

Observer

Natural Hazards



Volume XXXVIII • Number 2

November 2013

Security and resilience in Israel



An invited comment by Meir Elran



Meir Elran '13
Natural Hazards
OBSERVER

Israelis live in a volatile, hostile environment, requiring them to think in terms of defending themselves from the evolving threats from their enemies. "Resilience" in the Israeli context means "security."

Over the last two decades, the threats have changed. Originally confined primarily to the military sphere, now most threats are posed by non-state actors, directed at civilians and civilian infrastructure. Since 2000, Israel has seen four terrorist offensives. The first, labeled the Second Palestinian Intifada, lasted four agonizing years, from 2000 to 2004. It included 130 suicide bombings which, along with other terrorist attacks, caused more than 1,000 fatalities, 80 percent of whom were civilians.

The second terrorist episode erupted in July 2006 with an attack by Hezbollah. It lasted 33 days, with daily rocket attacks and missiles launched against the entire northern part of the country.

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. Then last November, Hamas again attacked the south and central parts of Israel, including missiles launched at the major population centers of Tel Aviv and Jerusalem.

These circumstances have led Israelis to consider how they will deal with these threats. The issues are not simply military ones. We must also ensure the functional continuity

of our civilian population and our threatened communities in the most effective way.

This is the essence of "resilience."

Resilience, in its generic sense, is a metaphor. It characterizes the flexible capacity of any system to respond to major traumatic disruption in a ductile manner—to bend, rather than break. It encompasses the ability to adapt and to cope with the challenge it faces in proportion to that challenge's severity, bouncing back to the original, or even enhanced, functionality. A resilient system—economic, infrastructural, personal, organizational, social, or even a national system—is one that can absorb the aftermath of a major challenge, resuming its designated mission.

Resilience is not a static quality. It must be continually enhanced in advance to reach a higher level of effectiveness following a disaster of any kind. The problem often is that resilience in general, and societal resilience in particular, is not always an accepted operational paradigm. There is a wide gap between the popular use of the term and the abundance of academic papers written on the subject on one hand, and the minuscule scope of practical implementation of the concept,

(Please see "Israel," page twelve)

INSIDE ...

Colorado floods

Too much climate news

'First' first responders

Resources

Page three

Page five

Page nine

Page fifteen



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.

Staff

Jolie Breeden.....Program Associate
Nnenia Campbell.....Research Assistant
Sienna Dellepiane.....Library Assistant
Courtney Farnham.....Professional Research Assistant
RoseMarie Perez Foster.....Senior Research Associate
Kathryn Goggin.....Library Assistant
Wanda Headley.....Library Manager
Wee-Kiat Lim.....Research Assistant
Liesel A. Ritchie.....Asst. Director for Research
Diane Smith.....Office Manager
Kathleen Tierney.....Director
Jamie Vickery.....Research Assistant
Courtney Welton-Mitchell.....Research Associate
Dan Whipple.....Editor

Research Affiliates

Dennis S. Mileti.....Rancho Mirage, CA
Lori Peek.....Colorado State University
Deborah Thomas.....University of Colorado at Denver

Observer cartoons are drawn by Rob Pudim.

Send items of interest to the Natural Hazards Center, University of Colorado at Boulder, 483 UCB, Boulder, CO 80309-0483; (303) 492-6818, (303) 492-2151 (fax); hazctr@colorado.edu. The deadline for the next *Observer* is **July 31, 2013**.

Notes

Dear friends,

It may have been a quiet week in Lake Wobegon, but in Boulder things have been jumping since the last issue of the *Observer*. The major event of course has been the severe flooding we experienced here (described in more detail on page three).

Once the roads cleared enough for us to replenish the larder at home, the Natural Hazards Center went back to work. Flooding in Boulder was a topic that especially interested NHC founder Gilbert White. He left some instructions in his *Boulder Creek Floodplain Notebook* with guidelines for a study of the disaster. You can take a look at his outline here—<http://www.colorado.edu/hazards/bcfm/>.

In addition to following Gilbert's instructions on this, we've awarded six Quick Response grants to researchers to study the recent flooding. The recipients are:

Tara Opsal and Tara Shelley, Colorado State University

Problems Related to the Oil and Gas Industry During a Flooding Disaster: The Nature and Extent of Citizen Complaints and Satisfaction with Government Response

Deborah Brosnan, University of California Davis
Assessing Ecological and Natural Resources Impacts of Colorado Floods to Strengthen Disaster Risk Reduction and Build Cross-Cutting Resilience

Deserai Crow, University of Colorado, and Elizabeth Albright, Duke University

Policy Learning and Political Context: Analyzing Responses to Colorado's Extreme Flood Events of 2013

Bridgette Cram, Florida International University
Women in the Face of Disaster: Incorporating Gender Perspectives into Disaster Policy

Rachael Budowle, University of Wyoming
Sustainable Food Systems: Impacts of Disasters and Relief Efforts on Resilience

Andrew Rumbach, Deborah Thomas, Carrie Makarewicz, Jeremy Nemeth, University of Colorado, Denver

Understanding Household Recovery Following the Colorado Flash Floods

We're also compiling a Web site of photos, reports, data and other relevant information about the floods that will be housed on the Hazards Center site.

—The editor

Parsing the 2013 Colorado floods

‘Twas a dark and stormy night ... and day ... and night ... and ...

IN BOULDER, COLORADO, at the end of September, you could virtually map the contours of the floodplains by measuring the piles of house-

hold debris left on the curb for the trash collectors. On the top of a rise, the curb would be clear. Twenty yards down the hill, a battered bookcase, a cluster of soggy and soiled towels. Further down the street, larger piles would appear—sofas, box springs, mattresses, dolls and dollhouses, ruined stuffed animals. Piles and piles of them, the piles growing as you reach the base of one hill, then repeating the pattern in reverse as you climb the next one.

It started raining on September 10, then kept it up pretty much nonstop until the 13th. And it rained hard, reaching about 1.2 inches per hour on September 12. An area that usually gets about 12 inches of precipitation in an entire year got nearly 17 inches in less than a week. According to an early [report](#) prepared by CIRES at the University of Colorado, “Boulder’s COOP weather station (since 1893) set records for one-day (9.08 inches), two-day (11.52 inches) and seven-day (16.9

inches) totals; the previous one-day record was 4.80 inches and previous one-month record was 9.59 inches.”

The CIRES report says, “An unusually persistent and moist weather pattern led to rainfall totals from September 9th-15th that have been observed in only a handful of events on the Front Range in the past century.” Most of the rain fell in a 36-hour period, from the afternoon of September 11 to the morning of September 13. To residents, it seemed longer.

In Colorado’s infamous Big Thompson flood in July of 1976, rainfall was heavier, but not as long-lasting. The area around the canyon received nine to 10 inches of rain between seven p.m. and midnight of July 31. The most intense rainfall in the 2013 storm was about one inch per hour.

The impacts to the Front Range were profound and are still being assessed at this writing. As of [September 30](#), the Colorado Office of Emergency Management reported that eight people had died in the flooding and a ninth was missing and presumed dead. About 200 miles of roads were washed out in the 20 affected counties. Several communities, including Jamestown and Lyons, were completely cut off. In Longmont, flood waters cut the town in [half](#), making it virtually

impossible to get from the north to the south side.

Estimated road damage costs are \$475 million. Fifty bridges were destroyed. Nearly 2,000 homes were destroyed and another 16,000 damaged. But it could have been worse. University of Colorado geography professor John Pitlick said that in Boulder, mitigation measures taken by the city probably reduced damages to roads and building. For example, many bike and walking trails in the city share underpasses beneath highways with streams. These underpasses offer additional passage of increased water volumes under the roads.

People tried to get a scale of the disaster. Was it a “100 year flood?” A “1,000-year rainfall” event?

Scientists are shying away from these terms because they are often misunderstood. They now prefer to talk about likelihood or “return interval.” But a headline in the local paper early in the flooding saga called it the “hundred year flood.” In some drainages, it probably was, in others not. The CIRES report says, “This was likely a 100-year flood (or more accurately: a 1 percent probability per year flood) in some drainages but not in others, including Boulder Creek.”

Pitlick says that if you look at the flood inundation maps, the magnitude



of the flood corresponds more closely to a 50-year return interval, and in some places only a 25-year interval. But there was large variation among drainages, so these estimates are very preliminary. Rainfall was exceptional in duration and volume, but not in intensity.

Natural Hazards Center founder Gilbert White anticipated the flooding, and left instructions about research to be done in its aftermath. White died in 2006. He wrote in these instructions, "The causes of flood loss are to be found primarily in the decisions of individuals and public groups to expose themselves or others to the ravages of flood water. These were decisions to build or not build in floodplains, to prepare or not prepare to cope with high water when it comes, and to share knowledge with other people of how to mitigate losses."

Another question that people would like answered is: Is this the signature of global warming? The answer is ... probably not. Climate change makes slightly more water vapor available for precipitation, perhaps three to five percent, which is a relatively small amount. Heavy rainfall events are an anticipated consequence of the warming climate. This result is expected in many parts of the world, but its impact

in Colorado is less certain. Climate change can be neither included nor excluded as a contributing factor.

A recent paper in *Journal of Geophysical Research-Atmospheres*, however, finds a causal connection between global warming and extreme precipitation. Using a statistical analysis, R.E. Benestad of the Norwegian Meteorological Institute found that recent increases in very heavy precipitation—the "wet day 95th percentile"—are influenced by global mean temperatures. Benestad writes, "The results therefore constitute a strong evidence that the global warming has caused more intense precipitation over the last century."

Boulder is not alone in its flood fatalism. "Floods causing billions of dollars in losses dominate the natural catastrophe statistics for the first half-year 2013," says reinsurer Munich Re. "Around 47 percent of the overall losses and 45 percent of the insured losses derived from inland flooding that occurred in Europe, Canada, Asia and Australia."

The most expensive flooding so far this year was in southern and eastern Germany in May and June, with overall losses of \$16 billion.

They Said It ...

"It symbolizes that so far we have failed miserably in tackling this problem."—NOAA's Pieter P. Tans, quoted in a May 10, 2013 *New York Times* story reporting that the level of carbon dioxide in the atmosphere had reached 400 ppm, a level not seen in three million years.

"It means we are quickly losing the possibility of keeping the climate below what people thought were

possibly tolerable thresholds."—Ralph Keeling, Scripps Institution of Oceanography, quoted in the same *New York Times* story.

"It feels like the inevitable march toward disaster."—Maureen E. Raymo, a scientist at the Lamont-Doherty Earth Observatory, quoted in the same *New York Times* story.

Using better information to help elderly, disabled in crises

The elderly and disabled suffer disproportionately in disasters. But improved data collection might enable better assistance.

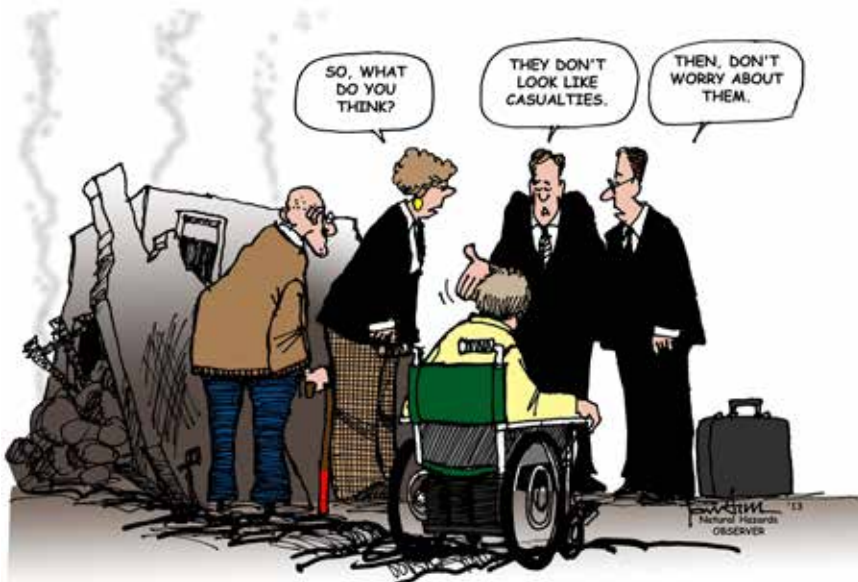
DATA COLLECTED after disasters often considers the number of people killed, but seldom emphasizes

the number injured and disabled. UNISDR chief Margareta Wahlström is urging improved data collection in disasters to provide more insight into disabling injuries and in assisting disabled people who are affected by disasters.

