for a special cabinet session in Safad, northern Israel in October 2011—that Israel's security policy is based on two principles: "Kill or be killed" and "He who harms you should bear the blood on his head" (*Haaretz* 2011).

As director of the Homeland Security Program in Israel, we cannot expect Meir Elran to provide a balanced perspective on the issues he raises. He speaks as a seasoned professional on behalf of the official hard line of Israeli security policy in the face of "terrorism." His position on issues is predictable, given the important office he holds within the Israeli political and administrative establishment. Nor do we expect

him to label so-called "enemies of Israel" as anything other than "terrorists." Once we label an adversary as "terrorists," they are demonized and do not even have the right to their own perspective or rationale, or their own broader narrative. One should bear in mind that the difference between a "freedom fighter" and a "terrorist" is often in the beholder's eye.

Striking in his discussion of seven principal components in "societal resilience" in Israel is his stress on an "aware, informed system." Yet most Jewish Israelis are remarkably unaware of the nature of the Israeli occupation in the West Bank, the suffocation of Gaza and its unending ordeal (see below), the sufferings of millions of Palestinian refugees, the marginalized situation of Arab-Palestinian citizens inside the Israeli state. Arabic is a language few Israelis choose to study, although it is the language of the region and of some 20 percent of the Israeli state population. Elran touches on "high school students' education and mobilization," yet the Israeli schools are remarkable in the way they inculcate ignorance of the Palestinian world and its realities, as analyzed in depth by Elhanan-Peled (2012). The underlying theme in Israeli "resilience" not touched on by Elran, is the explicit maxim: "build walls, not bridges." It characterizes recent and current Israeli security policy. Is this the characteristic of a resilient society or a myopic one?

One possible Palestinian response to Elran's discussion of Israeli "resilience" is to reply by sketching a portrait of Palestinian "resilience" in the face of constant Israeli attack and harassment, and what is called *sumud*—Palestinian "steadfastness" in the face of uprooting and oppression (Said and Mohr 1986; Falah 2013). In fact, their resistance grounded on *sumud* is also a form of grassroots "homeland security" that Elran himself is engaged in.

Do the lives of ordinary Palestinians count much for Elran or others in his position in Israel, especially those in charge of security functions? How does he see such killing of the innocent? Consider a well-known incident, one that occurred the night of July 23, 2002. An Israeli warplane dropped a one-ton bomb on a Gaza apartment building where a senior Hamas member Salah Shahade was sleeping together with his wife and family. The building was situated in a densely populated residential neighborhood. Besides Shehada and his wife and three children, 11 people were confirmed dead and well over 100 people wounded. Among the dead were a number of children as well as two elderly men (Hanna 2002). The euphemism in some circles for such slaughter is "collateral damage." Yet when the reporter asked the then commander of the Israeli Air Force, Dan Halutz, about the feelings of a pilot and what he feels when he drops a bomb, Halutz answered, "That is not a legitimate question and it is not asked. But if you nevertheless want to know what I feel when I release a bomb, I will tell you: I feel a light bump to the plane as a result of the bomb's release. A second later it's gone, and that's all. That is what I feel" (Levy-Barzilai 2002).

Cyclical violence

Such murder of entire Palestinian family members in Gaza by Israeli air raids is not an isolated incident. On the November 18, 2012, Israeli air strike left at least 11 members of the same family dead. The missile flattened the two-story home of the Daloo family, leaving four children and five women, including an 80-year-old grandmother, among the dead (Fagge et al. 2012). The scope of this essay does not allow us to chronicle the numerous Israeli attacks of this scope, which many observers would consider as war crimes targeting Palestinian civilians.

There is a strong sense of repeated outrage among Palestinians. An Israeli settler killed 29 Palestinians in Hebron in February 1994. As OXFAM (2013) notes: "Since then more systematic recording shows that settler violence is on the rise, and is undermining the physical safety and livelihoods of Palestinians. The number of settler attacks resulting in Palestinian casualties and property damage has increased by 32 percent in 2011 compared to 2010, and by over 144 percent compared to 2009 … In 2011, alone 10,000 Palestinian-owned trees, primarily olive trees, were reportedly damaged or destroyed. Over 90 percent of monitored complaints against settler violence have been closed without indictment in recent years." Various modes of settler violence continue down to the very present. On January 15, 2014, a mosque in the West Bank village of Deir Istiya was set on fire by Jewish settlers: "The main gate of the mosque and some of the carpeting inside were charred by the flames … Grafitti in Hebrew was scrawled on the mosque, reading 'Arabs out' and 'Revenge for spilled blood in Qusra'" (Mezzofiore 2014).

The violence is clearly cyclical at one level. But at another more fundamental one, Palestinians are reacting to the occupation of their homeland, a long history of erasure, silencing, and oppression.

The violence is clearly cyclical at one level. But at another more fundamental one, Palestinians are reacting to the occupation of their homeland, a long history of erasure, silencing, and oppression.

Elran begins his piece by pointing to numbers of fatalities in the wake of the Second Palestinian Intifada. According to him, this included "130 suicide bombings" and "more than 1,000 fatalities, 80 percent of whom were civilians" (Elran 2013). We assume he counts only Israelis. Without accepting his statistical data at face value, let us use a more independent source of information and bring the matter into more accurate comparison. According to The Washington D.C.-based Middle East Policy Council's website, 861 Israelis and 2,740 Palestinians were killed from the outbreak of the Second Intifada on September 29, 2000 down to March 2, 2004 (Middle East Policy Council 2004). Proportionally, if we take the total U.S. population as a basis for comparison, these figures are equivalent to 40,870 in the case of Israel and 226,103 Palestinians. That gives some comparative idea of the enormous magnitude of these losses. Significantly, the ratio of killing seems to have at time stabilized around one-to-three over a period of almost three-and-a-half years—three Palestinians are killed by Israel to one Israeli killed by a Palestinian. One should bear in mind that prior to the Second Intifada, the ratio was more than ten Palestinians to one Israeli over many years (Gordon and Frant 2002).

Let us look at one more item in Elran's very one-sided account. He says that in 2008, "Hamas attacked the southern portion of the country, with daily barrages of 140 rockets and missiles fired from Gaza, lasting about three weeks." We do not wish here to challenge his account of information or give any justification for Hamas's attack at the time. Israel for many

years has pursued a policy against individual Palestinians of what has become known as extra-judicial killings, assassinating "wanted" young Palestinian men (Barghouti 2001; United Nations 2003), and occasionally using Palestinians as "human shields" (Copans 2002, A9) in order to achieve this end. Some would consider this "state terrorism." This can happen any time, and without prior warning.

Palestinian response

In response, Palestinian militant groups, whose members are being assassinated, may react by firing their homemade missiles or rockets—an offensive weapon which hardly resembles the electronically sophisticated ones launched from Israeli airplanes on Palestinian targets. This begs the question: who is the party who retaliates and who is the victim in such circumstances? Israeli and Western media typically tend to foreground the Israeli narrative. No matter what happens, Israel continues to score points for being the seemingly innocent party under supposedly "unwarranted and indiscriminate attack," and the Palestinians are the guilty ones.

On October 30, 2011, two Israeli air raids took the life of nine Palestinians in the Gaza Strip. Egypt brokered a ceasefire agreement between Israel and the Palestinian fighters, but Israel broke the ceasefire agreement the following day, dispatching a third raid that killed one Palestinian in the southern suburbs of Rafah city. Responding to that incident, Netanyahu was quoted as saying "There is no cease-fire … I promise that the other side will pay even heavier prices than it has so far, until it stops firing" (Greenberg 2011). Such spirals of violence reoccur, and it is arbitrary to try to determine their first spark. But inevitably, Israeli fire power is overwhelming, and any incident serves to reinforce in Israeli public mindset the dominant mythology of unending threat.

After 10 years of fruitless negotiations within the framework of Oslo peace accords (Falah 2005), the Palestinian people of the West Bank and Gaza have largely lost hope in any meaningful peaceful solution and feel they have nothing left but to fight with their bodies, in effect their only weapon (Jamul 2004) against one of the world's best-equipped armies and a government run by ex-generals. Are the Palestinians allowed to resist the occupation of their homes and live as normal people like everybody else?

Elran never gives any hint that Gaza at the time was (and still is) under siege and suffocation.

It would be mistaken to think that Palestinian resistance to Israeli occupation of their homes, villages, towns and cities is only limited to sporadic violence. Indeed, as Nadia Abu-Zahra and Kay (2013) say, Palestinians engage in different forms of resistance employed in response to the regime of registration, documentation and movement restrictions. Too often, resistance is reduced to its most dramatic manifestations in individual, often violent acts and events

However, such basic reductionism fails to capture the most common, and possibly the most effective forms of daily Palestinian resistance. Abu-Zahra and Kay (2013) discusses three types of resistance based on what is being resisted: (1) the effects of systematic oppression; (2) the restrictions that comprise the system; and (3) the authority of the system. In response to these, three levels of resistance can be identified: resisting the effects, resisting the system, and resisting the system's root claims to legitimacy. According to Abu-Zahra and Kay (2013), the first mode is employed in the way Palestinians and their supporters refuse to allow the system of movement restrictions and identity documentation to undermine and destroy their health and educational services and structures. The detrimental effects of closure and geographic isolation, so well documented by international organizations in all sectors, are resisted on a daily, non-violent but forceful basis by health workers, teachers, administrators and countless others who strive to deliver the best services possible to the general population.

Resistance to the effects of systematic oppression extends far beyond the formal sectors, and into the heart of the family: parents wish the best for their children; children compete for the highest grades in the country; siblings sacrifice their own futures for their family members to succeed. But while the "resilience" of the family structure has received much acclaim, it all takes its toll. The closing section in Abu-Zahra and Kay's analysis here deals with "resisting the effects": the negative aspects of the new normality. It is about how coping has its costs: the struggle for survival is not always one of bliss, but rather one of trade-offs and extremely personal, powerful forms of discontent. Thus, perhaps the answer to these challenges is to instead resist the system: to actively

circumvent barriers, and to find ways to make administrative control more difficult and cumbersome for those in power. Yet this too comes at the cost of great risk, and above all, repression and reprisals from the military and administrative framework.

