THE CIP REPORT

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NATURAL DISASTERS

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In this month's issue of *The CIP Report*, we examine the protection of critical infrastructure before, during, and after natural disasters.

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First, we include a tribute to Dr. B. John Noftsinger, a Principal Investigator at James Madison University's Critical Infrastructure Protection Program (CIPP). Then, the U.S. Department of Homeland Security's (DHS) National Protection and Programs Directorate (NPPD) describes their approach to large-scale emergencies. A Specialist in Energy at the Congressional Research Service explains the hazards and risks of earthquakes in the United States. A research pilot at NASA's Dryden Flight Research Center then details an unmanned aircraft system used for imaging wildfires. Next, the Managing Director for Global Emergency Group expresses the need to improve infrastructure support for international disaster response. The State Emergency Operations Center (SEOC) Air Operations Coordinator for the Florida Fish and Wildlife Conservation Commission discusses air operations in response to a disaster. The Executive Vice President of the Outdoor Advertising Association of America then expounds upon the benefits of digital billboards. The rebuilding of critical infrastructure after a disaster is examined by the Senior Vice President of Fluor Corporation. Researchers at Decision Research explain the results of a study conducted to survey the psychological responses to the attack on Flight 253, the Haiti Earthquake, and the Japanese Disaster. Finally, the Head of Section at the International Cooperation and Development, United Nations University, Institute for Sustainability and Peace analyzes the limits and challenges of law and regulatory approaches to natural disasters.

This month's *Legal Insights* examines the issue of fraud following a disaster.

We would also like to remind everyone that the month of December is Critical Infrastructure Protection Month. For more information about Critical Infrastructure Protection Month, please click here.

We would like to take this opportunity to thank the contributors of this month's issue. We truly appreciate your valuable insight.

We hope you enjoy this issue of *The CIP Report* and find it useful and informative. Thank you for your support and feedback.

Mick Kicklighter
Director, CIP/HS
George Mason University, School of Law

In Memory of Dr. John B. Noftsinger, Jr.
November 30, 1962 – November 10, 2011

Dr. John Noftsinger, Principal Investigator at James Madison University (JMU) of the Critical Infrastructure Protection Program (CIPP), passed away suddenly on November 10, 2011. He served as Vice Provost for Research and Public Service and Professor of Integrated Science and Technology and Strategic Leadership. In addition to his role as Vice Provost, Dr. Noftsinger served as Executive Director of the Institute for Infrastructure and Information Assurance (IAA), where he was instrumental in establishing the JMU-GMU partnership in the area of critical infrastructure protection. His work in the security arena includes: co-authorship of a text, *Homeland Security: Policy, Perspectives, and Paradoxes* published by Palgrave Macmillan; service as a Senior Fellow at George Washington University's Homeland Security Policy Institute; and membership with the Steering Committee for the Critical Incident Analysis Group at the University of Virginia. Dr. Noftsinger's scholarship included numerous book chapters and papers on a variety of topics relating to higher education, strategic alliances, technology and security policy, and participation in post-graduate programs at Harvard University and the University of Oxford. His work was instrumental in establishing the Intelligence Analysis degree program at JMU and in creating innovative partnerships to help secure the Nation. Dr. Noftsinger is survived by his wife, Cindy, and their three sons, Joshua, Zachary, and Jacob.

Critical Infrastructure Disaster Planning and Response: Resilience through Collaboration

by the U.S. Department of Homeland Security,
National Protection and Programs Directorate

The Federal response to natural disasters, cyber intrusions, and other large-scale emergencies has evolved and expanded over the past 10 years to reflect the broad range of threats and hazards that impact the country. Along with State, local, territorial, and tribal partners, the Federal government works with the private sector to actively prepare for and respond to the full spectrum of natural disasters and other threats.

When disaster strikes, effective incident management and coordinated Federal, State, local, and tribal response is essential to ensuring the resilience of the Nation's critical infrastructure. The Department of Homeland Security's (DHS) National Protection and Programs Directorate (NPPD) works to facilitate information sharing and disaster response between the public and private sector critical infrastructure owners and operators. Key components of NPPD's incident management activities include the National Infrastructure Coordinating Center (NICC), the Homeland Infrastructure Threat and Risk Analysis Center (HITRAC), the National Cybersecurity and Communications Integration Center (NCCIC), and the Protective Security Advisor (PSA) program.