"Disaggregated and more detailed reporting after disasters can provide the evidence necessary to catalyze inclusive disaster risk reduction policies. For instance, disasters can create new and sometimes permanent disabilities in the lives of many persons, with implications for them, their families, their community and the whole economy. Yet, after disasters occur, what is always reported is the death toll but data is rarely collected on the number of persons disabled by the event," Wahlström said.

She spoke at meeting in late September hosted by the Japan Disability Forum, which was examining the issues surrounding people with disabilities in dealing with 2011 earthquake and tsunami. A theme of the meeting was that certain populations like the elderly and disabled suffer disproportionately in disasters when they are isolated from the larger community.

UNISDR has launched a worldwide survey of disabled people coping with disasters. "Dur-



ing the 2011 earthquake and tsunami in Japan, there was higher mortality among persons with disabilities living in communities than those living in institutionalized settings,” said Osamu Nagase of the Japan Disability Forum.

In the United States, the Centers for Disease Control and Prevention found, “Unlike older adults who reside in assisted living facilities and nursing homes, older adults who live in the community are sometimes overlooked during the planning process for preparing for an emergency. Older adults are especially vulnerable as they are more likely to have multiple chronic conditions, cognitive and physical disabilities, or limited resources that affect their ability to appropriately prepare for and respond to an emergency.”

CDC has prepared a **guide**—*Identifying Vulnerable Older Adults and Legal Options for Increasing Their Protection During All-Hazards Emergencies*—offering guidance for identifying and assisting older people in emergencies.

CDC says that none of the methods currently being used to identify older adults who may need help in emergencies have been evaluated. The agency says that basic epidemiological data can guide planning for the delivery of services during disasters. GIS mapping technology can locate older adults and alert first responders to their needs. Registries must be built kept up to date, and used in emergencies. Shelter intake procedures should identify older adult who might need special help.

A busy time in climate change—again

Warming of the climate system is ‘unequivocal’—and we’re doing it

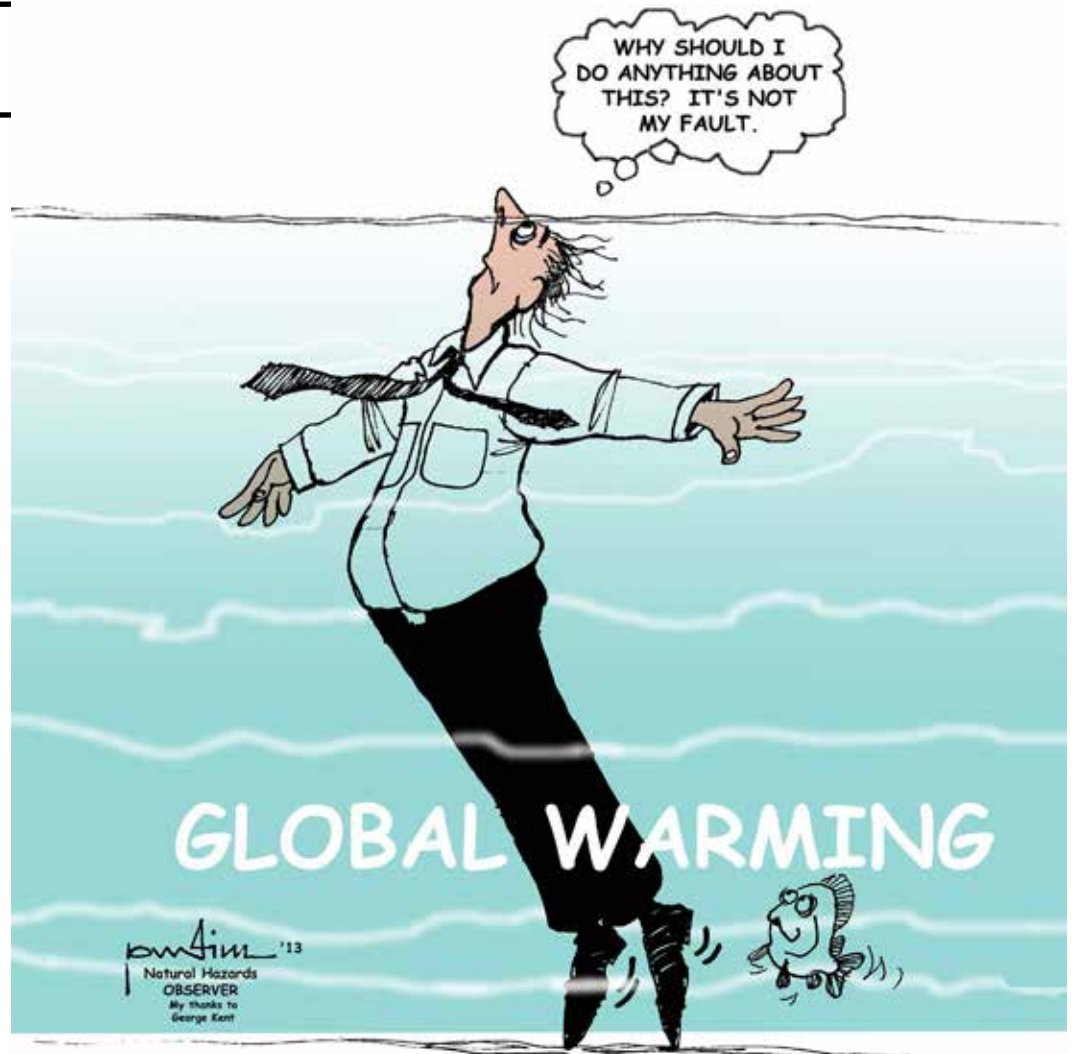
IT’S BEEN A BUSY TWO MONTHS in the climate change arena. The major development has been the **release** of Intergovernmental Panel on Climate Change’s *Fifth Assessment Report* (AR5). The main findings are the not-unexpected continued warming of the climate—well, not unexpected except by the tinfoil hat crowd—and the increased confidence with which these findings are now trumpeted.

But while the IPCC carried the big stick in the media, there are several other important studies released recently that place the climate situation in sharp relief.

The take-home message from the IPCC is not much different from reports AR1 through 4: “Warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, sea level has risen, and the concentrations of greenhouse gases have increased.”

Furthermore, the report says, “Human influence on the climate system is clear. This is evident from the increasing greenhouse gas concentrations in the atmosphere, positive radiative forcing, observed warming, and understanding of the climate system ... It is *extremely likely* that human influence has been the dominant cause of the observed warming since the mid-20th century.” (Emphasis in original.)

You can find your own panic or tipping points anywhere in this volume. The last three decades are the three warm-



est in recorded history. Global sea level will continue to rise, exceeding the already high rates achieved between 1971 and 2010, rising between a half meter and a meter by 2100, depending on the carbon emissions scenario you choose. Nights and days will be hotter. Number and duration of heat waves will increase. Frequency of heavy precipitation events will climb. And so on.

On May 10—well before the new IPCC report came out—the *New York Times* published a piece headlined, “Heat-trapping gas passes milestone, raising fears.” The concentration of carbon dioxide in the atmosphere reached 400 parts per mil-

lion, a level not seen for at least three million years.

The overall message of the AR5 report is not very different from the previous four, it's just said more forcefully. Consensus documents like this seldom shout, but this one is using its outside voice. One change made that reinforces the human fingerprint on the climate is the use of the total anthropogenic contribution to climate change, rather than simply the anthropogenic carbon dioxide contribution to the atmosphere. AR5 includes all greenhouse gases, other human-induced forcings (including aerosols, which probably contribute to cooling), natural forcings and internal variability (the latter two are close to zero).

The [website RealClimate](#) says of these changes, "First, the likelihood level is now at least 95 percent, and so the assessment is for less than 5 percent probability of the trend being less than half of the observed trend. Secondly, they [IPCC] have switched from the 'anthropogenic greenhouse gas' driven trend, to the total anthropogenic trend ... The GHG trend is almost certainly larger than the net anthropogenic trend because of the high likelihood that anthropogenic aerosols have been a net cooling over that time. Both changes lead to a stronger statement than in AR4. One change in language is neutral; moving from 'most' to 'more than half,' but this was presumably to simply clarify the definition."

AR5 projects a sea level rise of between eight and 98 centimeters by 2100. AR4 projected sea level rise of between 18 and 59 centimeters, so the new projections are 50 percent higher, according to Stefan Rahmstorf, Head of Earth System Analysis at Potsdam University, Germany, and a leading authority on sea level rise.

But even this level is too conservative, Rahmstorf says. Rahmstorf told the news service IRIN, "It is remarkable that IPCC has now come to its much higher sea level rise projections with their preferred method, independently of the semi-empirical models. The IPCC's own approach now confirms that its last report understated the risk of sea-level rise, and that was my main concern at the time."

By the year 2300, if there are no restrictions on emissions, sea levels will be from one meter to more than three meters higher. This would submerge many low-lying countries and most island states. According to IPCC's new estimates, Bangladesh, on the Bay of Bengal, could be facing a 20-cm hike in

sea levels in another three decades.

A study in September in the journal *Science* found that ice sheets "are surprisingly sensitive to even short periods of temperature change," says University of Buffalo geologist Jason Briner. When the earth cooled 8,200 years ago, glaciers on Baffin Island expanded rapidly. Now that the earth is warming, the earth may be facing a ice-free Arctic. An international team led by University of Massachusetts researcher Julie Brigham-Grette found that in the Pliocene—2.2 million to 3.6 million years ago—the Arctic was ice-free.

The year-round ice-free conditions in the Arctic could show why Earth was substantially warmer at that time, according to University of Colorado Boulder researcher Jim White. "When we put 400 ppm carbon dioxide into a model, we don't get as warm a planet as we see when we look at paleorecords from the Pliocene," said White, co-author of the new study published online in the journal *Palaeogeography, Paleoclimatology, Palaeoecology*. "That tells us that there may be something missing in the climate models."

That something may be the ice-free Arctic, which may be in our future. Eric Post and colleagues, writing in the August 2, 2013 issue of the journal *Science*, found, "Arctic sea ice loss has exceeded most model projections and is unprecedented in the last 1.5 millennia." Sea ice loss does not contribute to sea level rise, because the ice is usually already floating and displacing water. But it will have far-reaching effects on the ecology of the Arctic.

Sea ice loss may enhance algae and phytoplankton blooms, may ultimately reduce nutrient availability for phytoplankton, and replace larger phytoplankton with smaller picoplankton. Vertebrates like polar bears depend on the sea ice for foraging, reproduction, and resting. "Sea ice is the strongest predictor of genetic differentiation among arctic fox populations," the paper says. "In the Canadian Arctic Archipelago, interisland and island-mainland migration can promote genetic rescue of isolated wolf populations. The loss of sea ice that seasonally connects these populations will render such genetic rescue increasingly unlikely."

The other research cited above also indicates that an ice-free Arctic may reinforce warming, as it apparently did in the Pliocene.

But that's not all ...

Coming soon to the weather near you

It will get hotter—Honolulu, 2043; Rio, 2050; Mexico City, 2031

WHEN WILL YOU NOTICE global warming at your house? If you live in Indonesia, perhaps as soon as 2020. In New York, not

until 2047 or later.

"Noticing climate change" in this case means when the future annual average coldest day is warmer than the average current annual warmest day. A new paper in *Science* by University of Hawai'i Manoa researchers has looked at cities around the world and defined the years at which extreme events become normal ones—depending on which scenario is invoked.

These changes come first in the tropics, where socioeconomic conditions may make it most difficult for people to adapt. The tropics are also home to most of the

world's biodiversity. The ability of plants, animals, insects, and marine life to adapt to these changes is unknown.