The third form of resistance reveals the illegitimacy of the system. This is the kind of resistance of which pass-burning is but one of the many symbols and acts. It is also perhaps the most costly, and in the case of Palestinians, one of the least recognized and therefore most precarious. That is because any Palestinian who burns their ID jeopardizes access to many of the freedoms that people elsewhere in the world can take for granted and lacks recourse or advocate.

What is revealed here is the illegitimacy of denying these rights on a blanket basis to an entire population, and instead making them conditional on a series of selectively-granted "permissions." However, as many of these permissions are essential for daily lives, challenging the authority of the system means relinquishing the opportunity to resist in other ways.

In conclusion, we would reject Elran's notion of "resilience as a cornerstone of disaster management" in the Israeli-Palestinian conflict, instead of "societal transformation," building bridges and finding just solutions to the huge problems engendered by Israel's existence in its present form. What is needed is in-depth analysis of the "disaster" and its repercussions both for Jewish Israelis and Palestinian Arabs—in lieu of an orchestrated battery of government and military policy and public manipulation in order to "manage" it. Elhanan-Peled's insights in regard to Israeli education are very relevant in this regard (see also Falah 2005; Pappe 2013).

Ghazi-Walid Falah is a professor in the Department of Public Administration and Urban Studies at the University of Akron in Ohio. He can be reached at falah@uakron.edu.

References

Abunimah, A. 2008. Israel's 'Auschwitz Borders' revisited. *The Electronic Intifada*. Dec. 7. http://electronicintifada.net/content/israels-auschwitz-borders-revisited/7847. Accessed January 15, 2014.

Abu-Zahra, N., and A. Kay. 2013. *Unfree in Palestine: Registration, Documentation and Movement Restriction*. London: Pluto Press.

Barghouti, M. 2001. The right to take life. *Al-Ahram Weekly Online*, Issue No. 546, August 9-15. http://weekly.ahram.org.eg/2001/546/op5.htm

Berakoth. 1952. *The Babylonian Talmud*, ed. Rabbi Dr. Isidore Epstein. Tractate Berakoth, Folio 58a. London: Soncino. http://www.come-and-hear.com/berakoth/berakoth_58.html Accessed January 15, 2014.

Copans, L. 2002. Israelis forced teen to roust militant. *The Plain Dealer*, August 16, page A9.

Elhanan-Peled, N. 2012. *Palestine in Israeli School Books: Ideology and Propaganda in Education*. London: I.B. Tauris.

Elran, M. 2013. Security and resilience in Israel. *Natural Hazards Observer* XXXVIII (2): 1, 12-14.

Fagge, N., I. Lazareva, and L. Brown. 2012. Eleven members of family die in Gaza air strike as two-story home is flattened in deadliest incident of five-day old conflict. *Mail Online*, November 18. http://www.dailymail.co.uk/news/article-2234711/Gaza-conflict-11-members-family-die-Israeli-air-strike-2-storey-home-flattened.html. Accessed 17 January 17, 2014.

Falah, G-W. 2005. Peace, deception, and justification for territorial claims: The case of Israel. In *The Geography of War and Peace*, ed. C. Flint. 297-320. Oxford and New York: Oxford University Press.

Falah, G-W. 2013. Growing up in rural Galilee, Palestine: memories of childhood geographies. *Cultural Geographies* 20(3): 299-318.

Gordon, M. R., and D. Frant. 2002. Palestinians show link between the U.S. and Israeli terror. *New York Times*, April 18 [in ZNet Mideast]. http://www.zmag.org/content/showarticle.cfm?SectionID=22&ItemID=1756.

Greenberg, J. 2011. Israeli airstrike kills militant in fresh Gaza violence. *The Washington Post*, Oct. 30, 2011. http://www.washingtonpost.com/world/middle_east/israeli-airstrike-kills-militant-in-fresh-gaza-violence/2011/10/30/gIQAG61ZWM_story.html Accessed January 17, 2014.

Haaretz. 2011. Netanyahu to Gaza militants: Israel's policy is kill or be killed. *Haaretz.com*. October 31. http://www.haaretz.com/news/diplomacy-defense/netanyahu-to-gaza-militants-israel-s-policy-is-kill-or-be-killed-1.392761 Accessed January 17, 2014.

Hanna, M. 2002. "Utter devastation" in Gaza City. *CNN.com/WORLD*. July 23. http://edition.cnn.com/2002/WORLD/meast/07/23/hanna.gaza.otsc/. Accessed January 117, 2014.

Jamul, L. 2004. Palestine—In search of dignity. *Antipode* 36 (4): 581-595.

Levey-Barzilai, V. 2002. The high and the mighty. *Haaretz* August 29.

Mezzofiore, G. 2014. 'Arabs out': Jewish settlers torch and deface West Bank mosque. *Yahoo! News*. http://uk.news.yahoo.com/39-arabs-39-jewish-settlers-torch-deface-west-111800336.html#Di9pTPG Accessed January 17, 2014.

Middle East Policy Council. 2004. *Victim Comparison*. http://www.mepc.org/public_asp/resources/equiv.asp

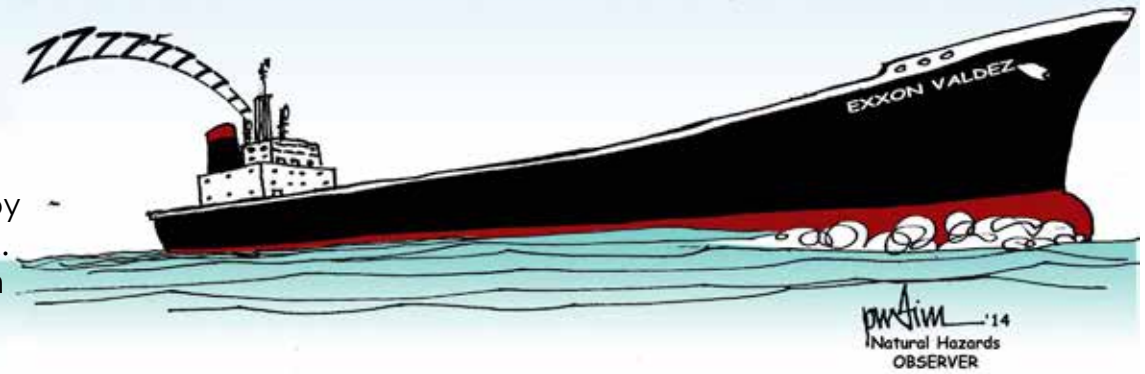
OXFAM. 2013. *20 Facts: 20 Years since the Oslo Accords*. http://www.oxfam.org/sites/www.oxfam.org/files/oxfam-oslo-20-factsheet.pdf. Accessed 26 September 2013.

Pappe, I. 2013. Conversation with Ilan Pappe. We don't have the luxury to wait any longer. *The Palestine Chronicle*, 22 Dec. http://www.palestinechronicle.com/conversation-with-ilan-pappe/#.Utpr6dL8LGi Accessed January 15, 2014.

Said, E., and J. Mohr, J. 1986. *After Last Sky*. New York: Pantheon Books.

United Nations. 2003. UN envoy condemns Israel's extra-judicial assassinations. August 26th. http://www4.alternative-news.org/display.php?id=3353

Observations: 25 years since *Exxon Valdez*



An invited comment by Duane A. Gill, Liesel A. Ritchie, and J. Steven Picou

March 24, 2014 marks 25 years since the *Exxon Valdez* ran aground on Bligh Reef in Prince William Sound, Alaska. The accident occurred after the tanker's captain, Joseph Hazelwood—who had a history of alcohol abuse and whose blood still had a high alcohol level 11 hours after the spill—inexplicably exited the bridge, leaving a tricky course correction to unlicensed subordinates (Exxon v. Baker 2008: Syllabus p.1).

The vessel spilled between 11 million and 33 million gallons of crude oil into one of the most pristine ecosystems in the world. It unleashed a disaster on local coastal communities with economic and cultural ties to natural resources damaged by the spill and clean-up. Social impacts of the disaster became chronic. Key resources, such as herring, failed to recover. Litigation became embroiled in a series of appeals that delayed resolution until 19 years after the spill.

The *Exxon Valdez* oil spill provided an opportunity to document human impacts and community recovery from a technological disaster. Beginning with a Quick Response grant from the Natural Hazards Center, Steve Picou and Duane Gill initiated a study of Cordova, Alaska in August 1989. A commercial fishing community with a subsistence heritage rooted in Alaska native culture, Cordova became ground zero for negative impacts from the spill. Before the spill, Cordova consistently ranked in the top ten most profitable U.S. seafood ports, but it dropped all the way to 54th place in 1993 and although it made a brief comeback from 2005-2008, it was in 27th place in 2012.

Picou and Gill's initial research evolved into a four-year community study (1989-1992) using a field experiment design that included Petersburg, Alaska as a control community and Valdez as a comparison community. This was followed by a project to develop and implement an alternative community mental health program from 1995-1997. Joined by Liesel Ritchie in 2000, our research team continued to document long-term sociocultural and psychosocial impacts of the disaster as we expanded our focus to include the litigation process, decision, and disbursement of damage awards. A 1994 jury verdict in Federal District Court found Exxon negligent and awarded $287 million in compensatory damages and $5 billion in punitive damages to almost 33,000 plaintiffs.

After numerous appeals, the U.S. Supreme Court heard the case and issued its decision on June 25, 2008. The Court ruled that Exxon was liable, but reduced the punitive damage award to $507 million—a one-to-one ratio to "actual" damages. Plaintiffs began receiving checks in October 2008 and by December 2009 almost all awards had been dispersed. We collected data before and after the decision. Our last official data collection was a 2013 telephone survey of Cordova and Petersburg residents.

This 24-year longitudinal study of the disaster included quantitative and qualitative methodological designs and provided a unique source of data and knowledge regarding community impacts and recovery. During the last 13 years, we engaged in three major types of data collection: (1) cross-sectional telephone surveys of the Cordova community and a control community (Petersburg) in 2000, 2006, 2009, and 2013 (led by Picou); (2) surveys of a renewable resource user group panel consisting of Alaska natives and commercial fishermen in 2001, 2006, 2009 (led by Gill); and (3) qualitative interviews with a panel of community residents in 2002-2003 and 2008-2010 (led by Ritchie). This article summarizes some of the key findings of this comprehensive research effort.