Large areas of Metropolitan Memphis and Shelby County were inundated by record flooding in May 2011. *Source: DHS/FEMA (photo by Ed Edahl)*

Coordination of Operations

On a daily basis, NPPD works closely with its critical infrastructure partners on protection and resilience initiatives, and communicates with partners through their respective Sector-Specific Agencies.[1]

As an essential reporting component of the interagency National Operations Center, the NICC maintains constant situational awareness of the Nation's 18 critical infrastructure sectors. The NICC monitors and assesses the operational status of critical infrastructure facilities and assets 24/7, to reduce risk, prevent damage, and enable rapid recovery from both natural disasters and other threats.

HITRAC is responsible for risk analysis and consolidates threat, vulnerability, and consequence analysis to provide risk-informed products on threats to the Nation's critical infrastructure to senior government officials. To be prepared for an incident, HITRAC coordinates with the intelligence community while collaborating with the National Infrastructure Simulation and Analysis Center[2] as well as public and private sector partners to identify vulnerabilities and determine appropriate mitigation measures.

(Continued on Page 4)

1. Sector-Specific Agencies are Federal agencies assigned to oversee public-private collaboration and other critical infrastructure protection activities within the 18 critical infrastructure sectors. For more information, see www.dhs.gov/nipp.
2. The National Infrastructure Simulation and Analysis Center conducts modeling, simulation, and analysis of critical infrastructure to assess risk, vulnerability, interdependencies, and event consequences. The Office of Infrastructure Protection oversees NISAC operations.

Planning and Response *(Cont. from 3)*

Cybersecurity and Critical Infrastructure

Critical infrastructure is increasingly dependent upon networked systems. Loss or disruption of critical networks for a long period of time can inhibit response and recovery efforts after a disaster. NPPD's Office of Cyber Security and Communications is responsible for enhancing the security, resilience, and reliability of the Nation's cyber and communications infrastructure by working with the public and private sectors as well as international partners to prepare for, prevent, and respond to catastrophic incidents that could degrade or overwhelm these strategic assets.

NPPD's National Cybersecurity and Communications Integration Center (NCCIC) is a 24/7, coordinated watch and warning center, responsible for producing a common operating picture for cyber and communications across Federal, State, local, territorial, and tribal governments as well as the intelligence community, law enforcement, and the private sector. Two primary cyber incident response teams are based at NCCIC:

- The U.S. Computer Emergency Readiness Team (US-CERT), which is responsible for protecting .gov networks and providing cyber expertise to the private sector to allow them to quickly respond to incidents.

- The Industrial Control Systems (ICS) Cyber Emergency Response Team (ICS-CERT), which focuses on ICS running such vital infrastructure as the Nation's power plants and transportation systems.

National Infrastructure Coordinating Center (NICC). *Source: DHS*

These DHS assets can respond to cyber incidents by analyzing relevant data, malicious software, and network traffic; advising on remediation actions; and coordinating response with public and private partners.

The NCCIC. *Source: DHS*

Coordination with FEMA

The Federal Emergency Management Agency (FEMA) has the lead in coordinating and providing Federal disaster response and recovery to State, local, territorial, and tribal governments. During incidents, FEMA activates the National Response Coordination Center (NRCC), which supports State, local, territorial, and tribal emergency response and recovery operations through the National Response Framework's Emergency Support Functions. The National Response Framework's guiding principles establish a comprehensive, all-hazards approach to domestic incident response that enables partners to prepare for and provide a unified National response to disasters.[3]

After the NRCC is activated, the

(Continued on Page 5)