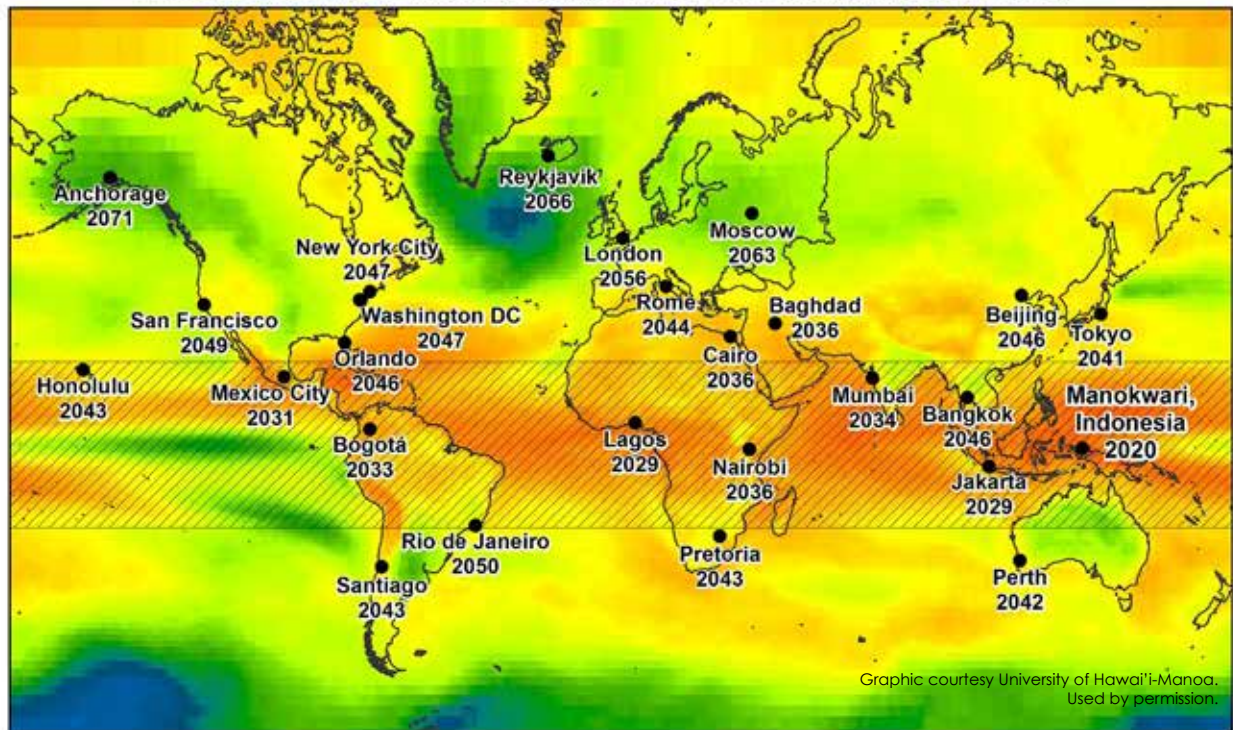
Camilo Mora and colleagues found that, under a business-as-usual scenario 2047, will be the mean year in which warming will begin to exceed normal bounds. Some places will be affected even earlier. They assumed atmospheric carbon dioxide concentrations of 538 parts per million by 2100 under their RCP45 scenario, and 936 ppm by 2100 under the RCP85 scenario.

Under the higher carbon concentration scenario (RCP85), Manokwari, Indonesia will be out of its historical "climate envelope" as early as 2020. Even under the RCP45 scenario, the city will reach this point by 2025.

In the abstract of their paper, the authors write, "Using 1860 to 2005 as the historical period, this index has a global mean of 2069 (+/- 18 years standard deviation) for near-surface

Year of Climate Departure for World Cities

Results show multi-model averages under RCP8.5 (Mora et al. 2013)



The global mean year of climate departure is 2047. The mean for the tropics (shown in the hatched area) is 2038, compared to 2053 for all other latitudes.

0 2,000 4,000 8,000 12,000 16,000 Kilometers

2020 2040 2060 2080 2100 Year of climate departure

air temperature under an emissions stabilization scenario and 2047 (+/- 14 years s.d.) under a 'business-as-usual' scenario. Unprecedented climates will occur earliest in the tropics and among low-income countries, highlighting the vulnerability of global biodiversity and the limited governmental capacity

to respond to the impacts of climate change. Our findings shed light on the urgency of mitigating greenhouse gas emissions if climate potentially harmful to biodiversity and society are to be prevented."

Yarnell Fire disaster report answers few questions

Nineteen firefighters die. Decisions were 'reasonable.'

THE DEATHS OF 19 firefighters of the Granite Mountain Hotshots at Arizona's Yarnell Hill fire was nobody's fault, according to the Arizona State Forestry Division's [report](#) on the accident. "The judgments and decision of the incident management organizations managing this fire were reasonable," the report's executive summary says. "Firefighters performed within their scope of duty, as defined by their respective organizations. The Team found no indication of negligence, reckless actions, or violations of policy or protocol."

This conclusion doesn't satisfy everyone. "The investigators emphasized that there were unable to answer one of the most-asked questions about the fatalities—why the crew left the safety of the already burned area, the black, to attempt to walk 1.6 miles mostly through unburned brush to another safety zone, the Boulder Springs Ranch," [wrote](#) Bill Gabbert in *Wildfire Today*.

The Yarnell Hill fire was started by lightning strikes at about 5 p.m. on Friday, June 28, 2013. The area is mountainous, with elevations ranging from 4,500 to 6,000 feet. It hadn't

burned since 1966. The area was very dry, with "chaparral brush, ranged in height from one to ten feet, in some places, was nearly impenetrable." There was plenty of fuel.



On June 30 at about 3:30 pm local time, the Granite Mountain group was the only crew that was out on the ridge, on the southwest perimeter of the fire. "Personnel who communicated with the Granite Mountain IHC knew the crew was in the black [the safe zone] at that time and assumed they would stay there. No one realized the the crew left the black and headed southeast, sometime after 1604. At 1630, thunderstorm outflows reached the southern perimeter of the fire. Winds increased substantially; the fire turned south and overran the Granite Mountain IHC at about 1642," the report says.

"There is a gap of over 30 minutes in the information available for the Granite Mountain IHC. From 1604 until 1637, the Team cannot verify communications from the crew, and we have almost no direct information for them. There is much that cannot be known about the crew's decisions and actions prior to their entrapment and fire shelter deployment at around 1642," the report says.

Had the crew stayed "in the black," however, they likely would have survived.

A **story** by Cally Carswell from October 1, 2013 in *High Country News*, says that one reason so many questions remain unanswered may be a legacy of the handling of other

fire investigations from past tragedies. The 2001 Thirtymile Fire in Washington resulted in an incident commander originally being charged with manslaughter in the death of four firefighters. "The manslaughter charges were reduced, but he pled guilty to the false statements indictment. This hadn't happened before and it sent shivers through the firefighting community," Carswell writes. This criminal investigation was the result of changes in investigative procedures in such cases to see if crimes were committed, and whether firefighters should be charged.

Wildfire Today's Gabbert wrote that the potential for criminal charges may have led to a lack of cooperation by firefighting personnel in the aftermath investigations.

The forestry division report concludes with a few recommendations, including a "cooperative effort to reduce hazardous fuels and improve overall suppression efforts for communities that are at high risk from wildfire."

The report also found some problems with radio communications during the fire, and suggested a review of state wildfire communications plan and program, along with several other reviews.

Social media in disasters: A work in progress

Social media are the latest thing in the hazards and disasters world—but that world is still sorting out what kind of thing it is.

The Department of Homeland Security released a report dated June 2013 that catalogs the *Lessons Learned: Social Media and Hurricane Sandy*. Acknowledging the proliferation of social media among the populace, it says, "Sandy, however, marked a shift in the use of social media in disasters. More than ever before, government agencies turned to mobile and online technologies before, during and after Sandy made landfall, to communicate with response partners and the public in order to share information, maintain awareness of community actions and needs, and more."

The report, prepared by DHS's Virtual Social Media Working Group, seems to view social media use from a top-down, information aggregation point of view. "Throughout the course of the storm," the report says, "including the days prior to landfall and for several weeks following, government agencies, response partners, utilities, nonprofits, ad hoc groups, and individuals leveraged various social media tools for a variety of purposes. Many of these represent the first time a government agency officially used social media for response activities."

There seems to be a disconnect, however, between the way that social media was used during Sandy, and the way people would like it to be used. The Federal Emergency Management Agency, for instance, "consolidated all U.S. government web content related to Sandy onto www.usa.gov/sandy. ... The goal of this effort was drive visitors looking for Sandy information back to one authoritative source for information."

While this is no doubt helpful, people seem to expect more. A report by the University of Maryland-based National Consortium for the Study of Terrorism and Responses to Terrorism (START), *Social Media Use During Disasters*, found, "Social media, however, are used for more than information seeking or sharing during disasters; the public increasingly

expects emergency managers to monitor and respond to their social media posts. A 2010 American Red Cross survey found an alarming 75 percent of 1,058 respondents expected help to arrive within an hour if they posted a request on a social media site."

It's an uncontroversial statement to say that help arriving in an hour during a Hurricane Sandy-like event is doubtful. The functional gaps between the centralized social media agglomeration of DHS and the dispersed expectations of many users are still far apart. Effectively harnessing these new technologies is a work in progress.

The Red Cross says, however, that during Typhoon Bopha, which struck the Philippines in December of 2012, "Thousands of lives were saved because 99 percent of the population have access to a mobile phone and could receive early warnings and information on staying safe."





PHASE ONE: BYSTANDERS Focusing on ‘ordinary people’ —the ‘first’ first responders

An invited comment by Jelle Groenendaal and Joseph Scanlon

In his presentation to the 2013 Natural Hazards Workshop in July this year, Gary Machlis of the National Park Service showed a photo of two young men pedaling bicycles propped up on rollers to power a generator. The generator in turn provided power for residents of Lower Manhattan to charge their cell phones during the power outage after Hurricane Sandy.

On December 26, 2004, an English family holidaying in Phuket, Thailand, left the beach just before it was struck by the tsunami generated by the earthquake in the Indian Ocean. They didn’t leave because they were finished sun bathing and swimming but because their 10-year-old daughter, Tilly, screamed at them to leave.

“The beach was getting smaller and smaller,” said Tilly’s mother. “I felt compelled to look, but I didn’t know what was happening.”

Tilly however had just studied tsunamis at school and she recognized what was happening. Because of her concern, her family fled and survived.

When a tornado tore through the Canadian city of Edmonton, Alberta in 1987, devastating a trailer park, survivors helped the injured into cars and drove them to the nearest

medical center—and completed their rescue work well before the first firefighters arrived on the scene.

When a Turkish Airlines plane crashed into a soggy field near Amsterdam’s Schiphol Airport in 2009, 25 bystanders, most of them motorists, rushed to the scene. They helped passengers out of the plane and brought them to a neighbouring empty farm shelter. Some heavily injured victims, who could not be moved were encouraged by bystanders (“the ambulance will arrive within a few minutes”), who opened suitcases searching for clothing to keep the victims warm. They also went back into the plane to search for travel companions of injured victims.

There are many other examples of ordinary people responding in emergencies.

Real first responders

It is well known by disaster researchers that the real first responders in the wake of a destructive incident are those who are there—not police, firefighters, and ambulance operators but surviving residents and passers-by.

It might be expected that emergency agencies would welcome such activity, even encourage it. But this is not usu-

ally the case. Studies by scholars like Ron Perry and Mike Lindell suggest many emergency agencies and governments in western industrial societies are not prepared for dealing with ordinary citizens during emergency situations. That was supported by data acquired from 85 participants (professional responders from police, fire departments, and medical services as well as representatives of the Red Cross, Salvation Army, Voluntary Medical Brigades, etc.) who attended a workshop organized by the Amsterdam-Amstelland Fire Department in the Netherlands. They found emergency plans rarely take into account the way ordinary citizens attempt to help themselves and others during emergency situations. The actions of ordinary people are rarely associated with any part of emergency response systems. Ordinary people, groups, and organizations are often underutilized or rejected during emergency situations.