One important observation that is often overlooked in conversations about Cordova is that it is a resilient community with many hard-working, intelligent, good-hearted citizens. Among the most consistent findings throughout our surveys from 1989 to 2013 were the high levels of community attachment reported by respondents. For example, in 2000, 90 percent of Cordovans agreed/strongly agreed that Cordova was a good place to live—95 percent did so in 2013. It is also noteworthy that throughout our formal interviews and informal conversations over the years, no one attributed all of the community's ills or all of their personal issues to the *Exxon Valdez* disaster. Rather, they tended to recognize and acknowledge the significance of the spill to the community but have sought diligently to move forward—although for two decades bureaucratic processes limited their ability to do so.

Initial impacts

Technological disasters produce high levels of uncertainty. This was apparent among Cordovans who experienced the spill as they became uncertain about short- and long-term effects on the ecosystem, as well as their community, families, and livelihood. The spill evoked reactions ranging from sadness, concern, and uncertainty to frustration, anger, and outrage at the grounding and inadequate spill response. Initial impacts in Cordova included high levels of collective trauma,

social disruption, economic loss, and psychological stress. Consistent with the "corrosive community" concept (Freudenburg 1997), social relationships were disrupted and community relations became strained in response.

Survey data from 1989 to 1992 revealed significantly higher levels of social disruption and psychological stress in Cordova compared to Petersburg (the control community) and Valdez (an impacted community more dependent on the oil industry than commercial fishing). Survey data from Cordova also showed significantly higher levels of psychosocial impacts among commercial fishermen and Alaska Natives compared to other residents.

The renewable resource community concept was developed to situate community, group, and individual reactions to this disaster. The RRC concept emphasized sociocultural and psychosocial relationships with the Prince William Sound bioregion. It focused attention on reactions to lost or damaged resources, as well as threats of long-term loss. This concept helped explain why Cordova was experiencing significantly higher levels of negative social impacts than the control and comparison communities, and why groups with the strongest cultural, social, and economic ties to ecosystem resources—commercial fishermen and Alaska natives—were more severely affected.

Chronic impacts associated with resource loss

Throughout 24 years of research, our data have consistently shown that a large majority of Cordovans believe the Sound's bioregion suffered permanent damage from the accident. There has been strong empirical evidence for these beliefs. Initially, scientists identified 26 species of wildlife damaged by the spill, but the most recent report indicated only 10 have fully recovered (EVOSTC 2010). Long-term loss of ecosystem resources has delayed recovery of subsistence, commercial, and recreational fisheries.

One of the species that has not fully recovered is Pacific herring—a keystone species in the Prince William Sound bioregion and an important resource for commercial and subsistence fisheries. The herring biomass collapsed in 1993 and as of 2013 had not recovered. Pacific herring was integral to the fabric and rhythm of community life through subsistence and commercial harvests. Prior to the disaster, Cordova's herring industry was worth $12 million. It accounted for almost one-third of the local economy, employed more than 1,100 people, and provided economic stability. For the past two decades, Cordova has struggled to fill this void in its local economy.

Subsistence relations have been disrupted and the herring spawn as a significant symbol of spring's arrival has been reduced to memories. Data on subsistence behaviors among renewable resource user group panelists (2001-2009) indicated almost 90 percent participated in subsistence activities, with more than 75 percent giving and receiving subsistence foods. However, more than one-third of the panelists reported declines in the amount of subsistence participation and sharing. Many Alaska natives reported herring as the main subsistence resource they could not obtain. Decreased subsistence participation, particularly activities related to herring, also reduced opportunities to transfer cultural knowledge and traditions to future generations.

Essentially, Cordova's commercial fishing season was shortened by two months. Instead of seasonal residents arriving in late February to prepare for herring, most now return in early May. As a result, seasonal residents spend less time in the community, which has affected community structures, social capital, and the local economy. The demise of the herring fishery caused some year-round residents to migrate from Cordova, which further disrupted community relationships.

Negative social impacts were exacerbated by contested herring science, most of which was sponsored by corporate interests and tied to litigation. Conclusions reached by corporate science were generally contrary to traditional ecological knowledge of commercial fishermen and Alaska natives. Government-sponsored herring science got off to a slow start and was generally inconclusive. Among Cordova residents, this generated skepticism about science and contributed to beliefs about recreancy—perceptions that an organization (in this case, the government) is not fulfilling its public responsibilities.

Loss of bioregional resources and economic revenues and opportunities contributed to persistent psychological stress. We used the Conservation of Resources (COR) model (Hobfoll 1988), based on the assumption that psychological stress results from loss of resources, threat of resource loss, and/or when resources are invested without gain or return. The model distinguished four types of resources—objects, conditions, personal characteristics, and energies. Cordova experienced losses in all four resource categories after the oil spill and during the prolonged litigation. As predicted by the COR model, our community and renewable resource user group survey data consistently revealed significant relationships between resource loss/gain and psychological stress.

Psychological stress

Survey data, contextualized and supported by qualitative findings, documented chronic patterns of spill-related psychological stress. We used the Impact of Event Scale (IES) to measure event-related stress (Horowitz 1986). The scale was designed to measure ongoing stress from traumatic events by focusing on intrusive thoughts and avoidance behaviors—two subscales that comprise the IES. Scale and subscale means are comparable to clinical cases and other events and the IES provides clinical classifications into sub-clinical, mild, moderate, and severe categories. The latter two indicate potential needs for mental health interventions.

IES and subscale means calculated for the Cordova community, commercial fishermen, and Alaska Natives from 1989 to 1992 revealed high levels of stress. 25 to 50 percent of respondents fell into the moderate and severe categories. Commercial fishermen and Alaska natives consistently had higher scale and subscale means compared to other Cordova residents—a pattern that held regardless of socio-demographic factors such as gender, age, education, income, marital status,

Most Cordovans considered protracted litigation as preventable and believed Exxon could have chosen to "pay up" and help the community recover and move on. They also believed the federal government failed to hold Exxon accountable and fulfill its obligation to protect citizens.

and dependent children in the household. The mean intrusive stress score for Cordova in 1989 and 1990 and commercial fishermen and Alaska natives in all four years was similar to means reported in clinical cases involving bereavement from parental death and rape victims two years after the rape.

Litigation—the primary mechanism used after a technological disaster to obtain relief and compensation, reduce vulnerability, and enhance resiliency—directly contributed to chronic psychological stress. Over time, research demonstrated that chronic *Exxon Valdez*-related stress was significantly related to being a litigant and experiencing litigation stress—more so than being a commercial fisherman or Alaska native.

The IES and subscale means in Cordova generally decreased after the Supreme Court decision and disbursement of punitive damage awards, but Alaska natives registered an increase in IES and avoidance means in 2009. Analysis of Cordova community data in 2006, 2009, and 2013 indicated that psychological stress was consistently predicted by being a litigant—a pattern observed during the years of litigation and five years after the final decision. Analysis of resource loss and psychological stress in Cordova in 2009 and 2013 revealed that gains in conditions resources (e.g., family stability) significantly decreased stress, while losses in Prince William Sound ecosystem resources significantly increased stress.

IES classifications for the Cordova community indicated that by 2013, only 13 percent of Cordovans manifested severe and moderate levels of stress. Clinical classifications for the renewable resource user group panel revealed that four out of ten panelists were in the moderate to severe categories across all time periods. Notably, 10 percent of the panelists remained in the severe category in 2009 after the Supreme Court's litigation decision and payments to plaintiffs.

Analysis of the IES for this panel in 2009 indicated that perceptions of recreancy were significantly related to IES with less trust in litigation organizations (i.e., Exxon, the Ninth Circuit Court of Appeals, and the U.S. Supreme Court) resulting in higher levels of psychological stress. By 2013, the Cordova community was moving toward recovery from spill-related mental health impacts. Nevertheless, former litigants and Alaska natives continued to exhibit long-term psychological problems associated with the *Exxon Valdez* disaster.

A new species of recreancy

Institutional trust is fundamental to social capital. Diminished trust in social institutions is linked to perceptions of recreancy. Most *Exxon Valdez* oil spill survivors believed Exxon and Alyeska were recreant, so trust in these institutions was diminished. Others blamed state and federal government agencies for inadequate regulation, complacency, and poor response. Prolonged litigation and controversial legal decisions extended perceptions of recreancy to the federal government, judicial system, and the U.S. Supreme Court.

Prior to the Supreme Court decision, Cordovans expected that mostly positive outcomes would result from a favorable litigation decision and payment of punitive damages. They generally expected positive changes in family, work, future plans, and community, an economic upswing, improved mental health, and a sense of closure. Negative outcomes were expected if litigation were not resolved in the plaintiffs' favor. These outcomes included: (1) increased mental health issues; (2) increased domestic violence; (3) further decline in social capital; and (4) a sense of injustice and betrayal. About one-fourth of the 2006 renewable resource user group panel were concerned that a favorable decision would create additional stressors and disruption as disparities between the "haves" and "have-nots." Others anticipated no major changes in the community.

After the 2008 decision, Cordovans reported a profound lack of trust in the Supreme Court and judicial process. One resident observed, "I think that the decision … created a whole other ball of wax for a lot of people here. They went from being angry at Exxon, to being angry at the legal system." Another observed, "Our legal system has allowed them to get away with it. It's not just the legal system; it's the political system. There could be enough pressure brought to bear [to make them pay]…. Nobody has brought any pressure to bear [on Exxon]."