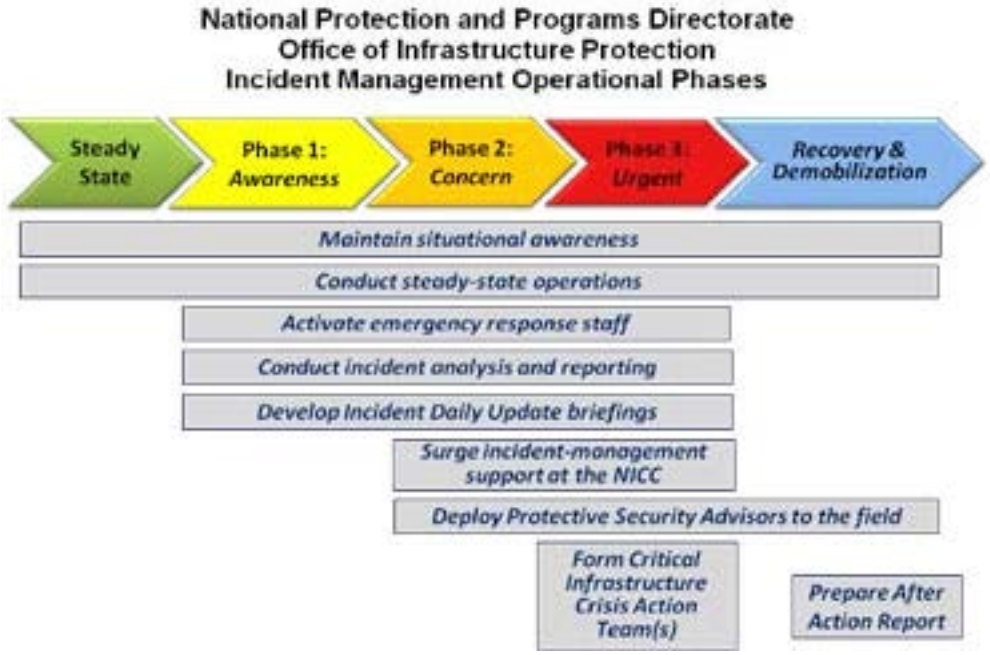
[3] Learn more about the National Response Framework at www.fema.gov/emergency/nrf/.

Planning and Response *(Cont. from 4)*

Infrastructure Liaison and FEMA Coordinator work with FEMA senior leadership and affected partners to provide critical infrastructure-related information, predict cascading effects, and otherwise support the response. For example, DHS can use interdependency and risk information provided by owners and operators through the Protected Critical Infrastructure Information (PCII) program to determine what effect a power station or transportation hub disabled by the storm may have upon other infrastructure in the region.[4]

If an incident warrants a presidentially-declared disaster declaration, which enables FEMA to provide Federal financial assistance, a Joint Field Office (JFO) is established within or near the affected area to help coordinate the multifaceted response and recovery. Through the Infrastructure Liaison and PSAs, NPPD integrates its operations with FEMA from mitigation through recovery.

Figure 1: During a disaster, DHS expands NICC steady-state 24/7 monitoring operations to provide support at both headquarters and in the field for Phase 2 and Phase 3 operations.



Three Phases of Incident Response

NPPD operations for protecting critical infrastructure can be broken into Steady State, Incident Response, and Recovery and Demobilization (see Figure 1). There are three phases of incident response: Awareness, Concern, and Urgent. During an incident, NPPD surges to provide decision-makers with actionable and timely information in addition to various operational resources. In support of Federal, State, local, territorial, and tribal incident management activities, NPPD generates threat assessments, conducts strategic and national level analyses of incidents, and responds to data and geospatial product requests.

During the awareness phase, DHS increases communication with partners to gather and share information and assess the emerging threat. During the Concern phase, analytical assessments focus more on identified infrastructure of concern, and personnel are put on standby to deploy to Emergency Operations Centers if needed. During the Urgent phase, additional staff are deployed as needed, and analysis is done in real-time on impacts until the focus of the incident shifts to recovery and demobilization (see Figure 1).

In each phase, NPPD personnel maintain two-way communication with sector partners through conference calls and video teleconferences to share real-time incident information, provide alerts and warnings, and discuss the incident's impact on the sectors. When an incident escalates beyond normal monitoring, NPPD surges subject-matter experts to form the Critical Infrastructure Crisis Action Team (CI CAT) that monitor the incident to support situational awareness and releases reports for critical infrastructure partners through the Homeland Security Information Network–Critical Sectors secure portal (HSIN-CS).

(Continued on Page 6)

[4] PCII is a DHS program that enhances information sharing between the private sector and the government by ensuring that proprietary or sensitive critical infrastructure-related information is protected from disclosure. Learn more at www.dhs.gov/pcii.

Planning and Response *(Cont. from 5)*

Protective Security Advisors (PSAs) are the Department's field-deployed critical infrastructure security specialists that help identify and reduce risk to critical assets. They also support incident response and work with public and private sector partners to increase the security and resilience of critical infrastructure by providing training, facility assessments, intelligence, sector-specific information, and other resources. These all-hazards activities support the private sector's ability to protect against, respond to, and rapidly recover from any incident.

Since PSAs are strategically located across the country, they can deploy quickly in response to disasters and other emergencies. During an incident and its response and recovery period, PSAs from other areas will be "surged" to the affected area. They may be assigned to State and local Emergency Operations Centers and may serve as the Infrastructure Liaison at the FEMA Joint Field Office. As the Infrastructure Liaison, the PSA provides expert knowledge of the impacted infrastructure — including interdependencies, cascading effects, and damage assessments — and makes recommendations on how to prioritize infrastructure restoration and coordinate re-entry and recovery efforts.