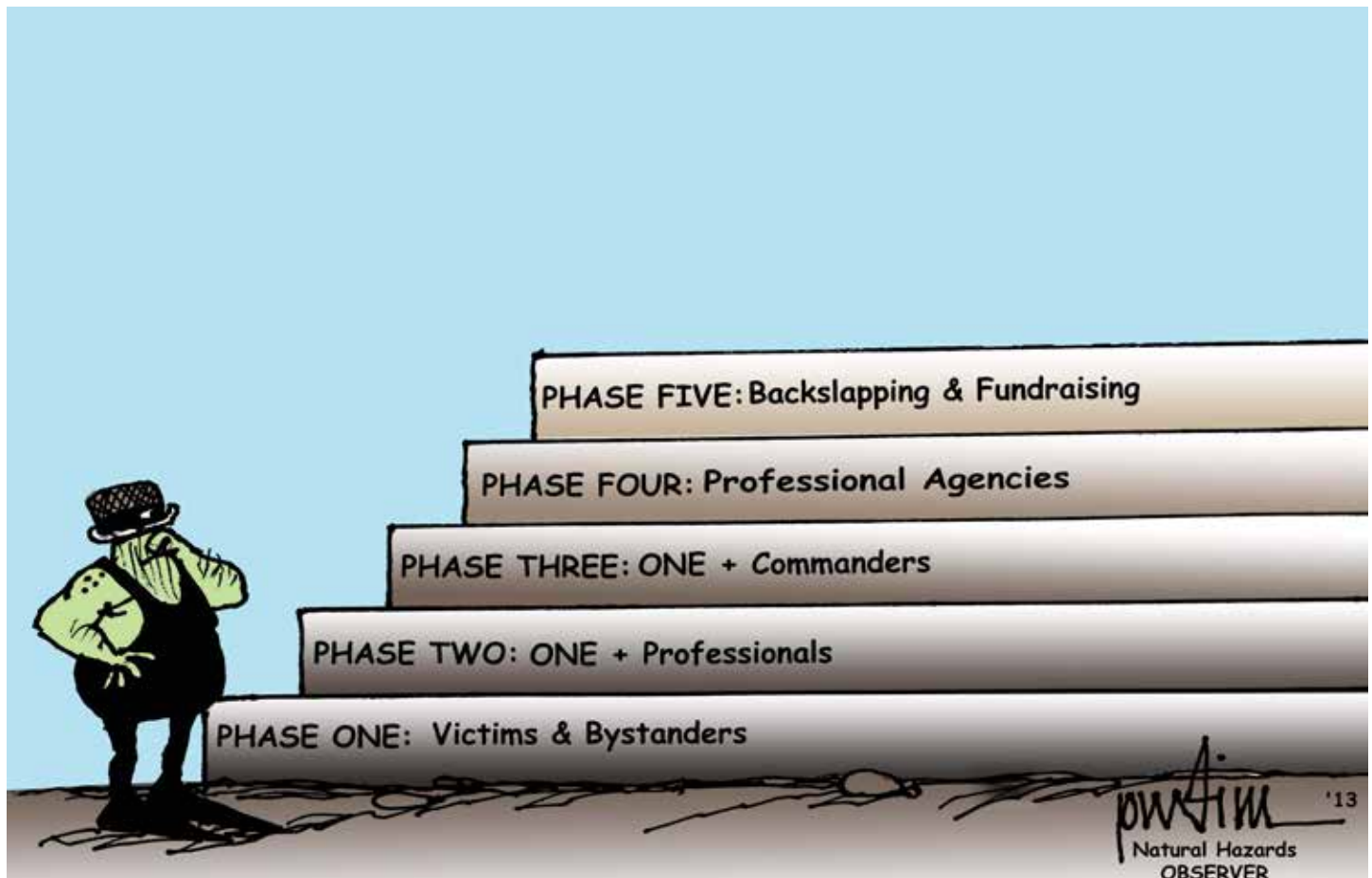
The Amsterdam-Amstelland departments are trying to change that by establishing guidelines designed to integrate ordinary people into emergency response. The fire department even tested its idea by staging a simulation outside a theatre just as the performance was ending. No emergency personnel responded. Instead firefighters watched to see what ordinary citizens would do. It also invited persons from all over the Netherlands to a half-day workshop in which fire officials outlined their ideas. A visiting scholar explained what research shows about ordinary people in disaster.

The result is that when Amsterdam firefighters arrive at an incident they are now required to determine what ordinary people have done before they arrived and to determine whether those people might still be useful. To make that approach work, they have developed a five-phase model for co-

operating with ordinary citizens.

- Phase one assumes that when an emergency occurs, victims and bystanders will start providing help and mitigate the crisis situation before emergency personnel arrive.
- In the second phase, the first few professional responders arrive. They are taught to accept assistance and not to push ordinary people aside.
- Phase three starts when commanders in charge of the fire brigade, police and medical service arrive. At that point, citizen response will be discussed in the first structured meeting and a decision made about its effectiveness. If appropriate, arrangements will be made for registration of volunteers.
- In the fourth phase, the operation continues under control by the professional emergency agencies. No new citizen assistance will be allowed unless the incident commander requests it.
- Finally, officials thank citizens who made a contribution to the emergency response—and officials explore the possibility of providing compensation for possible damage to personal belongings.

In short, citizen involvement must be considered at all stages of emergency response. The guidelines specify that ordinary citizens' co-operation must be voluntary: they are not obliged to participate. Second, the tasks to be performed by ordinary people should be without much safety risk. Third,



the task performed by ordinary people should add value to the overall emergency response. When ordinary citizens make the emergency situation worse, then they should be stopped. Fourth, ordinary citizens can only be asked to fulfill a task when they have the skills and knowledge to complete the task successfully.

Special attention is paid to cooperation with emergent groups. First, professional responders are expected to “merge” onto existing social structures. If a group of people spontaneously begins to help the victims or emergency agencies, this group should be allowed to do so. The internal organization of the group is not to be taken over by the professional emergency agencies since “reorganization” during a crisis is often counterproductive. Professional responders are expected to legitimize those activists. This can be done by providing them access to the disaster area, give them special clothing so it is visible to others that they are approved volunteers, keeping them informed about the emergency work, and so on. Finally, professional responders are expected to find the natural leaders within the group and work with them, for instance by making arrangements only with these leaders of the group or inviting them to meetings about the progress of the emergency response.

While the plan works, it has raised some concerns. It became very clear very quickly that it may be impossible to assess the competence of a citizen. If a person says, for example, that she’s a physician, how do you really know if she has a relevant skill? The answer is to develop photo identification which identifies an individual’s skill set.

A work in progress

The whole scheme is, in short, a work in progress. But it marks a dramatic change from the usual approach to civilian involvement in emergency response.

The Amsterdam fire department is not the only Netherlands agency changing its approach.

The Amsterdam police are adjusting their view of ordinary citizens and the role they play in an emergency. They run a free service called Burgernet (www.burgernet.nl). A citizen who subscribes to this service will be electronically notified if an emergency occurs—anything from a child missing, a police search for a vehicle or an industrial accident. The system is set up so that notices go only to those who voluntarily register themselves on the police department’s Web site.

In November, 2012, the national government also became involved in helping citizens become more aware of situations that might affect them. It launched NL-alert (www.nl-alert.nl), a national warning service quite similar to Burgernet. The NL-alert system can send electronic messages to mobile phones in the affected area. The messages contain information about the emergency along with instructions about what to do.

The Twente Fire Department at Enschede, about two hours from Amsterdam, is piloting another project in which some fire officials carry iPads. The devices provide information about buildings in their response area. It allows them to see visuals shot by ordinary people at the scene, who load the images and send them to off-site command posts. The officers can view the images on their iPads immediately. They can then respond appropriately, rather than seeing them for the first time on the six o’clock news or on YouTube.

In addition, every emergency service in Amsterdam has its own social media channel. This initiative took place in 2011 after the public sent more than 200,000 tweets about the way

The whole scheme is, in short, a work in progress. But it marks a dramatic change from the usual approach to civilian involvement in emergency response.



the fire service and the government responded to an industrial fire.

The major goal of the fire department is of course not only to get citizens involved but to change attitudes of emergency personnel.

Its workshops make clear that ordinary citizens can become involved in several ways. They can act on their own as individuals or groups just as the people did in Edmonton. They can take on tasks assigned to them by emergency personnel. That’s what happened in an Alaska hospital after the 1964 earthquake—patients were asked to assist with the response.

They can be built into emergency plans. In Ottawa, Canada for example, it was suggested to senior citizens that they keep track of their neighbors at all times and especially during an emergency. Then when emergency personnel arrive after an incident, the seniors will be able to tell them who is away, who has been rescued and by whom and who may well still be trapped.

Ordinary citizens can—as in Edmonton—act as individuals without contact with emergency agencies. They can act as an emergent or existing groups, again without contact with emergency agencies. They can act as individuals or groups with the awareness of but without interference from emergency agencies. They can act on their own or in groups but their actions can be taken into account when emergency agencies develop plans and respond. They can be co-opted by emergency agencies. They can initially respond on their own but be gradually integrated into emergency agency response. They can be built into emergency response as part of a plan.

Amsterdam is exploring all these possibilities and is willing to share its experience with anyone interested—and is attracting some attention. A description of its approach was published this year in one of the world’s leading police journals, the *Royal Canadian Mounted Police Gazette* and a similar account was published in *Canadian Firefighter*.

Jelle Groenendaal is a doctoral student at Radboud University Nijmegen. He works with the Amsterdam Fire Department. Joseph Scanlon is director of the Emergency Communications Research Unit at Carleton University in Ottawa, Canada. He can be reached at jscanlon@connect.carleton.ca.

Israel ...

(Continued from page one)

on the other. While “resiliencers” are convinced that resilience is an adequate systemic approach, a worthy strategy to deal with major disruptions, their conviction is not often shared by those responsible for implementation.

This is sadly the case in Europe and in the United States, as is apparent from the overflow of repeated new initiatives, which at best indicate the lack of progress. The picture is not totally different in Israel, where the establishment is still pre-occupied with developing sophisticated means of thwarting, deterrence, and protection. There is a striking accomplishment in the “protection” goal with the development of an ultra-modern anti-missile system named “Iron Dome,” which intercepted nearly 90 percent of enemy rockets launched against population centers in the last encounter.

Still, with all the successes, Israel is aware that its communities and vital systems are vulnerable. Communities must be prepared for the day after. This understanding is emerging gradually to be a basic part of the Israeli approach. It is seen in the extensive exercises being continuously carried out at all levels. The focus of these exercises centers on the operational capabilities of first responders. This is important. But only a small portion of the effort is directed to the components of resilience, and particularly those of social resilience.

Vital elements

WHAT ARE THE MOST VITAL ELEMENTS of societal resilience in the Israeli context—and arguably in any other society? Seven principle components emerge:

- An active community is a resilient community. Involvement in public life is needed on a routine basis, particularly by the stronger groups of the community, and especially by the younger generation.
- A resilient system is an aware, informed sys-

tem. People need to know in advance what to expect as far as it is knowable. They also must be ready for the unexpected, and prepared to act in different scenarios. Knowledge is a powerful asset that has to be cultivated and disseminated continuously.

- A resilient community enjoys an open discourse and inclusive relations between leaders and constituency. Leadership, formal and informal, local even more than the national, is a central feature around which the system revolves. Trust is a major component affecting the attitudes and conduct of the members of the community, especially in time of crisis.
- Communities must position themselves in a continuous state of high preparedness for the relevant disasters, based on a periodic assessment of the relevant threats.
- A common sense of purpose shared by the community is a major contributor to societal resilience. Common mindset and joint beliefs promote a sense of solidarity and connectedness. Bonding and networking are valuable tools to promote social capital—essential for societal resilience.
- A community which feels socially and economically secure, whose members are more optimistic about their private and collective future, tends to be more resilient. The spirit of the community affects its resilience in a direct manner.
- And of course first responders must be professionally proficient. Beyond that, they must exercise their missions in a spirit of close cooperation.

Israeli society is considered quite resilient, based mostly on its experience of disruption throughout the years of conflict with its neighbors, as well as the long history of persecution of the Jewish people in the Diaspora. Several studies have confirmed this impression, including a study of the rate of Israeli societal resilience in the period of the Second Intifada. But even if this is the case, the security circumstances and challenges unique to Israel require the maintenance of a high state of alert—and a higher state of resilience. Complacency is not an option.

Several specific programs have been carried out in many Israeli communities since the early 1980s. They are designed to enhance the capacity of the population to stand up to terrorist attacks and to keep up, as much as possible the functional continuity of community life. Many of the programs were centered around three main themes: empowerment of local leadership; enhancement of local services to the public; and upgrading the personal life skills of elementary school students to help them function as normally as possible in a crisis. Evaluations have shown the programs to have a mostly positive outcome of the communities’ resilience and conduct in ensuing emergencies.