Most Cordovans considered protracted litigation as preventable and believed Exxon could have chosen to "pay up" and help the community recover and move on. They also believed the federal government failed to hold Exxon accountable and fulfill its obligation to protect citizens. Deliberate decisions by government, the courts, and Exxon inflicted additional pain and suffering on litigants and delayed community recovery. As a community leader observed:

> "The disappointment over not having my $2.5 million [claim paid] wasn't as profound to me as the loss of confidence in our legal system. I'd always thought that the Supreme Court was near to God, [that] they were just above reproach, and could not be influenced by even the biggest corporation. [But] the Supreme Court is not above reproach. And the biggest corporation in the world is in charge. That was hugely disappointing and I'm still disappointed. If … any semblance of the original trial by jury, the verdict, and the compensation had been awarded, that could have provided closure for me. But now there'll never be closure, for me, because it's influenced how I look at the United States and our legal system. It's just changed everything … I don't trust anybody anymore in government."

Most Cordovans do not believe justice was served by the resolution of the *Exxon Valdez* litigation. The Supreme Court decision confirmed a lifescape change in which basic social institutions such as government and the judicial system cannot be trusted to fulfill obligations to protect citizens. Perceptions of recreancy have become embedded in the collective conscious of Cordova. Because of this fact, many Cordova residents expressed "reluctant resignation" regarding the litigation outcome. Years of litigation contributed to an apathy that affected relationships with big business, government, the judicial system, and for some, contributed to a lack of closure from this disaster.

Conclusions

Drawing conclusions from 25 years of research is a tenuous undertaking. One of our interviewees offered an insightful perspective:

> "The problem is if you are trying to write a report on this and you see too many endless possibilities, you would never finish it. Every time you open one door, there will be two more doors. If you open one of those doors, there are two more doors. So you [have to] stop opening doors. At one point you start drawing conclusions from the doors you have opened."

To that end, this article presents some of the most compelling evidence from our studies. After the spill, Cordova experienced economic losses, sociocultural disruption, and psychosocial stress that persisted as compensation from litigation was delayed and the herring fishery failed to recover. The collapse of herring changed sociocultural structures and processes and perpetuated economic losses.

Cordova experienced chronic loss of resources that litigation failed to mitigate. Residents closely tied to damaged ecosystem resources, experienced high levels of psychosocial stress. The 2008 Supreme Court ruling slashed the punitive damages award and did not cover economic losses of most plaintiffs, particularly herring fishermen. Moreover, the adversarial litigation process and final decision eroded trust in the judicial system and diminished community social capital.

Many Cordovans do not expect to see recovery of the ecosystem in their lifetimes. Without restoration of the herring fishery, sociocultural changes associated with the collapse will likely become permanent. The resolution of the litigation marked a point of closure for many Cordova residents. For others, closure is ultimately related to the recovery of ecosystem resources such as herring and oil-free beaches. Some firmly believe that complete closure is not possible.

Since the 1989 disaster, there have been numerous large scale toxic contamination events in the United States. Within the past few years, the 2008 Tennessee Valley Authority coal ash spill and the 2010 BP oil disaster in the Gulf of Mexico fouled the natural environments and generated considerable social disruption. Ongoing research on these disasters has built directly upon the solid foundation provided by studies of the *Exxon Valdez* oil spill and continues to lend to our understanding of such events. More recent technological disasters include the January 2014 contamination of the water supply in Charleston, West Virginia and the February 2014 Duke coal ash spill that is affecting communities in North Carolina and Virginia.

These incidents are unpleasant reminders that this not so new "species of trouble" (Erikson 1994) continues to affect our natural and social environments in devastating ways. It is in this context that we encourage thoughtful, deliberate dialogue and action to promote preparedness, response, recovery, and mitigation efforts associated not only with what are typically thought of as natural disasters, but technological disasters, as well.

Duane A. Gill is professor and head of sociology at Oklahoma State University. He can be reached at duane.gill@okstate.edu. *Liesel A. Ritchie is assistant research professor and assistant director for research at the Natural Hazards Center, University of Colorado Boulder. J. Steven Picou is professor of sociology and director of the Coastal Resource and Resiliency Center, University of South Alabama.* *Their work was sponsored by National Science Foundation award #ARC-0909497.*

References

Exxon Valdez Oil Spill Trustee Council (EVOSTC). 2010. *2010 Update on Injured Resources and Services.* Anchorage, AK: *Exxon Valdez* Oil Spill Trustee Council [May]. http://www.evostc.state.ak.us/static/PDFs/2010IRSUpdate.pdf

Exxon v. Baker. 2008. Exxon Shipping Company, et al., Petitioners v. Grant Baker et al. 554 U.S. (2008).

Erikson, Kai T. 1994. *A New Species of Trouble: Explorations in Disasters, Trauma, and Community*. New York: W.W. Norton.

Freudenburg, W.R. 1997. Contamination, corrosion and the social order: An overview. Current Sociology 45(3):19-40.

———. 2000. The 'risk society' reconsidered: Recreancy, the division of labor, and risks to the social fabric. Pp. 107-22 in *Risk in the Modern Age: Social Theory, Science and Environmental Decision-Making*, M.J. Cohen (ed.). New York: St. Martin's Press.

Gill, D.A., L.A. Ritchie, and J.S. Picou. 2014. *Collaborative Research to Investigate and Document Social Impacts of High-Stakes Litigation Resolution in a Renewable Resource Community*. Final report prepared for the National Science Foundation, Office of Polar Research, Washington, D.C. (ARC-0909497.)

Hobfoll, Stevan E. 1988. *The Ecology of Stress*. New York: Hemisphere.

Horowitz, M.J. 1986. *Stress Response Syndromes.* New York: Aronson.

Picou, J. Steven, Duane A. Gill, and Maurie Cohen (eds). 1997. *The* Exxon Valdez *Disaster: Readings on a Modern Social Problem*. Dubuque, IA: Kendall-Hunt.

Ritchie, Liesel Ashley. 2004. *Voices of Cordova: Social Capital in the Wake of the* Exxon Valdez *Oil Spill*. Ph.D. Dissertation. Department of Sociology, Anthropology, and Social Work. Mississippi State University.

Spill ...

(Continued from page one)

actually located on the Elk River, about 1.5 miles downstream from Freedom's Etowah River Terminal. The extreme cold from the "polar vortex" experienced in early January had caused several line breaks. As a result, stored capacity was at low levels.

The incident

Sometime early in the morning of January 9, 2014, a mixture of MCHM and polyglycol ethers began leaking out of the bottom of the MCHM tank. By 8:15 a.m., local residents near the Etowah River Terminal reported to local authorities that they were smelling a distinctive licorice-like odor. Freedom Industries claims that the company became aware of the spill at 10:30 a.m. At that time, they began to take a few rudimentary containment measures—primarily putting cement blocks and a sack of chemical absorbent at the end of the containment wall to stop liquid from going around it. Given the strength of MCHM's odor, Freedom's claim that they only realized there was a leak at 10:30 is dubious.

It is clear that Freedom Industries did not have anything approaching an effective emergency response plan. The containment wall apparently was intended to channel runoff from the site into the river. Apparently no thought had been given to what would happen if a leak from one of the tanks occurred.

When personnel from the West Virginia Department of Environmental Protection and the Kanawha County Fire Department arrived at the site around 11:00 a.m., they found a 400 square foot puddle of MCHM. MCHM was flowing past the containment wall into a rusted line intended to divert a spill. Although Freedom Industries saysthey notified the appropriate authorities, DEP vigorously denies this.

It is estimated that approximately 7,500 gallons of the MCHM mixture leaked into the Elk River. Later inspection of the tank after it was emptied revealed a one-inch hole in its bottom and evidence that the tank bottom had been pushed upward. The company believes that this was due to freezing of nearby water lines. The MCHM eventually found its way into American Water's intake.

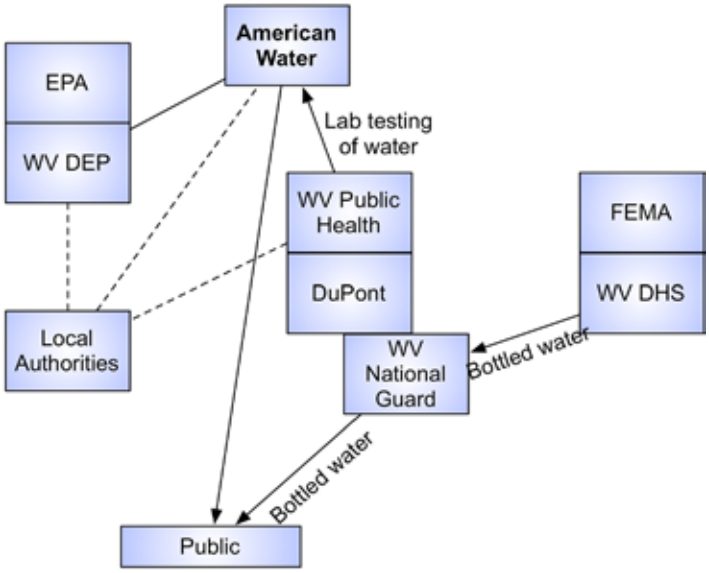
There apparently was some confusion in the initial communications between DEP and American Water. Freedom never contacted the water company. American Water apparently believed that the carbon beds in its water treatment system had sufficient capacity to remove MCHM so that no contamination of the drinking water supply would occur. By 4:00 p.m. on January 9, American Water concluded that it could not remove all of the MCHM and that the drinking water supply would be contaminated. At 5:00 p.m., American Water began notifying its customers that they should not use the water.

Response and recovery

The response and recovery from the incident is continuing a month later. As shown in the figure, there are three distinct aspects: providing water to the public, including both providing water while service was interrupted and restoring the water system; resolving legal issues; and keeping the public informed.

The organizations involved in providing water to the

public and in restoring the water distribution system are shown in the figure. DEP was responsible for ensuring that American Water's efforts to decontaminate and restore the water distribution system met regulatory criteria, which is set at one ppm MCHM. American Water and several state agencies worked together to provide water to the area's residents and businesses while the system was restored.



Providing water to customers left high and dry by the incident was of paramount importance to both American Water and local and state authorities. Water distribution centers were set up by both American Water and the state. The Federal Emergency Management Agency provided bottled water to West Virginia's Department of Homeland Security. The West Virginia National Guard distributed the water. American Water provided both bottled water and water from tanker trucks bought for this purpose to its customers. After a few initial hiccups, the distribution of water worked acceptably.