During recovery and demobilization, DHS prepares an After Action Report on the DHS response to the incident to inform future management activities. PSAs may continue to work in the field with affected partners as needed.

Case Study: Hurricane Irene

DHS response to Hurricane Irene began long before landfall and continued well past the actual storm. Preparations began with Phase 1 (Awareness) activation as the storm approached the coast, whereby NPPD worked to maintain situational awareness, create storm track models, and conduct impact assessments and collect data. DHS leveraged dependency and interdependency information from Phase 1 assessments, including the needs of critical infrastructure owners and operators and the storm's potentially cascading effects. This allowed PSAs to generate a quick reference guide to identify Infrastructures of Concern and prepare to track the course of an incident and its effects.

As Irene made its way across the Atlantic, the NICC continuously monitored the storm's track to determine when and where it would make landfall. On August 26, the day prior to landfall, NPPD surged to its full incident response posture with the CI CAT to ensure that senior leadership and critical infrastructure owners and operators had timely and actionable information to support their contingency planning and business continuity needs. Consequently,

Hurricane Irene. *Source: NOAA*

DHS was able to rapidly respond to numerous Requests for Information and Requests for Action from its public and private sector partners, providing vital information for readiness and response.

After making landfall in the Carolinas on the morning of August 27, the storm continued up the East Coast. Phase 3 (Urgent) was activated, and NPPD surged PSAs from around the country to support operations in impacted areas across the Eastern Seaboard. PSAs supported the response and rapid restoration and reconstitution of critical infrastructure assets and systems impacted by the hurricane, including Energy, Water, Transportation Systems, and Healthcare and Public Health. They worked closely with owners and operators, State and local first responders, State emergency management agencies, and FEMA and other Federal partners to collect information on the operating status of critical infrastructure in affected

(Continued on Page 30)

Earthquakes in the United States: Hazard, Risk, Monitoring, Detection, and Warning

By Peter Folger, Specialist in Energy and Natural Resources Policy, Resources, Science, and Industry Division, Congressional Research Service

Earthquake Hazards and Risk

Portions of all 50 states and the District of Columbia are vulnerable to earthquake hazards, although risks vary greatly across the country and within individual states. Seismic hazards are greatest in the western United States, particularly in California, Washington, Oregon, Alaska, and Hawaii. Alaska is the most earthquake-prone State, experiencing on average a magnitude 7 earthquake almost every year and a magnitude 8 earthquake every 14 years. Given its low population and infrastructure density, Alaska has a relatively low risk for large economic losses from an earthquake. In contrast, California has more citizens and infrastructure at risk than any other State because of the State's frequent seismic activity combined with its large population.

According to the U.S. Geological Survey (USGS), 75 million people in 39 states are subject to "significant risk" from earthquakes.[1] The first step in assessing risk to people, property, and infrastructure is estimating the seismic hazard to a region, as shown in Figure 1. Figure 1 shows where earthquakes are likely to occur in the United States and how severe the earthquake magnitude and resulting ground shaking are likely to be. As a second step, shaking hazards maps are often combined with other data, such as the strength of existing buildings, to estimate possible damage in an area due to an earthquake. A third step in estimating potential losses would be in assigning value to the infrastructure at risk from earthquake damage. The combination of seismic risk, population, and vulnerable infrastructure can help improve the understanding of risks that urban areas across the United States face from earthquake hazards that may not be immediately obvious from the probability maps of shaking hazards alone, and the potential economic costs at stake.