There are, however, pitfalls to be addressed. Their “top down” approach must be supplemented by “bottom up” programs. Many of the programs are not sustainable, primarily because of budget cuts. And too many communities did not participate, a fact which relates to the issues of inequality. Stronger communities are more often

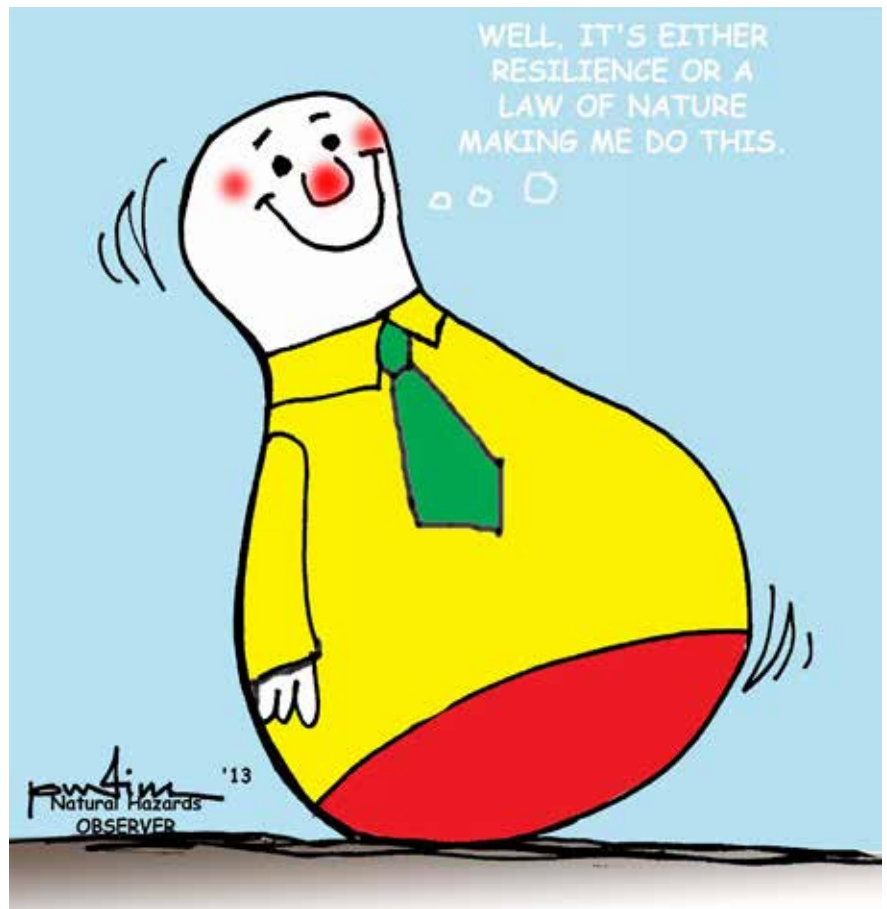


exposed to resilience programs, while weaker communities—those most in need of the programs—participate less.

As long as the nation is confronted with terrorist security challenges, Israel needs a fully funded, all-encompassing national program to first achieve and then maintain a high level of social resilience. This program should include—among other items—systems and practices for dissemination of information, grass root social capital empowerment, development of social media networks, high school students' education and mobilization, local leadership promotion, and first responders' professional training. If Israel invests in these essential skills not even five percent of what it is investing in the hard resistance to hazards of different kinds, it will dramatically improve the overall capacity to respond adequately to future terrorist attacks.

What's missing?

UNFORTUNATELY ISRAEL, LIKE MOST OTHER COUNTRIES, is not there. Something is missing in the equation. Governments around the globe invest heavily in "hard" items of resistance, but seldom in "soft" ones. Why? This is presumably due in part to the longer term nature of social processes that are associated with construction of resilience. Building resilience doesn't fit neatly into the election cycle. It usually takes



The Natural Hazards Observer is back in print!

Back by popular demand!

Many people have asked us how to get a print copy of the *Observer*. They've even said that they'd be willing to pay a little for the privilege.

For **only \$15 a year**, you can get a hard copy of the bimonthly *Observer* conveniently delivered by First Class mail.

The *Observer* is still available for free online. You can sign up for pay or free versions at ibs.colorado.edu/hazards/subscribe.

Yes! Send me a one year subscription to the *Observer* for only 15 bucks.

NAME _____

ADDRESS _____

CITY _____ STATE/ZIP _____

EMAIL _____

Or fax this page to (815) 301-3738



As long as the nation is confronted with terrorist security challenges, Israel needs a fully funded, all-encompassing national program to first achieve and then maintain a high level of social resilience.

too long for politicians to be responsive (“Not in my term of office”).

Then there is the impact of the industries which promote the hard responses’ systems for homeland security and disaster reduction.

But beyond that, it should be taken into consideration that “resiliencers” are possibly not quite convincing in their arguments about the necessity of enhancing resilience as a major part of the disasters response strategy. The outcome of all this is that most decision makers do not really comprehend what resilience really means and entails. For many of them it is, if not just a buzz-word, then an approach too complicated or politically expensive to implement in practice.

This means that there is still a long way to go to sway the decision makers. Perhaps one way to make the point would be to produce more analytical studies that would clearly show the connection between an enhanced rate of community resilience and the quick return to normal functionality following a major disruption. Several such studies have been conducted in Israel to show that communities that have been through a systemic preparedness and experienced a resilience-enhancement program have conducted themselves under emergency situations in a better fashion, and bounced back significantly faster than the others.

Studies that have been done regarding elementary schools that passed through specific preparatory educational programs show that they functioned up to 50 percent better than schools that did not experience similar programs.

Another study examined the rate of resilience of the Israeli society during the years of the Second Intifada and found that with time and with the gathering of experience in handling severe security situations, Israelis became more resilient, as measured by shortening the time it took them to recuperate following dramatic terrorist events. Furthermore, their actual conduct improved following the rebounding stage, when compared to the level of conduct before the terrorist episodes. Such quantitative studies measuring societal resilience are necessary not only for evaluating the progress and results of specific resilience programs in the community, but also as data-based marketing leverage upon those who are responsible to allocate the necessary means for the different response strategies.

Resilient communities are better able to bounce back from disasters and disruptions in a sustainable way and maintain a good quality of life for all. They are better prepared for uncertainties and able to adapt to changing conditions. This should be perceived as a universal truth, not shaped by one culture or another. When this is the case, we can learn from each other’s experience and promote together the role of resilience as a cornerstone of disaster management.

Meir Elran is director of the Homeland Security Program, Institute for National Security Studies at Israel’s Tel Aviv University. He can be reached at elran_m@bezeqint.net.

Ordering information for Joan Webster’s books—The **Complete Bushfire Safety Book** and **Essential Bushfire Safety**—was inadvertently left out of last issue’s print edition. The former can be found at <http://www.randomhouse.com.au/books/joan-webster/the-complete-bushfire-safety-book-9781740510349.aspx> and the latter at <http://www.publish.csiro.au/pid/6969.htm>.

Resources

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

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

ALL HAZARD

Introduction to Homeland Security: Fourth Edition. By Jane A. Bullock, George D. Haddow, and Damon P. Coppola. 2013. ISBN: 978-0-12-415802-3. 669 pp., \$56.21. Elsevier. <http://www.elsevier.com/books/introduction-to-homeland-security/bullock/978-0-12-415802-3#>.

“Do you believe that FEMA [the Federal Emergency Management Agency] is appropriately placed within the DHS [Department of Homeland Security] bureaucracy in its current position under the Secretary of Homeland Security, or should it have been placed somewhere else within the federal structure outside of DHS? Explain your answer.”

I’ve always been cursed with the ability to see the other guy’s point of view, so I can argue this one either way. I don’t want to spoil your fun, though. Make your own argument. This is only one of the many thought-provoking questions in this comprehensive textbook about Homeland Security. It poses many other “critical thinking questions.” Is immigration really a security issue? Why are the news media considered important in emergency preparedness education (give examples)? Should the feds spend money on first-responder preparedness or on emergency management solutions to terrorism?

The book doesn’t shy away from the controversial choices that have been made in the creation of the U.S. Department of Homeland Security, nor from the tensions that arise from the DHS emphasis on dealing with terrorism against its responsibilities for handling hazards and disasters. It also has some handy data references.

Building a Resilient Workforce: Opportunities for the Department of Homeland Security—Workshop Summary. Heather M. Colvin and Rachel M. Taylor, rapporteurs. 2012. ISBN: 978-0-309-25511-0. 231 pp., \$44.10 (softcover) or free download. National Academies Press. http://www.nap.edu/catalog.php?record_id=13380.

This is a very interesting exploration of ideas to improve the resilience of employees in a high-stress environment, in this case the Department of Homeland Security. DHS noted that people who worked in some parts of the agency, notably law enforcement, had higher than normal suicide rates, “in some cases ... much closer to those seen in the military.” Other stress-related revealed themselves as well, and the agency launched a remarkably forthright effort to make people’s work and personal lives better and more resilient.

This is a summary of the workshop, not its final recommendations, but it presents a crisp look at the issues surrounding workplace resilience. Several themes emerge from the sessions, but the one that may be most salient for other organizations is the difficulty of achieving a work-life balance in stressful environments, especially where people are

“overdedicated” to their jobs.

The rapporteurs are to be commended for a readable and well-organized presentation of what was a wide-ranging discussion. The chief flaw in the book is its excess of acronyms. But perhaps that’s inevitable in an NAS/IOM hosted DHS OHA meet.

FIRE

Essential Bushfire Safety Tips: Third Edition. By Joan Webster. 2012. ISBN: 978-0-643-10780-9. 172 pp., \$29.95 (softcover). CSIRO Publishing. <http://www.publish.csiro.au/pid/6969.htm>.

One way to tell whether a how-to book is a good one is whether it includes a lot of lists. This one does, providing a solid grounding in wildfire safety in digestible bites. It lets you know what to do in virtually every circumstance when facing a bushfire—preparing in advance, protecting your pets and livestock, deciding where to shelter, and when to leave.



It’s also a book with a point of view. Since Victoria, Australia’s Black Saturday bushfires on February 7, 2009, “knee-jerk reaction set panic coursing through many communities,” Webster writes in her introduction. “It fueled the oppressive assertion that even well-prepared home defenders were likely to die; brought calls to prohibit defending homes; urged that every country town be mandatorily evacuated; and asserted that the only way to ensure safety was to abandon your home to its fate. It has undone 20 years of effective understanding of bushfire safety.”