However, American Water was left with a difficult decision with regard to restoring the water distribution system. Either they could shut the system down and then decontaminate it, or the could rely on dilution and addition of activated carbon to eventually reduce the concentration of MCHM to safe levels. They chose the latter, because, as they told their customers in a January 29 press release:

> "Shutting down the plant would have quickly resulted in loss of the entire system, meaning no fire protection and sanitation for approximately 300,000 people. Further, starting the plant back up after the chemical leak was stopped or contained, then replenishing and re-pressurizing the entire Kanawha Valley distribution system, would have taken more than one month even under optimum conditions."

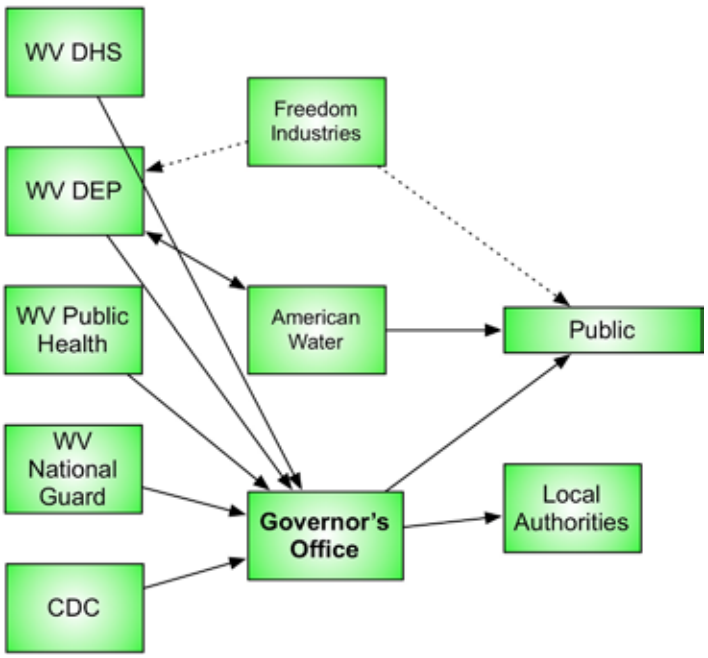
As a result of this decision, hourly monitoring of water quality at both inflow and outflow points began. Initially

monitoring was hampered by inadequate analytical techniques. Analysis of a sample by traditional methods required almost an hour. The analytical laboratory of the West Virginia Department of Public Health could not keep up. They subsequently used additional analytical capability from the West Virginia National Guard and from a local DuPont plant. Working together, these laboratories were able to improve the analytical techniques and cut analysis time in half.

By the evening of January 13, no MCHM could be detected in the water entering the area's drinking supply at a detection level of about 10 ppm. However, MCHM was still in the pipelines leading to area residences and businesses. Its distinctive odor was still detectable. At this point, American Water (with the concurrence of DEP) began a phased restoration of the water distribution system. Starting with customers closest to the water treatment plant, American Water provided directions for flushing water lines so that normal use of the water system could resume. Through a tedious and cumbersome (and sometimes contentious) process, eventually normal water service was restored throughout the system.

Informing the public

Efforts to keep the public informed provided textbook examples of what to do and what not to do. Freedom Industries held one—and only one—press conference, shortly after the leak occurred. It was a public relations disaster. The image of Freedom Industries' president sipping on bottled water and trying to slink away from the press is a low water mark in crisis communications. If anything, the press conference increased the public's rage and its sense that Freedom was criminally insensitive to the public's plight.



Conversely, the governor's office communicated with the public every day. The governor and the adjutant general of the West Virginia National Guard did an excellent job. They provided all of the information they had, and followed up accurately and promptly. The governor's office took great pains to coordinate and ensure information sharing among all of the affected agencies. The governor's office had apparently paid attention to Mississippi Gov. Haley Barbour's superlative performance after Hurricane Katrina. American Water took a more cautious approach, especially in deferring to the governor's office in the immediate aftermath. However, once the emergency was over, American Water appears to have communicated honestly and accurately with its customers.

Unfortunately, the efforts of the governor's office to provide the public with accurate and timely information were undercut by the Centers for Disease Control and Prevention. Public communications from the state and from American Water were referenced against the safe drinking water level for MCHM of one ppm accepted by the CDC. The public pronouncement by the CDC that pregnant women should not drink the water until MCHM was at undetectable levels confused the public and harmed the credibility of the governor's office. The CDC's advice seemed more to provide political cover than a reasoned position based on evidence of risk.

Legal and compliance issues

West Virginia's Department of Environmental Protection is at the apex of resolving all of the legal and compliance issues relating to the incident. In general, DEP, local authorities, and American Water worked amicably and professionally during incident to restore the water system. Since Charleston is also the state capital, it is inevitable that the political class is holding hearings and rumbling about the need for new laws. However, in the words of one resident, "Why pass new laws when you don't enforce the ones we have?"

The relationship between the state and local authorities and Freedom Industries is rather different. Freedom Industries is facing large fines. The company has entered into a consent agreement with the state to remove all of the tanks from the site and to decontaminate the soil. The state has taken the rather unusual step of acting under its authority to regulate storm water. The obvious advantage of this approach is that it has expedited cleanup action. However, this is at the expense of a lengthy period of public comment on cleanup plans.

The tangled affairs of the company's owners further complicates the legal situation. On December 31, 2013, Freedom Industries formally took ownership of the Etowah River Terminal as part of a corporate merger. Although not publicly disclosed until after the incident, the actual owner of Freedom Industries was a holding company principally held by the owner J. Clifford Forrest of the third largest coal company in Pennsylvania, and the 21st largest nationally. Facing several lawsuits that would have far exceeded the value of its assets, the company declared bankruptcy and was refinanced in the context of a new holding company also owned by Forrest. In effect, this made the new holding company the principal creditor of Freedom Industries, essentially ensuring that any judgments against the company would have minimal financial impact.

Contributing causes

There were several contributors to the incident. First and foremost, Freedom Industries' management was unprepared for the incident and responded poorly. There is no evidence they had formulated an effective emergency operations plan. Their crisis communications were abysmal. Prior to the incident, their relationships with their regulators were almost non-existent. The inspection that they had commissioned in October, 2013, should have triggered further action to ensure tank integrity. There is no evidence that management was technically competent—the owners did not have any chemical

or chemical engineering experience—or able to evaluate what was happening and take appropriate action in a timely manner. They were not familiar with facilities that they had taken title to just eight days before. The due diligence prior to the takeover of the Etowah River Terminal was inadequate.

However, the state legislature also contributed their share to the events of January 9 and beyond. As a result of previous incidents, the Chemical Safety Board had recommended a much more rigorous compliance program in the Kanawha Valley to be led by local public health authorities. The legislative declined to provide the funding to implement this recommendation. Historically, regulatory functions have been underfunded by the state, at least in part due to concerns about losing badly needed jobs.

The murky regulatory status of chemicals such as MCHM at the federal level contributed to the incident. In making budget decisions with limited funding, it is understandable state regulators didn't put high priority on controlling chemicals like MCHM which were not deemed particularly hazardous.

One can argue that DEP should have paid some attention given the quantities of chemicals involved. While it is true that the regulatory status of MCHM is murky, DEP's power to regulate storm waters could have been used in several ways to avoid or mitigate the incident.

- DEP could have required periodic inspections of tanks on the site, and containment walls and lines.
- DEP could have required that catchment areas be lined to prevent movement of chemicals to the soil and groundwater.
- DEP could have required level detection in the tanks with alarms to warn of sudden leaks.

However, it must also be acknowledged that DEP's use of its regulatory powers to control storm water to clean up the site is both innovative and laudable.

Finally, we'll never know how much the weather contributed to the event. The extremely cold weather prior January 9 certainly was a factor in American Water's decision process in the initial hours of the incident. As Freedom Industries has claimed, the cold weather may have triggered whatever caused the breach in the MCHM tank.

Avoiding future incidents

The Chemical Safety Board should complete its investigation next month and will offer specific recommendations related to the incident. We can only hope that West Virginia's legislators will implement them. However, we know enough already to offer some guidance on avoiding (or at least mitigating) such incidents in the future.

- Local authorities must know the location of chemical facilities (manufacturing and storage) in their region. Information should include quantity and type of chemicals stored.
- Local authorities and management of chemical facilities should play out "what-if" scenarios looking at the cascading impacts of chemical releases. Ideally, this should be done in the context of local emergency planning committees that include all appropriate stakeholders, including owners of critical infrastructure like water systems.
- Better tools must be developed to determine chemical hazards. The Material Safety Data Sheet for MCHM contains little information. This is true of many bulk chemicals in use today. Given the literally millions of chemicals currently sold or in use it is not practical to test every one exhaustively. We do need an approach to identify which chemicals require exhaustive testing.
- The CSB is proving to be as valuable in its field as the National Transportation Safety Board is in identifying the causes of and preventing transportation accidents. Transferring its function to the Environmental Protection Agency (as has been proposed) would diffuse its focus and likely lead to poorer investigations. However, Congress should consider making implementation of the CSB's recommendations mandatory.
- The incident highlights the need to have reasoned discussions about striking the balance between jobs and environmental protection. Clearly West Virginia's legislators had previously tilted the balance toward jobs—perhaps understandable for the nation's second poorest state. They accepted the risk of potentially paying more later for environmental cleanup rather than spending now on environmental protection. While we can decry the human costs of that acceptance, we must also acknowledge that we elect our legislators to

strike that balance. In West Virginia, proud but poor, ruggedly independent and distrustful of government, it is likely that the majority of the people would have supported the balance struck, at least before the incident. But that was in the absence of any discussion of costs and possible consequences.

M. J. Plodinec is with the Community and Regional Resilience Institute. He can be reached at john.plodinec@gmail.com. *Alicia Smith is a colonel in the United States Army.*

References

The CSB's final report on the incident should provide a much more definitive account of the incident itself. For now, good sources of information for those interested are:

The testimony of Rafael Moure-Eraso, Chair, United States Chemical Safety Board. http://www.csb.gov/csb-testimony-from-transportation-and-infrastructure-field-hearing-on-charleston-wv-chemical-spill/.