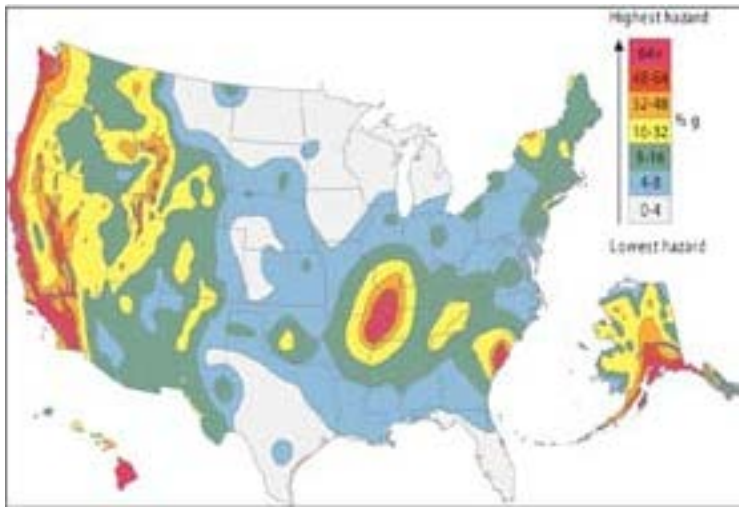


Figure 1: Earthquake Hazard in the United States. Note: The bar in the upper right shows the potential ground motion — expressed as a percentage of the acceleration due to gravity (g) — with up to a 1 in 50 chance of being exceeded over a 50-year period. *Source: USGS Fact Sheet 2008-3018 (April 2008), at http://pubs.usgs.gov/fs/2008/3018/pdf/FS08-3018_508.pdf.*

The 1994 Northridge, CA earthquake was the Nation's most damaging earthquake in the past 100 years (estimated $44 billion total losses), preceded five years earlier by the second-most costly earthquake — Loma Prieta, CA ($10 billion total losses).[2] Comparing losses between different earthquakes, and between earthquakes and other disasters such as hurricanes, can be difficult because of the different ways losses are calculated. Calculations might include a combination of insured losses, uninsured losses, and estimates of lost economic activity.

(Continued on Page 8)

1. Department of the Interior, U.S. Geological Survey, *Earthquake Hazards — A National Threat*, Fact Sheet 2006-3016, (March 2006), http://pubs.usgs.gov/fs/2006/3016/2006-3016.pdf.

2. Insurance Information Institute, http://www.iii.org/media/facts/statsbyissue/earthquakes/.

Earthquakes *(Cont. from 7)*

Estimating Earthquake Losses

The United States faces potentially large total losses due to earthquake-caused damage to buildings and infrastructure as well as lost economic activity. As urban development continues in earthquake-prone regions in the United States, concerns are increasing about the exposure of the built environment, including utilities and transportation systems, to potential earthquake damage.[3]

One approach to estimating potential losses is to "normalize" the damage estimates from past earthquakes by adjusting for inflation, increases in wealth, and changes in population. For example, adjusting the 1906 San Francisco earthquake and subsequent fire using 2005 dollars would result in losses between $39 billion and $328 billion, depending on assumptions and earthquake mitigation measures, if that earthquake happened today.[4]

Some studies and techniques combine seismic risk with the value of the building inventory[5] and income losses (e.g., business interruption, wage, and rental income losses) in cities, counties, or regions across the country to provide estimations of economic losses from earthquakes. An April 2008 report from FEMA calculated that the average annualized loss from earthquakes nationwide is $5.3 billion, with California,

(Continued on Page 9)

Rank	Metro area	AEL	Rank	Metro area	AEL
1	Los Angeles-Long Beach-Santa Ana, CA	$1,312	23	Reno-Sparks, NV	$29
2	San Francisco-Oakland-Fremont, CA	$781	24	Charleston-North Charleston, SC	$22
3	Riverside-San Bernardino-Ontario, CA	$397	25	Columbia, SC	$22
4	San Jose-Sunnyvale-Santa Clara, CA	$277	26	Stockton, CA	$21
5	Seattle-Tacoma, WA	$244	27	Atlanta-Sandy Springs-Marietta, GA	$19
6	San Diego-Carlsbad-San Marcos, CA	$155	28	Bremerton-Silverdale, WA	$18
7	Portland-Vancouver-Carlsbad, OR	$137	29	Ogden-Clearfield, UT	$18
8	Oxnard-Thousand Oaks-Ventura, CA	$111	30	Salem, OR	$17
9	Santa Rosa-Petaluma, CA	$69	31	Eugene-Springfield, OR	$17
10	St. Louis, MO-IL	$59	32	Napa, CA	$16
11	Salt Lake City, UT	$52	33	San Luis Obispo-Paso Robles, CA	$16
12	Sacramento-Arden-Arcade-Roseville, CA	$52	34	Nashville-Davidson-Murfreesboro, TN	$15
13	Vallejo-Fairfield, CA	$40	35	Albuquerque, NM	$15
14	Memphis, TN	$38	36	Olympia, WA	$14
15	Santa Cruz-Watsonville, CA	$36	37	Modesto, CA	$13
16	Anchorage, AK	$35	38	Fresno, CA	$13
17	Santa Barbara-Santa Maria-Goleta, CA	$34	39	Evansville, IN-KY	$12
18	Las Vegas-Paradise, NV	$33	40	Birmingham-Hoover, AL	$11
19	Honolulu, HI	$32	41	El Centro, CA	$11
20	Bakersfield, CA	$30	42	Little Rock-North Little Rock, AR	$11
21	New York-Northern New Jersey-Long Island, NY	$30	43	Provo-Orem, UT	$10
22	Salinas, CA	$29			