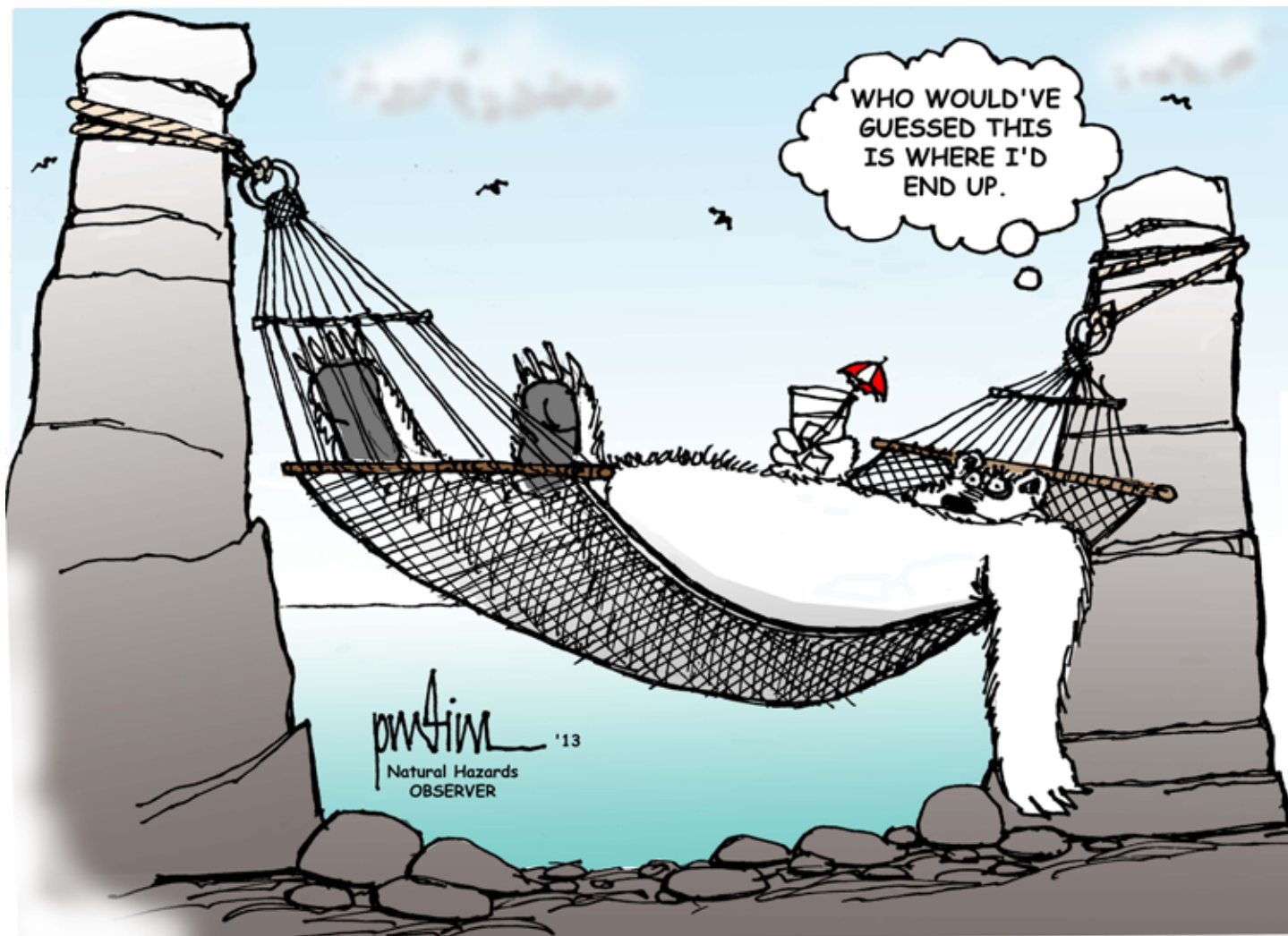
But research into the Black Saturday tragedy has shown that deaths were not caused by people staying in their homes, but rather by staying without being properly prepared. In the 2009 Victorian Bushfires Research Taskforce report, researchers found, “Overall, less than one-third of those interviewed had undertaken a high level of long term preparation to implement their household bushfire survival plan. A little more than half of the bushland-urban interface residents had undertaken no preparation.”

Webster’s book explains step-by-step how to plan to defend one’s home, or how to decide to leave and when to make that decision. Though it is written for Australia, it’s lessons are universal.

MEDIA

Who Speaks for the Climate? Making Sense of Media Reporting on Climate Change. By Maxwell T. Boykoff. 2011. ISBN: 978-0-521-11584. 228 pp. \$29.99 (softcover). Cambridge University Press. <http://bit.ly/15KCCQU>.

I was visiting with a conservative friend of mine the other day, a guy who might be described as a Rockefeller Republi-



can, a stickler on fiscal issues, but tolerant on social ones. He volunteered he believed in climate change because “the climate is always changing.” He also agreed that there was little doubt that humans were causing it, but he didn’t know if was worth reordering our entire system of energy use and distribution to deal with it.

For those of us attuned to the nuances of climate coverage, behind these innocent-sounding opinions are the signs of person who watches too much Fox News. It’s true in only the most limited sense that “the climate is always changing.” Over the last 10,000 years or so—since the establishment of agriculture around human settlements—the climate as measured by global average temperature has varied within a relatively narrow band. This measure has since escaped that narrow band in a dramatic northward spike—you’ve heard of the “hockey stick,” no doubt—that will continue to spike as long as humans pump CO₂ into the atmosphere.

There is a more subtle message here, too. Back in the paleolithic days of climate science, say the mid-1990s, the issue was called “global warming.” That’s because the globe, as the term implies, was getting warmer, mostly. But a lot of climate skeptics argued that “global warming” was an inaccurate term. Some places, they said, would get cooler, or wetter, or snowier, or whatever, so a more proper term for the issue would be “climate change.” Framing the issue as “global warming” had a lot going for it. It was simple, direct, easily intelligible. It also implied some sense of crisis. This latter was precisely what the skeptics—who don’t want to reorder

our entire system of energy use and distribution—didn’t like about it.

The term “climate change” eventually took over the debate. This was partly because the term is a slightly fairer description of the issue, but it was also another small triumph of the skeptics’ media machine. Now they seem to be abandoning “climate change” as well to try to convince us that the globe is cooling ... but let’s not go there.

In *Who Speaks for the Climate?*, Max Boykoff discusses many issues surrounding the coverage of climate change, including this question of framing the debate. If you call it “global warming,” the skeptics are probably going to label you an “alarmist.” And the media has often helped them along in this characterization. “When mass media report on this issue,” he writes, “excessive attention has been paid to the tails ... outlier viewpoints at the ends of the distribution, rather than those under the bell curve that converge on agreement, have received amplified attention in media representations in particular country contexts such as the US and UK.”

Boykoff tackles this issue and many others in a dense, research-packed book, suitable for the classroom. The media landscape covering climate change is itself changing rapidly. There is less emphasis today on the “false balance” of skeptics’ competing claims than there was even when Boykoff’s book was published. But the mass media’s representation of the threats and opportunities presented by global warming are important in the debate. As Boykoff says, few of us arise and take in the latest technical papers with the morning coffee—

not even, I'll wager, climate scientists or warming skeptics. We're all more likely to look at *Good Morning America* or the *New York Times*. What these outlets say and the way they say it matters.

NUCLEAR POWER

Fallout from Fukushima. By Richard Broinowski. 2012. ISBN: 978-1-922070-16-6. 273 pp. \$27.95 (softcover). Scribe. <http://scribepublications.com.au/books-authors/title/fallout-from-fukushima/>.

This book makes two predictions about the future of nuclear energy. Neither of them will have you rushing out to buy stock in the industry. The first one is that as a result of the Fukushima tsunami disaster, Japan will give up on nuclear power. The second is that as a consequence, Japan will become a world leader in renewable energy technologies.

The broad outlines of the Fukushima tragedy as known to virtually everyone. As a result of a force nine earthquake, a double tsunami with 10 billion tons of water, traveling at 10 kilometers a minute crashed ashore on the coastline of Fukushima, Miyagi, and Iwate prefectures in Japan. About 30,000 people were killed or missing. On top of that, the Fukushima nuclear plant failed, spreading radioactive contamination by land, air, and sea.

Broinowski combines his personal research experience at Fukushima with a survey of nuclear nations and nuclear accidents to examine the future of nuclear power. He concentrates especially on the decisions countries are now making about whether to continue down the path of reliance on nuclear power—like Australia or the United States—or to abandon it, like Germany has and, Broinowski predicts, Japan will.

Contesting the Future of Nuclear Power: A Critical Global Assessment of Atomic Energy. By Benjamin K. Sovacool. 2011. ISBN: 978-981-4322-75-1. 296 pp. \$70 (hardcover). World Scientific. <http://www.worldscientific.com/worldscibooks/10.1142/7895>.

In *Fallout from Fukushima* (above), Richard Broinowski explains why Japan will give up on nuclear power. In this book, Benjamin Sovacool explains why the rest of the world ought to as well. Sovacool lays out his conclusions on page one: "The economist John Maynard Keynes is reputed to have once said, 'If a thing is not worth doing, it is not worth doing well.' This book contends that nuclear power is one such thing not worth doing, well or otherwise. The basic premise behind the nuclear renaissance is wrong, whether one looks at it technically, economically, environmentally, or sociopolitically."

Sovacool spends the rest of the book destroying the myths that surround nuclear power—that it's safe, that it's cheap, that it's reliable. From a hazards perspective, the nuclear industry is pushing it as a carbon-free source of electricity to help combat global warming. But even this is a myth, he says, "When one takes into account the carbon-equivalent emissions associated with the entire nuclear lifecycle, nuclear plants contribute significantly to climate change and will contribute even more as stockpiles of high-grade uranium are depleted."

In his final chapter, Sovacool tries to answer the question: If it's so bad, how come it keeps popping up? "Three primary culprits exist," he writes. "The true costs of nuclear energy are not borne by those benefitting from it, resulting in what economists call 'market failure;' many of the costs and risks involved with nuclear electricity are passed directly on to

ratepayers; and nuclear power has, since its inception, been associated with complex notions of progress and modernity that make it seductive, despite all of its intractable challenges. Taken together, these three culprits ... largely explain why nuclear power plants flourish."

WEATHER

Warnings: The True Story of How Science Tamed the Weather. By Mike Smith. 2010. ISBN: 978-1-60832-034-9. 286 pp. \$24.95 (hardcover). Greenleaf Book Group Press. <http://www.mikesmithenterprises.com>.

Since we had a thousand-year precipitation event here in Boulder last month (see page 3), perhaps we can be forgiven a little for taking notice of flash flood incidents in books. *Warnings* starts off with one, a disaster that didn't occur in Vermont because local authorities were able warn a train in time that the tracks had been washed out ahead in a flash flood. Smith jumps from that anecdote about the science of weather forecasting to a detailed look at the way meteorology learned to issue effective, timely tornado warnings.

CLIMATE

Climate Change and Social Ecology: A New Perspective on the Climate Challenge. By Stephen M. Wheeler. 2012. ISBN: 978-0-415-80985-6. 192 pp. \$144. Routledge. <http://www.routledge.com/books/details/9780415809856/>.

One of complaints of the American counter-climate change lobby is that it will mean adopting an ascetic lifestyle, making sacrifices, giving up the good life. This fear is captured in bumper sticker language asserting environmentalists want us to "freeze in the dark." Consequently, most tomes on the climate adaptation issue soft-pedal the sacrifices that people might be asked to make in order to live in a less carbon-spewing world.

Not Stephen Wheeler, though. His *Climate Change and Social Ecology* is uncompromising on the western lifestyle and firm in the vision that we have to give it up to save the planet. He writes that several issues important to solving global warming are still off the table. "One basic cause of global warming is consumption, since every item we consume is in turn directly or indirectly responsible for substantial emissions. This fundamental problem is rarely discussed in climate change planning, in part because current capitalist economies are based on continual growth in material consumption."

Other high cost topics that seldom enter the policy debate are mobility, population growth, and inequality, he says.

Changes in lifestyle, in the way we approach the world—our social ecology—will be necessary to slay the climate dragon, Wheeler argues. In his chapter "Storyline 2: A Sustainable Society," he paints a picture of the distant future—the year 2500—that will thrill some people, but leave the freeze-in-the-dark crowd muttering to themselves about communist plots to destroy the American dream. He posits a visitor from outer space who finds cities "limited in extent and represent a small footprint on planet Earth." There are few lights at night, the population of the planet "is carefully limited to a billion or less." People walk or bike to their destinations. They have spacious outdoor decks on which they serve dinner. Access to outside space is important. Presumably this access occurs during the summer because Wheeler's survivors have abandoned the tropical regions and inhabit the more northerly or southerly latitudes. There are few cars.

This utopia seems—how to put this?—unlikely, short of Armageddon. Wheeler says that we don't have to get to an unfamiliar place, but one that was familiar to everyone perhaps in the 1930s and 1940s, when we lived on a smaller scale. There's no doubt that lifestyles will have to change to change the direction of the carbon use and temperature curves from upward-bending hockey sticks to the arc of an accurate free throw. But another way will have to be found besides small settlements eating delicious vegetarian meals surrounded by carefully tended and wilderness. Delightful as it sounds, it's that very thing that inspires the fevered dreams of the business-as-usual crowd.

And frankly I doubt there will be much enthusiasm for

the ideas even among many of who are willing and eager to attack the climate issue. One issue that must be addressed is the question of whether the future is a friend or an enemy. People won't make even small concessions for people who are alive now—Syrian gas attacks, Kenya mall slaughters, invasions of Iraq, development of nuclear weapons in Iran, and so on. Why would they sacrifice for people 500 years in the future whom they'll never meet and who are barely even related to them?

Contracts and Grants

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

End-to-end development of time-dependent geo-targeted alerts and warnings enabled by dense observations of the 2011 Tohoku tsunami. National Science Foundation grant #1331600. http://www.nsf.gov/awardsearch/showAward?AWD_ID=1331600. Two years. \$299,852 to principal investigator Jean-Paul Ampuero, California Institute of Technology, ampuero@gps.caltech.edu.