The Wikipedia article on the incident provides a useful summary, although it is not accurate in some details. http://en.wikipedia.org/wiki/2014_Elk_River_chemical_spill.

The Charleston (West Virginia) *Gazette* has extensively reported on the incident. Taken together, its reports provide a good picture of the incident's aftermath and of cleanup efforts.

Mary Fran Myers Gender And Disaster Award 2014 nominees sought

Deadline: April 14, 2014

The Gender and Disaster Network and the Natural Hazards Center at the University of Colorado Boulder invite nominations of women and men who should be recognized for their efforts to advance gender-sensitive policy, practice, or research in the areas of disaster risk reduction. The intent of the Mary Fran Myers Gender and Disaster Award is to recognize women and men whose advocacy, research, or management efforts have had a lasting, positive impact on reducing disaster vulnerability. All those whose work has added to the body of knowledge on gender and disasters, is significant for gender-theory or practice, or has furthered opportunities for women to succeed in the field are eligible.

Established in 2002, the Mary Fran Myers Award recognizes that vulnerability to disasters and mass emergencies is influenced by social, cultural, and economic structures that marginalize women and girls, and may also expose boys and men to harm. The award was so named to recognize Myers' sustained efforts as co-director of the Natural Hazards Center to launch a worldwide network promoting women's opportunities in disaster-related professions and supporting research on gender issues, disasters, emergency management, and higher education.

The Selection Committee is especially interested in soliciting nominations from outside the United States and nominations of both men and women. We also invite re-nominations of past nominees who have not yet been recognized. The award carries no travel funds or other material compensation but recipients are honored virtually at the annual June 2014 Natural Hazards Workshop in Broomfield, Colorado, and featured in the annual GDN poster. The individual selected will be invited to serve on the Mary Fran Myers Gender and Disaster Award Selection Committee for one year and then encouraged to serve as Chair the second year.

There are three steps to making a nomination. The nomination committee prefers to receive nomination materials in English but is also able at this time to accept those prepared in Spanish, French, or Italian due to the generosity of GDN volunteer translators.

- Submit your full name and contact information (mailing address, e-mail, telephone, fax) and that of the nominee.
- Attach a short (three pages maximum) resume or curriculum vitae of the nominee.
- Write a letter of nomination detailing how this individual's work fits the award criteria.
- Optional: A one-page letter of support from one other person or organization may also be submitted.

If you would like a past nominee to be reconsidered, please let us know by email. Submit updated nomination materials you would like the Selection Committee to consider.

BY APRIL 14, 2014, please submit these materials electronically to the Gender and Disaster Network at gdn@gdnonline.org. Complete nominations will then be forwarded to the chair of the 2014 Selection Committee.

Questions? Please contact Maureen Fordham [maureen.fordham@northumbria.ac.uk] or Elaine Enarson [enarsone@gmail.com].

Contracts and Grants

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

From sensors to tweeters: A sustainable sociotechnical approach for detecting, mitigating, and building resilience to hazards. National Science Foundation grant #133146. http://www.nsf.gov/awardsearch/showAward?AWD_ID=1331463. Four years. $2,408,881 to principal investigator Louise Comfort, University of Pittsburgh, comfort@gspia.pitt.edu.

This project addresses the national challenge of defining and building resilience to hazards that would engage the whole nation, including scientists, governmental agencies at all levels of jurisdiction, private and nonprofit organizations, and communities. To meet this challenge, it is essential to define, design, and demonstrate an interdisciplinary, dynamic process that will transform societal understanding of risk and enable self-organized, collective action to support the resilient management of hazards.

This study will identify and model the interactions among physical, engineered, and sociotechnical systems that occur in hazard emergence and response as a complex, adaptive system of systems to enhance resiliency in practice and enable communities to manage the risk of hazards within existing resource and time constraints. It will use the threat of Near-Field Tsunamis (i.e., waves generated within 200 miles of shore) in a location prone to this risk, Padang, West Sumatra, Indonesia as a case study to investigate methods of assessing accurately and efficiently the dynamics of NFTs generated by undersea earthquakes or landslides as they impact human communities. This process is an iterative search for information under evolving conditions to inform decisions at multiple levels of action in response to shared risk.

Five basic research questions drive this project: (1) What instruments, metrics, media, tools, and technologies are most effective in enabling communities at risk to collect, access, and exchange information about risk? (2)What types of information and what forms of communication contribute most effectively to collective recognition of risk, creating public awareness of a shared threat to safety? (3) To what extent does investment in data collection, analysis, search, and exchange enable more informed decision making in community environments exposed to long-term risk, and reduce the potential for ecological, social, and economic losses from episodic catastrophes? (4) What causal models, based on combined real-time and stored data for social and physical systems, offer alternative strategies for collective action to protect community population, infrastructure, and resources? and (5) How can the proposed resilience models, methods and tools for collective action be used to assess accurately and efficiently the dynamics of NFTs generated by undersea earthquakes or landslides and enable collective action to manage the impact of hazards on coastal communities?

This research will test four hypotheses: (1) Computational modeling of complex adaptive relationships under uncertain conditions increases collective understanding of tsunami risk and increases collective problem solving capacity; (2) Multiple patterns of information dissemination regarding risk among community residents increase the efficiency of self-organized collective action; (3) Timely, accurate transmission of tsunami risk increases efficiency in targeting evacuation procedures to diverse community groups and areas with different degrees of exposure; and (4) Detecting the temporal rate of seismic motion, or source slowness, discriminates tsunami earthquakes from non-tsunami earthquakes.

Correlating infrasound signals with volcanic emissions at Karymsky Volcano, Kamchatka, Russia. National Science Foundation grant #1331084. http://www.nsf.gov/awardsearch/showAward?AWD_ID=1331084. Two years. $100,191 to principal investigator David Fee, University of Alaska Fairbanks, dfee@gi.alaska.edu.

To effectively mitigate volcanic eruption hazards and understand eruption dynamics it is necessary to: 1) identify the different types of volcanic emissions; and 2) quantify the relative proportions, amounts, and location of these volcanic emissions. However, the difficulty of obtaining accurate, real-time, and continuous volcanic emissions measurements is well known. Relating infrasound, or low frequency sound, to volcanic emissions shows particular promise towards quantifying and understanding volcanic emissions, suggesting that infrasound may provide a tool to indirectly quantify and characterize volcanic emissions. In this project we will perform a detailed, quantitative analysis of the diverse infrasound signals from Karymsky Volcano, Kamchatka, Russia with corresponding measurements of volcanic emissions.

The primary objectives are to: (1) identify and characterize the infrasound signals from the diverse activity at Karymsky; (2) collect detailed volcanic emissions data; (3) identify infrasound signals characteristic of certain types of emissions; and (4) quantitatively correlate temporal trends in infrasound signals with the mass flux of volcanic emissions. We will develop quantitative relationships between volcanic emissions and infrasound based both on theoretical and empirical analysis. An additional goal of this project is to validate a multispectral infrared camera technique for measuring volcanic emissions with established tephra sampling and ultraviolet remote sensing SO_2 measurement techniques.

This project addresses important questions in volcanology and geophysics regarding infrasound signals, volcanic emissions, and eruption dynamics. To address these questions an unprecedented multiparameter data set will be collected and analyzed, which will lead to a better understanding of the release of volcanic emissions and their observable infrasound signals. This understanding will improve monitoring and detection of volcanic hazards and the viability of using infrasound as a remote, continuous tool to detect and characterize volcanic emissions will be evaluated. This project will also increase our understanding of eruption source mechanisms, which will benefit a wide variety of volcanologists and geoscientists.

Toward an integrated, lifecycle governance framework for delivering civil infrastructure systems. National Science Foundation grants #1334292 and #1333264. http://www.nsf.gov/awardsearch/showAward?AWD_ID=1333264. Three years.

$203,010 to principal investigator Michael Garvin, Virginia Polytechnic Institute, garvin@vt.edu, and $316,202 to principal investigator Raymond Levitt, Stanford University, Ray.Levitt@Stanford.edu.

In an era when governments worldwide are too cash-strapped to build or upgrade sorely needed infrastructure, some have experimented with long-term concessions (often referred to as public-private partnerships, or P3s) to private consortia to finance, design, build, operate, and maintain infrastructure assets. P3s offer potential solutions to this infrastructure challenge, along with political challenges. Existing governance theories provide partial insights for governing shorter-lived, less complex transactions, but are inadequate to guide the necessary legislation, contracts, and management practices for P3 infrastructure projects to thrive and remain sustainable over their typical 30-year concession terms. This project integrates and expands upon previous work to build a cross disciplinary theoretical framework that will ultimately help design new governance approaches for enhancing the efficiency and speed-of-delivery advantages of P3s.

Economists agree that investments in expanded delivery of high quality civil infrastructure assets provide enormous and widely shared public benefits. Such investments can also generate multi-decade, relatively low-risk, inflation-adjusted cash flows, so they offer excellent investment opportunities for pension funds, sovereign wealth funds, and other institutional investors who could deploy their huge pools of capital into P3 infrastructure projects to stabilize and boost their portfolio investment returns while supporting worthy economic development. This project will also inform the governance of complex and multi-faceted organizations with recommendations for both future research and new public policy initiatives.

Pre- and post-typhoon sediment patterns in the central Philippine Islands. National Science Foundation grant #1419677. http://www.nsf.gov/awardsearch/showAward?AWD_ID=1419677. One year. $19,380 to principal investigator Peter Ward, University of Washington, ward.biology.uw@gmail.com.

Strong storms can have devastating impacts on people living on the coasts, built infrastructure, and on marine fisheries and ecosystems that lie offshore. Typhoon Haiyan, the largest storm ever recorded, hit the Philippines in the fall of 2013, causing serious damage on land. Similarly, it had devastating impacts on marine ecosystems and biological communities, but the extent of these impacts because they are not readily visible due to their underwater locations are generally under documented and appreciated.