Table 1: U.S. Metropolitan Areas with Estimated Annualized Earthquake Losses of More Than $10 million. *Source: FEMA Publication 366, HAZUS MH Estimated Annualized Earthquake Losses for the United States (April 2008). Annualized earthquake losses (AEL) calculated in 2005 dollars.*

3. U.S. Department of Homeland Security, *HAZUS-MH Estimated Annualized Earthquake Losses for the United States*, FEMA Publication 366, (April 2008), http://www.fema.gov/library/viewRecord.do?id=3265. Hereafter referred to as FEMA 366.

4. Kevin Vranes and Roger Pielke, Jr., "Normalized Earthquake Damage and Fatalities in the United States: 1900-2005," *Natural Hazards Review*, 10(3), (August 2009), 84-101.

5. Building inventory refers to four main inventory groups: (1) general building stock, (2) essential and high potential loss facilities, (3) transportation systems, and (4) utility systems (FEMA 366).

Earthquakes *(Cont. from 8)*

Oregon, and Washington accounting for nearly $4.1 billion (77 percent) of the U.S. total estimated average annualized loss.[6] Table 1 shows metropolitan areas with estimated average annualized U.S. earthquake losses over $10 million.

Annualized earthquake loss (AEL) addresses two components of seismic risk: the probability of ground motion and the consequences of ground motion. It enables comparison between different regions with different seismic hazards and different building construction types and quality. For example, earthquake hazard is higher in the Los Angeles area than in Memphis, but the general building stock in Los Angeles is more resistant to the effects of earthquakes. The AEL annualizes the expected losses by averaging them over time.

A single large earthquake can cause far more damage than the average annual estimate. Annualized estimates, however, help provide comparisons of infrequent, high-impact events like damaging earthquakes with more frequently occurring hazards like floods, hurricanes, or other types of severe weather. The annualized earthquake loss values shown in Table 1 (see Page 8) represent future estimates, and are calculated by multiplying losses from potential future ground motions by their respective frequencies of occurrence, and then summing these values.[7]

Earthquake Monitoring

Congress authorized the USGS to monitor seismic activity in the United States in the 1990 law that modified the National Earthquake Hazard Reduction Program (NEHRP). The USGS operates a nationwide network of seismographic stations called the Advanced National Seismic System (ANSS). Globally, the USGS and the Incorporated Research Institutions for Seismology (IRIS) operate 140 seismic stations of the Global Seismic Network (GSN) in more than 80 countries.[8] The GSN provides worldwide coverage of earthquakes, including reporting and research.[9]

Monitoring the United States with the Advanced National Seismic System

According to the USGS, "the mission of ANSS is to provide accurate and timely data and information products for seismic events, including their effects on buildings and structures, employing modern monitoring methods and technologies."[10] If fully implemented, ANSS would encompass more than 7,000 earthquake sensor systems covering portions of the Nation that are most vulnerable to earthquake hazards.

In the original conception for ANSS, approximately 6,000 of the planned stations would have been installed in 26 high-risk urban areas to monitor strong ground shaking and how buildings and other structures respond. Under ANSS, the USGS installs strong-motion seismometers to record seismic data from damaging earthquakes in the United States on the ground, in buildings, and other structures in densely urbanized areas.

Monitoring the Planet with the Global Seismic Network

The GSN is a system of broadband digital seismographs arrayed around the globe and designed to collect high-quality data that are readily accessible to users worldwide, typically via computer. Currently, 140 stations have been installed in 80 countries and the system is nearly complete. However, in some regions the spacing and location of stations has not fully met the original goal of uniform spacing of approximately 2,000 kilometers. The system is currently providing data to the United States and other countries and institutions for earthquake reporting and research, as well as for monitoring nuclear explosions to assess compliance with the Comprehensive Test Ban Treaty.

(Continued on Page 10)

6. FEMA 366, p. 37.
7. FEMA 366, p. 10.
8. IRIS is a university research consortium, primarily funded by the National Science Foundation, that collects and distributes seismographic data.
9. The GSN also monitors nuclear explosions.
10. USGS Earthquake Hazards Program, http://earthquake.usgs.gov/research/monitoring/anss/.