New tsunami/earthquake research in seismology and civil engineering will be combined with findings from empirical social science research on public responses to warnings to develop enhanced tsunami warning messages in order to improve appropriate protective action taking among members of the public. This project will focus on the 2011 Tohoku tsunami data to show how messages can be developed that increase the specificity of geo-location, time to impact, and hazard impact, and integrate into the tsunami warning system. In 2011, a dense array of seafloor pressure gauges off southern California recorded the Tohoku tsunami with unprecedented spatial and temporal resolution.

The tsunami data, together with numerical modeling, will be used to characterize the physical sources (e.g., standing waves in the source region and large-scale bathymetric structures between source and receivers) of multiple large-amplitude wave arrivals that make tsunamis a long-duration, time-dependent, location-dependent hazard. A primary product that will result from validation of the simulations with the pressure gauge data will be the ability to determine which waveform features are important for alert and warning message content. From the analyses, tsunami hazard prediction models will be refined in ways that have a bearing on public risk communication under times of imminent threat. Numerical simulation and data processing results from the dense pressure gauge array of 2011 tsunami data, as well as NOAA DART and coastal tide gauge data, will be used to increase warning message specificity by capitalizing on social science knowledge of public behavior to hazard warnings.

Predicting landslide runout and granular flow hazard: enhanced-g centrifuge experiments, contact dynamics model development and theoretical study. National Science Foundation grant #1331499. http://www.nsf.gov/awardsearch/showAward?AWD_ID=1331499. One year. \$299,748 to principal

investigator Colin Stark, Columbia University, cstark@ldeo.columbia.edu.

This project addresses the unpredictability of landslides and debris flows and boosts societal resilience and sustainability in the face of growing landslide hazard and risk across the world. Landslides and debris flows pose a particular challenge because their timing, location, size, and impact on infrastructure and people are notoriously hard to predict. Such unpredictability undermines society's ability to make accurate risk assessments, to frame safe design principles or to enforce sound engineering codes. This project is being tackled by an interdisciplinary team of computer scientists, engineers and geoscientists working together on laboratory experiments and numerical simulations. The research is framed around enhanced-g experiments conducted on a state-of-the-art geotechnical centrifuge.

These experiments will measure the forces driving and resisting landslide motion across a range of simulated scales, to guide development of numerical algorithms to simulate such motion, and to help in the framing of continuum models that can be applied simply to real world problems. The experimental results are to be disseminated as part of a new community initiative for establishing best practices for the sharing of laboratory data. Cutting-edge, open-source, 3-D contact dynamics code, tailored to handling eroding granular flows and their impact on the environment, provides a valuable new resource.

Dynamic integration of natural, human, and infrastructure systems for hurricane evacuation and sheltering. National Science Foundation grant #1331269. http://www.nsf.gov/awardsearch/showAward?AWD_ID=1331269. Four years. \$2,240,226 to principal investigators Rachel Davidson and Tricia Wachtendorf, University of Delaware, rdavidso@udel.edu.

This project will improve understanding of and decision support for hurricane evacuation and sheltering through a dynamic modeling approach. The hazard will be represented using a set of probabilistic scenarios that describe the range of ways a hurricane may evolve. For each hurricane scenario, storm surge, wind speed, and rainfall flooding maps will be developed for each time step. The research team will also model the dynamic decision making of emergency managers

and residents as the available information changes, and the dynamic movement of residents over the course of the event. Overlaying the results of these models will help to understand the interactions within and among the systems through space and time. The project has four main components. First, an integrated meteorological, hydrological, and storm surge modeling system that will be implemented to determine a set of probabilistic ensemble scenarios for an offshore hurricane. Second, theoretical models of resident and emergency manager temporal decision-making will be developed. Third, a multistage stochastic program will be developed that integrates the outputs from the first two steps to support emergency managers' hurricane evacuation and sheltering decisions so as to minimize personal risk and travel time. Fourth, the interconnected hazard, behavioral, and evacuation/shelter models will be demonstrated through case study applications in North Carolina.

This project will have broad significance because it will result in a major leap forward in understanding and improving management of evacuation and sheltering for hurricane events. Wind, storm surge, waves, rainfall, and runoff, all of which can substantially affect evacuations, will be considered simultaneously and comprehensively in this project. The project will also advance understanding of how officials and residents make decisions over time, and how the information on which their decisions change over time. It will explicitly represent the fact that emergency managers make initial decisions while a hurricane is still far offshore and large uncertainty remains, and then make subsequent decisions after a day or two has passed and more is known about the likely effects of the storm. Overall, the framework for this project will for the first time capture the three features of hurricane events that are perhaps most important for understanding evacuation and sheltering. These features are: (1) the events are dynamic over space and time; (2) involve great uncertainty; and (3) include many interactions within and among the natural, infrastructure, and human systems.

Simulation and design tools for tsunami bridge engineering. National Science Foundation grants #1344695 and #1344615. http://www.nsf.gov/awardsearch/showAward?AWD_ID=1344695. Three years, two grants. \$135,000 to principal investigator Michael Scott, Oregon State University, michael.scott@oregonstate.edu, and \$315,000 to principal investigator Michael Motley, University of Washington, mrmotley@uw.edu.

This project will develop tsunami loading and design recommendations for bridges that address issues that must be treated differently for bridges than for buildings. These issues include: (1) three-dimensional bridge geometries such as deck shape, skew and embankments, whose hydraulic characteristics can lead to channelization, bore entrapment, and shielding; (2) debris impact and debris damming that can greatly increase the forces on a bridge, both during the initial impact of the tsunami waves and during the outflows; and (3) fluid-structure interaction effects that can be significant for particular types of bridges and retrofit strategies, such as the deployment of fenders or in cases with flexible structures. Bridge-specific retrofit strategies will also be explored. Recent advances in the development of parallel processing software and the availability of powerful computational platforms make it possible to simulate these complex effects. Computational fluid dynamics (modeling will address the effects of

three-dimensional hydraulic geometries. The Material Point Method will address the effects of debris impact fields and damming by modeling debris explicitly. The Particle Finite Element Method will allow researchers to consider the fluid-structure interaction, the effects of the preceding earthquake shaking and the effect of uncertainties. As part of this planning grant, the simulation strategies will be developed sufficiently to guide the detailed design of critical experiments in a NEES2 facility early in FY2015.

Over the past decade, tsunamis have caused hundreds of thousands of deaths and hundreds of billions of dollars of damage. The loss of critical lifeline structures has exacerbated these catastrophes by delaying emergency response efforts and post-event economic recovery. Large tsunamis also threaten at least five U.S. states and numerous U.S. territories. Nearly all past tsunami research has focused on run-up modeling, the development of evacuation strategies, and more recently, on the design of buildings to resist tsunamis. In comparison, little research has addressed the tsunami performance of bridges, and no guidelines are available to design safe and economical tsunami-resistant bridges or to develop retrofit strategies. To these ends, the proposed research will transform the design of tsunami-resistant bridges, and consequently, greatly improve post-event response and recovery effort.

Geologic evidence of tsunamis originating from the Japan Trench's southern segment. National Science Foundation grant #1357722. http://www.nsf.gov/awardsearch/showAward?AWD_ID=1357722. Six months. \$19,239 to principal investigator Benjamin Horton, Rutgers University New Brunswick, bhorton@marine.rutgers.edu.

In the wake of the 2011 Tohoku tsunami, studies modeling rupture scenarios for the Japan Trench have identified areas of uncertainty, particularly along the southern segment. The accuracy of these seismic models and the understanding of fault movement along the southern Japan Trench can be greatly improved by locating and mapping prehistoric tsunami deposits. Records of tsunamis developed from the sedimentary deposits they leave behind, improve our understanding by expanding the age range of events available for study. This project will locate geologic evidence of past tsunamis originating from the southern segment of the Japan Trench, which to date remains undocumented. The study will investigate the beach ridges and coastal ponds of Chiba region of Japan using the state-of-the-art litho-, bio-, and chronostratigraphical techniques. The research is highly exploratory in nature since, as of yet, geologic evidence of paleo-tsunamis in this region has not been found.

The importance of understanding the timing and magnitude of tsunamis originating from the Japan Trench was highlighted by the unexpected Mw 9.0 Tohoku event in 2011. Despite generating the largest instrumental record of an earthquake, very little is known about the Japan Trench, particularly its southern segment near Tokyo. The establishment of a recurrence interval for tsunami generating earthquakes improve assessments of natural hazards to the Greater Tokyo Area, the largest metropolitan area in the world.

Geological hazards, climate change, and human/ecosystems resilience in the Islands of the Four Mountains, Alaska. National Science Foundation grants #1301929, #1301927, and #1301925. http://www.nsf.gov/awardsearch/showAward?AWD_

ID=1301929. Three years. Three grants. \$35,258 to principal investigator Breanyn MacInnes, Central Washington University, macinnes@geology.cwu.edu; \$425,196 to principal investigator Dixie West, dlwest@ksu.edu, University of Kansas Center for Research; and \$85,655 to principal investigator Kirsten Nicolaysen, nicolakp@whitman.edu, Whitman College.

Assessing the degree to which geological hazards in the Aleutian archipelago disrupted prehistoric human and ecological systems has important lessons for current inhabitants of the northern Pacific Rim. The Islands of Four Mountains region embodies environmental instabilities that, in the last 10,000 years, include changing subarctic climate, volcanic eruptions, earthquakes, tsunamis, and sea level fluctuations. Compared to adjacent regions to the east and west, strong ocean currents and smaller island size magnify ecologically driven resource extremes, perhaps creating a physical bottleneck and the cultural boundary that persisted into the early 20th century. These islands provide an excellent opportunity to assess the development of prehistoric human adaptations to geological hazards and environmental change.

The same volcanic activity, precipitous coastlines, high winds, and strong riptides that may have posed profound risks to prehistoric individuals hinder modern research expeditions. The Four Mountain prehistoric sites are little studied but are significant in light of new geologic data indicating volcanic activity during human migration and societal development in the Aleutian archipelago. Extensive new radiocarbon, geological, paleoenvironmental, and cultural data expected from these sites will yield novel insights into the record of geological hazards, human coping mechanisms, changing subsistence, and adaptations during the prehistoric and European contact periods.

The Islands of the Four Mountains are located in an ecologically and economically important region of the world—the north Pacific and Bering Sea. People on two continents rely on fish from its marine ecosystem, and, given the sensitivity of airplanes to volcanic ash and of coastal cities to tsunamis, its geologic hazards potentially affect all nations of the northern Pacific Rim. Comprehensive research on long-term human-environmental interactions in the Bering Sea region, set against a backdrop of accelerated global change, is vital to understanding the dynamics of Aleutian biological and human systems and effectively addressing the social, political, and economic issues that arise from changes in those system dynamics today. The island group lies in a zone of high catastrophic potential in that one of its volcanoes, Mt. Cleveland, has erupted explosively more than 20 times in the last decade (as recently as May 2013) and during the time of prehistoric human habitation. The Aleutian plate boundary is the site of four earthquakes having a magnitude greater than 8 and dozens with magnitudes greater than 7, and these have generated tsunamis historically and prehistorically.

Quantitative uncertainty modeling for performance based earthquake engineering. National Science Foundation grant #1355032. http://www.nsf.gov/awardsearch/showAward?AWD_ID=1355032. Three years. \$307,532 to principal investigator Shiling Pei Shiling, Pei@sdstate.edu, Colorado School of Mines.

The ultimate goal of earthquake engineering is to mitigate the adverse effects of earthquakes on the society. This requires accurate prediction of structural responses to earthquakes. Because of numerous factors, such as earthquake in-

tensity, material properties, and construction quality that are unknown, there is uncertainty in the responses of structures. In earthquake engineering, this uncertainty must be quantified and considered in design of buildings to ensure safety. Currently, uncertainties are accounted for using empirical equations in the design of buildings. This project will develop a systematic method to accurately calculate the level of uncertainty in building responses during future earthquakes. Once the model is implemented, it will increase the accuracy of earthquake response prediction, ultimately enabling engineers to build safer buildings.