This research will document and assess the sediment erosion and redistribution across the central Philippine Islands as a result of super storm Haiyan and its impact on sea life and marine ecosystems. Mapping of seafloor sediments and sample collection via piston coring will be undertaken to measure net changes in the accumulation and/or erosion of pre-existing carbonate and siliciclastic sediment cover from intertidal to deep water (500 meters below sea level) environments in the central Philippine Islands.

Results of the investigation will be used to examine differences in sedimentation and erosion processes between normal and extreme-event timeframes. Sediments will be collected using piston cores and photographic images will be recorded of the seafloor. Drone-enabled aerial photography of the study area will also be collected. These data will be compared with time-series data of the same locations that have been taken over the last three years by the principle investigator. Particular emphasis will be given to changes in sea grass beds, reefs, and biological communities that form the basis of Philippine fisheries and tourism.

Typhoon Haiyan: Environmental impacts on the Philippines. National Science Foundation grant #1418717. http://www.nsf.gov/awardsearch/showAward?AWD_ID=1418717. One year. $20,018 to principal investigator Benjamin Horton, Rutgers University New Brunswick, bphorton@marine.rutgers.edu.

This work will compare the environmental impacts of the 2013 Typhoon Haiyan and the 2004 Indian Ocean tsunami. Sedimentary deposits of Typhoon Haiyan will be collected and compared with previously collected sedimentary deposits of the Indian Ocean tsunami in order to measure land elevation, storm surge flow, and sediment deposit.

Post-depositional change within overwash deposits will also be determined. In turn, the differences from these two datasets will be linked to the physics of sediment erosion, transport, and deposition. Field research will focus on the Leyte Gulf coastline, which was the region that suffered the largest storm surge during Typhoon Haiyan. The same site will be revisited and resampled a year later to assess the degree of post-depositional change in a tropical environment. The 2004 Indian Ocean tsunami deposits were sampled at similar intervals.

This project will collect a unique dataset that will illustrate the nature, magnitude and spatial variability of coastal changes from beach erosion, overwash deposition and island breaching.

Effects of an extreme rain event in the Boulder Creek CZO. National Science Foundation grant #1415571. http://www.nsf.gov/awardsearch/showAward?AWD_ID=1415571. One year. $22,142 to principal investigator Suzanne Anderson, University of Colorado Boulder, suzanne.anderson@colorado.edu.

This project centers on LiDAR data collection plus water sample analysis following the September 2013 storm in the Colorado Front Range. In areas identified as being most highly impacted, post-storm LiDAR data will be differenced with data collected for the Boulder Creek Critical Zone Observatory three years earlier using the same protocols.

The LiDAR will provide a unique data set with which to quantify hillslope and channel change with sufficient spatial resolution to reveal: (1) the locations and sizes of hillslope failures and the transport paths of these failures and their depositional zones; and (2) channel changes on all streams including sites of both vertical and lateral scour and deposition.

In addition to the LiDAR data analysis, the project will analyze the chemistry of water delivered from the landscape since the first day of the storm. This will enable a quantitative assessment of the sources and transport dynamics of major elements, organic molecules, and isotopes.

The long duration, widespread area, and severe magnitude of the storm (70 percent of mean annual precipitation) is exceptional and provides a rare opportunity to address fundamental questions about the effects of severe storms in a semi-arid mountainous wildland-urban interface. The affected region includes the Boulder Creek Critical Zone Observatory, Rocky Mountain National Park, and the Big Thompson River. Since the storm impacted areas burned in recent large

wildfires, including the Fourmile Canyon fire of September 2010 in Boulder Creek, there is an opportunity to probe the role of such one-two punches in landscape evolution.

Understanding the full range of Amazon drought and impacts. National Science Foundation grants #1303831 and #1304083. http://www.nsf.gov/awardsearch/showAward?AWD_ID=1304083. Four years. $101,644 to principal investigator Jonathan Overpeck, University of Arizona, jto@email.arizona.edu, and $82,135 to principal investigator Mark Bush, Florida Institute of Technology, mbush@fit.edu.

This grant will provide improved paleoclimatic and paleo-drought perspectives needed to manage Amazonia in the face of natural climate variability and change. The project targets three clusters of western Amazon lakes in Brazil, Ecuador, and Peru to establish a regional network of at least four sub-decadally resolved 1,500- to 3,000-year long integrated records of paleoclimate, vegetation, and fire-history for western Amazonia.

The team will use a climate and Earth system modeling strategy to address many questions, including: To what extent are the hypothesized drought events in each lake record really droughts, i.e., reproduced in other lake records nearby (restricted drought) and over 1,000 km away (broader drought)? What are the best "paleo-informed" estimates of drought and abrupt change risk for Amazonia? How did Amazonian vegetation and fire dynamics respond to the spectrum of past drought severity, and how might these biophysical feedbacks affect future forest sustainability and the risk of a tipping point? Is there early warning behavior in the Amazonian dynamical system approaching critical transitions? How well do state-of-the-art models simulate the observed record of drought and abrupt change? What are the dominant controls on decadal to century-scale drought variability and abrupt hydro climatic change in Amazonia?

In 2005, the Amazon basin was hit with a drought unprecedented in the period of instrumental observation. Scientists quickly realized this drought was a new threat that put Amazonia's biodiversity, ability to act as a carbon sink, and ecosystem services (e.g., hydrologic and economic) at risk. In 2010, a second, more severe drought occurred. It has been posited that Amazonia might not survive accelerating climate change, perhaps even reaching a tipping point beyond which substantial areas of the forest would convert irreversibly to savanna.

The University of Arizona and Florida Institute of Technology team has collected data showing that single-year periods of severe drought were not uncommon in Amazonia, and that longer multi-year (up to ~15 years) droughts and abrupt climate changes have also occurred. Comparisons between this 1,500-year record and state-of-the-art climate model simulations also indicated that models might underestimate the risk of future prolonged Amazonian drought. As carbon feedbacks are important components of modern fully-coupled climate models, integrating estimates of forest resilience into the paleoclimatic assessment is critically important to understanding the past and future role of drought in this landscape.

This project will provide information useful in managing Amazonian ecosystem services in the face of climate variability and change, via scientific publications as well as reports to Amazonian policy-makers and managers in their native languages.

Strain rate and moment accumulation rate along the San Andreas Fault system from InSAR and GPS. National Science Foundation grant #1424374. http://www.nsf.gov/awardsearch/showAward?AWD_ID=1424374. 18 months. $162,056 to principal investigator Bridget Smith-Konter, University of Hawai'i, brkonter@utep.edu.

The San Andreas Fault System (SAFS) is a natural laboratory for investigating the physics of the earthquake cycle along a major continental transform boundary. Two of the key parameters that can be used for seismic hazard assessment are seismic moment accumulation rate and strain accumulation rate. The GPS component of the Plate Boundary Observatory (PBO) provides accurate vector velocities (< 1 mm/yr accuracy) at a spacing of 10 to 20 kilometers along the SAFS. However, the velocity gradient (strain rate) varies most rapidly within 20 km of the major faults, so strain rate is not well resolved by the GPS data alone. Radar interferometry (InSAR) provides deformation maps at 100 m spatial resolution, although factors such as temporal decorrelation and atmospheric path errors have made it difficult to achieve this full resolution with sufficient precision to improve upon the GPS measurements. The L-band data provided by the ALOS satellite retains phase coherence over longer time intervals than the prior C-band missions. This improvement, combined with stacking techniques to reduce atmospheric errors, now makes it possible to image the entire SAFS using InSAR with unprecedented spatial coverage and resolution.

The primary focus of this research is to construct high spatial resolution vector surface deformation measurements by combining the high accuracy point measurements provided by PBO GPS data with the high spatial resolution InSAR measurements available through WInSAR from foreign and domestic SAR missions. The research has four main objectives:

- Resolve secular plate boundary deformation using new GPS and InSAR measurements provided by EarthScope (PBO and WInSAR). This involves the development of community software to preprocess the new data streams to be provided by the ALOS-2 and Sentinel-1 InSAR satellites (2013 launch);
- Use an integrated GPS-4D model-InSAR technique to better constrain fault slip rates and determine the depth of the locked/creeping transition on active faults of the SAFS;
- Generate high-resolution estimates of strain rate and seismic moment rate along major faults of the SAFS; and
- Explore methods for isolating non-tectonic deformation contributions common in both InSAR and GPS data.

Conferences and Training

March 11-13, 2014
Best Practices in Higher Education Emergency Management Conference
University of Tennessee at Chattanooga
Chattanooga, Tennessee
Cost: $225

This conference will focus on best practices for addressing campus emergency functions, as well as needed improvements. Topics include public information, logistics support, exercises and training, engagement opportunities, effective response strategies, and recovery. Emergency management professionals in areas outside education are encouraged to attend and contribute their expertise.

http://www.utc.edu/safety-risk-management/best-practices/presentations.php

March 13-14, 2014
2014 Annual Land Use Conference
Rocky Mountain Land Use Institute
Denver, Colorado
Cost: $525

Interior Secretary Ken Salazar will deliver the keynote address at the meeting. The gathering will focus on growth issues as the nation emerges from the recent recession. Topics covered will include retrofitting existing neighborhoods while ensuring access to transportation, schools and recreation; ensuring that financing is available; and many others.

http://www.law.du.edu/index.php/rmlui/rmlui-practice/rmlui-annual-conference/program

March 13-14, 2014
International Conference on Disaster Management ICDM-2014
Yeshwantrao Chavan College of Engineering
Nagpur, India
Cost: $160

Increasing trend of conflict between human activity and the ecosystem is becoming alarming to global environment causing climatic change leading to increased natural and man-made hazards. This conference will provide a platform for researchers, professionals, planners and policy makers associated with the field of disaster management to share the latest knowledge and techniques for managing the impact of natural and man-made hazards.

http://www.icdm14.com

March 19-20, 2014
2014 Aerial Fire Fighting Conference
California Department of Forestry and Fire Protection
Sacramento, California
Cost: $1,400

This conference will examine the impact of budgetary restraints on agriculture, forestry, and firefighting department procedures and infrastructure in relation to recent large-scale wildfires. Topics include investing in future pilots and equipment, navigation technologies, fire suppression, rescue equipment, and emergency response methods.