Earthquakes *(Cont. from 9)*

Earthquake Detection and Warning

Unlike other natural hazards, such as hurricanes, where predicting the location and timing of landfall is becoming increasingly accurate, the scientific understanding of earthquakes does not yet allow for precise earthquake prediction. Instead, notification and warning typically involves communicating the location and magnitude of an earthquake as soon as possible after the event to emergency responders and others who need the information.

When a destructive earthquake occurs in the United States or in other countries, the first reports of its location, or epicenter,[11] and magnitude originate either from the National Earthquake Information Center (NEIC), or from one of the regional seismic networks that are part of ANSS. Other organizations, such as universities, consortia, and individual seismologists may also contribute information about the earthquake after the event. With data gathered from the networks described above and from other sources, the NEIC determines the location and size of all destructive earthquakes that occur worldwide and disseminates the information to the appropriate national or international agencies, government public information channels, news media, scientists and scientific groups, and the general public.

Traditionally, the information commonly available following a destructive earthquake has been epicenter and magnitude, as in the data provided by the NEIC described above. Those two parameters by themselves, however, do not always indicate the intensity of shaking and extent of damage following a major earthquake. Recently, the USGS developed a product called ShakeMap that provides a nearly real-time map of ground motion and shaking intensity following an earthquake in areas of the United States where the ShakeMap system is in place. Figure 2 shows an example of a ShakeMap.

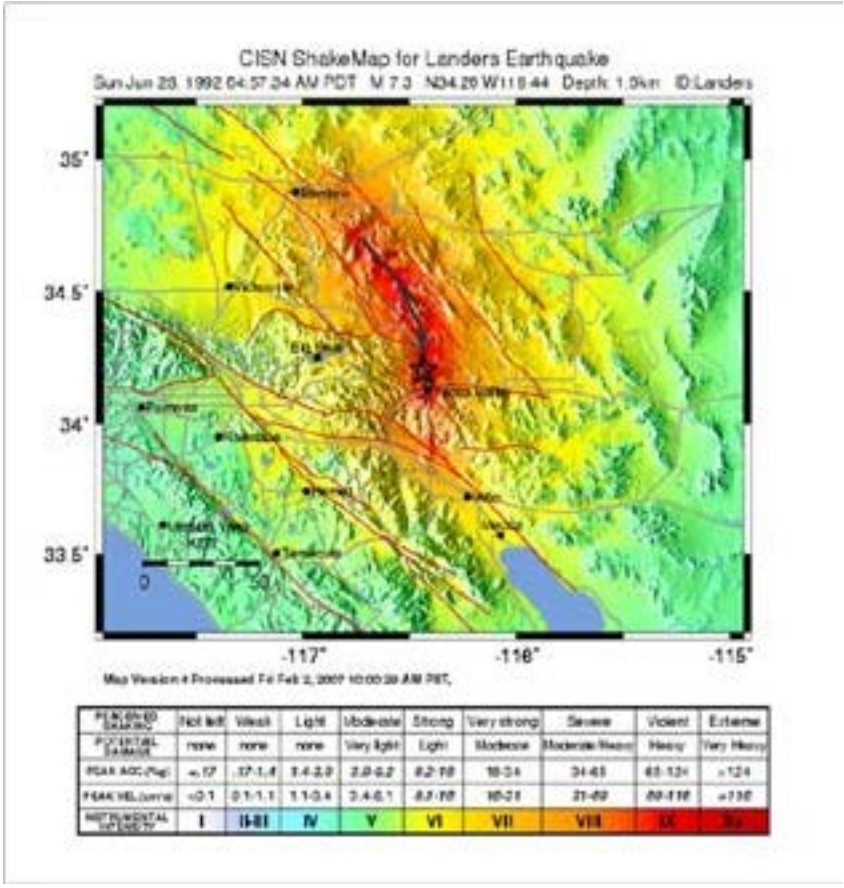


Figure 2: Example of a ShakeMap. Note: 1992 Landers earthquake, June 28, 1992, magnitude 7.3. *Source: USGS, http://earthquake.usgs.gov/earthquakes/shakemap/sc/shake/Landers/.*

The Role of NEHRP

At present, earthquakes can be neither accurately predicted nor prevented. The U.S. National Earthquake Hazard Reduction Program (NEHRP) emphasizes hazard reduction through hazard assessment, monitoring, detecting, and warning rather than earthquake prediction. The program's focus has been on understanding the earthquake hazard and its risk to populations and infrastructure in the United States; developing effective measures to reduce

(Continued on Page 36)

[11] The epicenter of an earthquake is the point on the earth's surface directly above the hypocenter. The hypocenter is the location beneath the earth's surface where the fault rupture begins.