Currently, consideration of uncertainty in Performance Based Earthquake Engineering is simplified, empirical, and without experimental verification. The goal of this study is to develop a quantitative framework for uncertainty propagation in PBEE and verify it experimentally using a new approach termed herein as probabilistic shake table tests. Initially, an uncertainty propagation model will be developed based on principles of probability theory and structural dynamics. Then a specially designed shake table testing procedure, which will isolate the uncertainty contributions from different sources, will be conducted to collect the necessary data to calibrate and verify this model. Finally, the calibrated model will be applied to improve uncertainty modeling in performance based earthquake design and shake table test planning.

Three case studies of natural disasters. National Science Foundation grant #1331284. http://www.nsf.gov/awardsearch/showAward?AWD_ID=1331284. One year. \$16,331 to Gregory Cushman, gcushman@ku.edu, University of Kansas Center for Research.

This grant supports archival research to investigate a series of natural disasters that occurred in the Netherlands: the deadliest floods in European history (the Christmas Flood); rinderpest epidemics that destabilized agriculture; and the arrival of invasive mollusks that jeopardized the entire Dutch coastal defense system. Historical studies thus far consist of case studies highlighting the local and immediate economic effects of individual events. These studies posit no relational connections to these events and offer limited evaluations of their role in the development of Dutch hydro-engineering and medicine. As a result, the impact of these events remains underappreciated. This study will show that these disasters had profound economic, cultural, and environmental implications.

These events constituted a unique disaster period in Dutch history with significant implications for Dutch society, culture, and environment. It conceives of these seemingly singular disasters as a synergistically connected and ultimately affecting Dutch adaptation resulting in a massive redesign of Dutch water defense and new methods of combating disease. This study is grounded in the methods of historical disaster studies, climate change research, and European historical geography; the researcher has training in environmental history and experience teaching global environmental studies. The final product will argue that these disasters prompted a reordering of the Dutch physical environment, the cultural rationale for understanding risk and calamity, and the place of science and technology in Dutch society.

The unsteady Earth: Predicting nature's uncertainties in post-3/11 Japan. National Science Foundation grant #1323484. http://www.nsf.gov/awardsearch/showAward?AWD_ID=1323484. 18 months. \$8,230 to principal investigator Hugh Raffles, raf-

flesh@newschool.edu, New School University.

This research will investigate earthquake knowledge in one of the most seismically active areas of the world. But even in a place where tremors are an everyday occurrence, a recent massive quake came as a stark reminder of the tremendous capabilities of earthquakes to surprise, to undo previous assumptions, and to destroy and remake worlds. The failure of seismologists to predict this large quake has added fuel to long-standing international debates over the possibilities and limits of seismological knowledge.

Using ethnographic and historical research methods, this study explores the uncertainty surrounding earthquakes, which has made seismology into a field that is remarkably, if at times begrudgingly, open to unconventional explanations, methods, and types of evidence. This project also considers how people understand earthquakes not only through science, but also through folklore, history, spirituality, public education, popular culture, and observations of strange weather and animal behavior. Centrally, the project inquires into how the physical instability of the earth might compel and reconfigure practices of observing, sensing, and knowing nature itself.

Short and long-term sediment dynamics following wildfire in chaparral environments. National Science Foundation grants #1359734, #1359730, and #1359705. http://www.nsf.gov/awardsearch/showAward?AWD_ID=1359730. One year. Three grants. \$16,764 to principal investigator Joan Florsheim, florsheim@eri.ucsb.edu, University of California-Santa Barbara; \$2,000 to principal investigator Anne Chin, anne.chin@ucdenver.edu, University of Colorado Denver; and \$2,499 to principal investigator Linda O'Hirok, linda.ohirok@csuci.edu, California State University Channel Islands.

This project focuses on production and delivery of dry ravel, a characteristic and immediate post-fire response on steep slopes in the western United States. Dry ravel arises from a dry-season transport process whereby gravel sediment moving down slopes by gravity becomes trapped by vegetation. This material provides a significant sediment source into river channels after wildfire in chaparral environments. The investigators will quantify the volume of dry ravel sediment deposited along channel margins as a result of the Springs Fire that burned Big Sycamore Canyon in Southern California during May 2013. Terrestrial laser scanning before and after the rainy season (which typically begins around October 1) will capture initial changes in landscape topography. These data will be augmented by field surveys. Data collected during the first post-fire year are important for developing models of the dynamics of dry ravel. The investigators have geomorphic data spanning over 25 years for Big Sycamore Canyon and two comparable basins nearby with different fire histories--a tributary to north fork Matilija Creek that burned completely during the July 1985 Wheeler Fire and a tributary to Malibu Creek that has remained unburned. Comparing dry ravel processes at these three sites will enable a direct comparison of both short- and long-term sediment dynamics following wildfire in chaparral environments.

Developing a predictive understanding of both short- and long-term effects of wildfire is critical, especially in an era of changing climate that has increased frequencies and magnitudes of wildfires. Yet, accurately predicting post-fire effects remains elusive, and physically-based models of post-fire runoff and erosion are still being developed.

DOE support for the Climate Variability and Predictability (CLIVAR) project office activities, 2009-2014. National Science Foundation grant #1357212. http://www.nsf.gov/awardsearch/showAward?AWD_ID=1357212. Two years. \$100,000 to principal investigator Karyn Sawyer, karyn@ucar.edu, University Corporation for Atmospheric Research.

The International and U.S. CLIVAR (CLimate VARIability and predictability) project offices (USCLIVAR PO) provide critical infrastructure support leading to the coordinated planning and implementation of U.S. and international research activities that address CLIVAR goals which are to:

- Describe and understand the physical processes responsible for climate variability and predictability on seasonal, inter-annual, decadal, and centennial time-scales, through the collection and analysis of observations and the development and application of models of the coupled climate system, in cooperation with other relevant climate-research and observing programs;
- Extend the record of climate variability over the time-scales of interest through the assembly of quality-controlled paleoclimatic and instrumental data sets;
- Extend the range and accuracy of seasonal to inter-annual climate prediction through the development of global coupled predictive models;
- Understand and predict the response of the climate system to increases of radiatively active gases and aerosols and to compare these predictions to the observed climate record in order to detect the anthropogenic modification of the natural climate signal.

This award supports the USCLIVAR PO staffing, travel by U.S. scientists to participate in CLIVAR meetings, funds for open science workshops, and costs associated with outreach and communications necessary to communicate CLIVAR findings and opportunities.



Conferences and Training

November 3-8, 2013

Annual Mexican Geophysical Union Meeting
Geophysical Union of Mexico

Puerto Vallarta, Mexico

Cost: \$158

This annual meeting will address issues such as climate change, geohydrology, environmental geology, and natural hazards. Topics include tectonics in Mexico, applied mineralogy, coastal oceanography, a climatic history of the Mexican basin, and deep-water hydrocarbon exploration in Brazil. Web site and registration are in Spanish.

<http://ugm.org.mx/raugm/>

November 5-6, 2013

Humanitarian and Military Better Practices Exchange
GreenHumanitarian

Washington, D.C.

Cost: Free

This conference will discuss ways to reduce the environmental impacts of military and large-scale humanitarian operations, with a focus on identifying effective methods and policies. Topics include collaborating on survivor assistance, military engagement in environmental issues, creating action plans to address environmental impacts, reducing nonrenewable resource consumption, communities and the environment, and applying policy across military and humanitarian groups.

<http://greenhumanitarians.com/2013/09/11/78/>

November 6-8, 2013

Cultures of Disasters

Copenhagen Center for Disaster Research

Oslo, Norway

Cost: Free

This conference will focus on disaster experience with a focus on historical perspectives and cultural understanding. Topics include disaster ethnology, the rhetoric of weather extremes, cultural heritage and mitigation, apocalyptic disaster stories, disaster memory, and visual representations of disaster.

<http://www.uio.no/forskning/tverfak/kultrans/aktuelt/konferanser/cultures-of-disasters/program/>

November 7-8, 2013

Disaster Governance: The Urban Transition in Asia
Asia Research Institute

Singapore

Cost: Free

This conference will discuss ways in which urban populations in Asia deal with disaster using social decision-making that involves government, civil society, and business. Topics include impediments to preparedness, cultural contributions disaster readiness, priorities that shape disaster governance, the role of communities in disaster prevention, and collaborations between cities.

http://www.ari.nus.edu.sg/events_categorydetails.asp?categoryid=6&eventid=1421

November 11-13, 2013

2013 SPAR Europe and European LiDAR Mapping Forum

SPAR Point Group
Amsterdam, Netherlands

Cost: \$670

This conference will focus on measurement gathering, data analysis and delivery of 3D images and mapping. Topics include technology for oil and gas "mega projects," LiDAR data acquisition, offshore and coastal measurements, new technologies, LiDAR tools for forestry, laser scanning in railway monitoring, and digital documentation of heritage sites.

<http://www.sparpointgroup.com/Europe/>

November 14-16, 2013

2013 Backyards and Beyond
National Fire Protection Association

Salt Lake City, Utah

Cost: \$495

This conference will examine fire hazards in the wildland-urban interface and lessons learned from the Firewise Program. Topics include community safety strategies, home construction and landscape design, wildfire planning and suppression, fire behavior, and wildfire technology and policy.

<http://www.nfpa.org/training/backyards-and-beyond>

November 14-16, 2013

New Jersey Statewide Conference on EMS
New Jersey Office of Emergency Medical Services
Atlantic City, New Jersey

Cost: \$275

This conference will focus on emergency preparedness in the health and safety field with an emphasis on knowledge and practices that increase the effectiveness of patient care. Topics include recognizing fatal response mistakes in mass casualties, hazardous material terrorism, responder safety during unrest, bombing injuries, using social media during disasters, and situational awareness. A symposium on emergency medical response during superstorm Sandy will be held before the conference on November 12-13.

<http://www.njemsconference.com/2013conferencehome.html>

November 19-21, 2013

2013 AHIMTA Conference
All Hazards Incident Management Teams Association
North Charleston, South Carolina

Cost: \$325

This conference will explore best practices in incident management, including lessons learned from recent disasters. Topics include interagency disaster

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>

response coordination, the Boston Marathon bombing, National Guard resources, emergency mobilization systems, incident response during Hurricane Sandy, writing incident management objectives, and the Moore, Oklahoma tornado.

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

December 3-5, 2013
Eighth International Conference on Urban Regeneration and Sustainability
Wessex Institute of Technology
Putrajaya, Malaysia

Cost: \$980

This conference will address the many aspects of urban environments that work toward creating a truly sustainable city. Topics include risk assessment and planning, transportation infrastructure, environmental management, cultural heritage, quality of life, urban planning, and waste management.

<http://www.wessex.ac.uk/13-conferences/sustainable-city-2013.html>

January 7-10, 2014
International Disaster Conference
International Disaster Conference and Expo
New Orleans, Louisiana

Cost: \$300

This conference will discuss emergency management policy and successful mitigation practices. Perspectives from homeland security, emergency response, disaster recovery, business continuity, and global security will be presented. Topics include disaster preparation, mitigation, recovery, data security, restoration and remediation, and business continuity.

<http://internationaldisasterconference.com/>

February 2-6, 2014
94th Annual Meeting
American Meteorological Society
Atlanta, Georgia

Cost: \$575

This meeting will explore extreme weather, climate and the built environment with a focus on public awareness, technological advances, and societal implications. Topics include strategies for better communication, adaptation and mitigation, emergency

response, public perceptions and behavior, and advances in modeling and observations.

<http://annual.ametsoc.org/2014/index.cfm/programs-and-events/theme/>

March 19-20, 2014
2014 Aerial Fire Fighting Conference and Exhibition
California Department of Forestry and Fire Protection
Sacramento, California

Cost: \$1,400

This conference will examine the impact of budget restraints on agriculture, forestry, and fire department processes and infrastructure. Topics include recent large-scale wildfires; pilots, aircraft, delivery technologies; navigation, fire suppression, rescue equipment; and emergency response methods.

<http://tangentialink.com/event/aerial-firefighting-sacramento-2014/>

April 30-May 3, 2014
50th Anniversary Workshop
University of Delaware Disaster Research Center
Newark, Delaware

Cost: \$100

This workshop will focus on the ways in which urbanization, the economy, aging infrastructure, and growing populations are creating new challenges in disaster research and management. Topics include climate change, technological failures, new research directives and methodology, integrating findings with policy needs, and basic disaster science research.

<http://sites.udel.edu/drc50thanniversary/>



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.