http://tangentlink.com/event/aerial-firefighting-sacramento-2014/

March 20-21, 2014
ASIS Region 1D Conference: Critical Infrastructure Protection
American Society for Industrial Security
San Diego, California
Cost: $175

This conference will discuss the relationship between facility operations, emergency management, and security personnel to better prepare for disasters. Topics include innovative security practices, providing security in the face of budget restraints, infrastructure technology, emergency management implementation, and new security developments and regulations.

http://www.sdasis.org/

March 24-25, 2014
International Conference on Information and Communication Technologies for Disaster Management
CERIST
Algiers, Algeria
Cost: $340

This conference will examine new methods of research and technologies related to the study of disasters. Topics include emergency communication, decision enhancement systems, cloud computing for disaster management, crowd sourcing, damage and loss assessments, and post-disaster needs assessment.

http://www.ict-dm.org/index.php

March 24-28, 2014
International Conference on High Impact Natural Hazards related to the Euro-Mediterranean Region
European Geosciences Union
Istanbul, Turkey
Cost: $408

This conference will discuss large-impact natural hazards with high destruction potential (tsunamis, earthquakes, hydro-meteorological events, volcanoes, and landslides) in the Euro-Mediterranean region. Topics include best practices in prediction, the physics of tsunamis, educating students and the public on natural hazards, flooding, and volcano monitoring.

http://www.avh9.net/home.html

April 4-5, 2014
Planning for Disaster Resilience Symposium
Texas A&M University Hazard Reduction & Recovery Center
College Station, Texas
Cost: $100

This symposium will discuss the key role urban planning has in creating community resilience. Topics include hazard mitigation, emergency preparedness and response planning, recovery and adaptation, evacuation planning, engaging community in disaster planning, and risk communication and development policies.

http://hrrc.arch.tamu.edu/outreach/events/

April 14-16, 2014
2014 Southeast Regional Conference
Association of State Dam Safety Officials
Montgomery, Alabama
Cost: $425

This conference focuses on challenges in construction and maintenance of dams, as well as dam failure mitigation and disaster prevention. Topics include earth dam rehabilitation, dam failure liability, Alabama water policy, instrumentation and monitoring systems, and emergency action planning.

http://damsafety.org/conferences/?p=5f1b08a0-c1d8-4d4f-82b7-87068b06b021

May 5-8, 2014
5th Africa Regional Platform for Disaster Risk Reduction
United Nations Office for Disaster Risk Reduction-Regional Office for Africa
Abuja, Nigeria
Cost: Not specified

The meeting brings together stakeholders ranging from nongovernmental organizations to the private sector to share their common commitment to building resilience to disaster risk and climate change in African communities.

http://www.unisdr.org/africa

May 5-7, 2014
The Australian and New Zealand Disaster and Emergency Management Conference
The Australian Institute of Emergency Services, Australian and New Zealand Mental Health Organization, and others
Gold Coast, Australia
Cost: $749

This conference will discuss post-disaster psychological and physical problems, as well as community ability to prepare for and recover from disasters. Topics include managing animals in disasters, current trends in emergency management education, the role of local government in business recovery, trauma and disaster mental health mitigation, community resilience, and data protection.

http://anzdmc.com.au/index.php

May 5-7, 2014
Design for Urban Disaster
Harvard University
Cambridge, Massachusetts
Cost: $75

The conference is for humanitarian aid practitioners, government experts and physical space designers "to explore ways to improve actions before and after disasters. A release about the meeting says, "Urban disasters are on the increase, with rapid urbanization causing more people to live in place vulnerable to hazards such as flood, earthquake, and fire."

http://www.designforurbandisaster.com/

May 8-9, 2014
Conference on Disaster Mitigation, Preparedness, Response and Sustainable Education
Center for Rebuilding Sustainable Communities
Boston, Massachusetts
Cost: $120

This conference will examine the role of architecture, planning, and engineering education in preventing and mitigating natural hazards. Topics include cultural resources recovery, contingency planning, transportation infrastructure, future trends in education, ethical and political ethics, and Atlantic-based tsunamis.

http://www.umb.edu/crscad/events/sustainable_reconstruction_2014

May 12-15, 2014
2nd International Conference: Climate Change—The Environmental and Socioeconomic Response in the Southern Baltic Region
Baltic Sea Experiment and Szczecin University
Szecsecin, Poland
Cost: Not available

Progress has been made in the understanding of the climate system on the global scale. But understanding of regional scales is still needed. This conference will highlight: climate proxies and models; natural dynamics of climate and coastal areas; changing Baltic sea coasts; and adaptation of energy politics to climate change.

http://www.baltex-research.eu/SZC2014/index.html

May 19-21, 2014
Local Solutions: Northeast Climate Change Preparedness Conference
Antioch University, U.S. Environmental Protection Agency
Manchester, New Hampshire
Cost: $240

The conference will be an educator's summit, facilitating networking with public and private stakeholders for training in climate preparedness. The conference will present "how-to" knowledge about the tools available to communities to deal with the changing climate. "Attendees will also learn how to craft effective communications and engagement approaches, and how to forge public-private and school-community partnerships that leverage resources. Above all, key decision-makers and other individuals will meet in an accessible setting to discover synergies and teach each other about how to protect what we all invest so much of our professional and personal lives in: safe, healthy, and thriving—resilient—communities," according to the website.

http://www.antiochne.edu/innovation/climate-change-preparedness/

May 22-23, 2014
New Zealand's First Disaster Communications Conference
Emergency Media and Public Affairs, University of Auckland
Auckland, New Zealand
Cost: $700

Attendees will hear some of the world's leading disaster communications professionals, including Denis McLean, Chief of Communications for the UN Office for Disaster Risk Reduction, discuss their experiences and give advice and tips on how to lead the community through a disaster. At a "fast five" session, some of New Zealand's most experienced public information managers sharing their top tips for communicating in emergencies.

http://www.emergencymedia.org/site/conferences_nz.htm

Natural Hazards Observer
ISSN 0737-5425
Printed in the USA.
Published bimonthly.

The *Observer* is available free online. A print subscription to the *Observer* is $15 a year to subscribers within the United States. Back issues of the *Observer* are available for $4.00 each, plus shipping and handling. Orders must be prepaid. Checks should be payable to the University of Colorado. Visa, MasterCard, and American Express cards are also accepted.

Subscribe to the *Observer* and the Natural Hazard Center's electronic newsletter, *DR-Disaster Research News You Can Use*, at:
http://ibs.colorado.edu/hazards/subscribe

May 29-31, 2014
Resilient Cities 2014: Fifth Global Forum on Urban Resilience and Adaptation
Local Governments for Sustainability, World Mayors Council on Climate Change Secretariat
Bonn, Germany
Cost: Not yet posted

The event will focus on: risk data and analysis; adaptation planning and policy; comprehensive adaptation approaches; collaborative and community-based adaptation; resilient infrastructure and city-region support systems; and governance and capacity building.

http://resilient-cities.iclei.org/bonn2013/about/

June 1-3, 2014
Emergency Media and Public Affairs Conference—Australia
Emergency Media and Public Affairs
Canberra, Australia
Cost: $1,335

Attendees will hear some of the world's leading disaster communications professionals, including Denis McLean, chief of communications for the UN Office for Disaster Risk Reduction, discuss their experiences and give advice and tips on how to lead the community through a disaster.

http://www.emergencymedia.org/site/conferences_aus.htm

June 9-12, 2014
Second Arab Conference on Disaster Risk Reduction
Government of Egypt, League of Arab States—UN
Sharm El Sheikh, Egypt
Cost: Not yet posted

The Second Arab Conference for Disaster Risk Reduction will provide a forum for Arab governments, policy makers, planners, academia, civil society and development experts to discuss disaster risk reduction in the region.

http://www.preventionweb.net/english/email/url.php?eid=36370

June 11-12, 2014
16th Futures Conference: Sustainable Futures in a Changing Climate
Turku University, Finland Futures Research Centre
Helsinki, Finland
Cost: $475

This conference brings together experts from the field of futures studies to look at sustainable development under the modern regime of changing climate. The conference will "present current academic research and give new viewpoints and novel ideas to decision-makers to assist them towards more feasible decisions for sustainable development."

http://www.futuresconference.fi/2014/

June 16-18, 2014
23rd SRA-E Conference
Society for Risk Analysis
Istanbul, Turkey
Cost: $750

The theme of this European-oriented conference will be "Analysis of Governance and Risks Beyond Boundaries." This means that risk is not constrained by the boundaries of nations, but can travel across regions. The conference will "promote recent scientific novelties in risk reduction and to enhance inter-disciplinary approaches to develop new strategies in both evaluating and coping with well-known and less-known risks."

http://srae2014.itu.edu.tr/

June 16-18, 2014
International Science—Policy Workshop 2014
Partnership for Environment and Disaster Risk Reduction
Jakarta, Indonesia
Cost: Not yet posted

The workshop will examine how to maximize integration of disaster risk reduction and climate change adaptation through ecosystem based approaches and how these integrated strategies can help inform policies and programming that aim to build local and national resilience to disasters. While the inter-linkages between climate change and DRR are now widely acknowledged, these two domains continue to develop in silos with different stakeholders, expert groups, funding mechanisms and processes. One way to promote the integration of climate change adaptation and DRR is through the adoption of ecosystem-based approaches. Ecosystem-based approaches to DRR and CCA integrate the use of biodiversity and ecosystem services into an overall strategy to reduce people's vulnerability and increase their resilience to natural hazards and climate change.

http://ehs.unu.edu/article/read/call-for-abstracts-international-science-policy-workshop

Natural Hazards Center
Institute of Behavioral Science
University of Colorado at Boulder
483 UCB
Boulder, Colorado 80309-0483

Change Service Requested

Non-Profit Org.
U.S. Postage
PAID
Boulder, CO 80309
Permit No. 156

Printed on recycled paper

Support the Natural Hazards Center

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

Support Center Operations—Provide support for core Center activities such as the *DR* e-newsletter, Annual Workshop, library, and the *Natural Hazards Observer*.

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

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

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

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

Or call (303) 492-2149 to discuss making a gift.

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