NASA's Ikhana Unmanned Aircraft System Used for Imaging Wildfires

by Hernan D. Posada, Research Pilot, NASA's Dryden Flight Research Center

The name "Ikhana" comes from the Choctaw word meaning intelligent, conscious, or aware. Using Ikhana and its predecessor Altair, NASA and the U.S. Forest Service successfully demonstrated technologies that improved real-time wildfire imaging and mapping capabilities during research flights by the unmanned research aircraft.

Ikhana's first wildfire flights took place between mid-August and late September 2007 and originated from NASA's Dryden Flight Research Center at Edwards Air Force Base, California. The flights demonstrated various platform, sensor, and data-dissemination technologies related to improving real-time wildfire observations. Each flight built upon results of the previous ones to expand the aircraft and sensor system's capabilities in endurance and range, number of observations made, and flexibility in mission and sensing reconfiguration.

Carried in a pod mounted under Ikhana's wing was the Autonomous Modular Sensor developed by scientists at NASA's Ames Research Center in Moffett Field, California. The sophisticated sensor operates like a digital camera with specialized filters to detect light energy at visible, infrared, and thermal wavelengths continuously for up to 20 hours. The data were down linked in near-real-time to NASA Ames, where the information was overlaid on Google Earth maps and relayed over the Internet to the National Interagency Fire Center in Boise, Idaho, and then to fire incident commanders in the field to aid in allocation of firefighting resources.

Carrying its infrared imaging sensor pod under its left wing, NASA's remotely piloted Predator B unmanned aircraft, the Ikhana, banks away during a checkout flight prior to a wildfire imaging mission. *Photo courtesoy of NASA Photo / Jim Ross.*

The data were used to position firefighting resources, assess effectiveness of containment operations, and remove critical personnel and equipment from hazardous fire conditions. The real-time, thermal-infrared data were geo- and terrain-rectified for ease of use and were essential for operations in areas where blinding smoke obscured normal incident observations.

During the 2007 mission, ground-based pilots flew the aircraft between 23,000 and 25,000 feet altitude. Ikhana was airborne for a total of 56 hours over eight Western states and covered more than 8,900 nautical miles. Twenty wildfires in six states were imaged. Several of these fires were revisited on long-duration flights to provide time-induced fire progression data. Post-fire imagery captured aided teams working a Burned Area Emergency Response that included area stabilization and ecosystem rehabilitation.

The aircraft continued imaging wildfires within the State of California during the 2008 and 2009 fire seasons at the request of California's Department of Forestry and Fire Protection, the California Governor's Office of Emergency Services, and the National Interagency Fire Center.

The Western States Fire Mission also gathered data with satellite

(Continued on Page 36)

The Need to Speed Up Infrastructure Support for International Disaster Response

by Langdon B. Greenhalgh,
Managing Director, Global Emergency Group

Disasters can have a massive impact on infrastructure, destroying roads, buildings, homes, hospitals, water and sanitation systems, and almost anything else imaginable. The best functioning systems are rapidly wiped out or disabled when massive flooding, tsunamis, or earthquakes strike, usually leaving previously vulnerable people even more at risk than before. Equally as debilitating as natural disasters can be the negative impact that conflicts, such as those in Somalia or the Democratic Republic of Congo, can have where years and decades of neglect have left in place a dysfunctional system of basic infrastructure. Indeed, a nation's ability to respond and rapidly re-build permanent infrastructure following a disaster is very much related to its level of preparedness, surge response capacity, and economic strength. Weaker nations sometimes never fully recover from natural disasters (anyone who has visited Port au Prince, Haiti recently can attest to this) and even the strongest nations take a great deal of time to recover (anyone who has visited Hurricane Katrina affected areas of New Orleans can attest to this).

Infrastructure replacement, temporary or permanent, are a significant issue for emergency response entities seeking to provide services in the wake of a major emergency. Airports and ports are needed to ship emergency relief items in from other national, regional, or international locations. Roads are needed to move the supplies in-country to those in need. Water and sewage systems damaged or destroyed need to be replaced so that people can live and the spread of disease can be prevented. Not to mention the fact that housing and health care facilities damaged by a disaster must be rapidly substituted to prevent any further loss of life and protect human dignity. These are the basics, but other key infrastructure we have all grown to rely upon throughout the world, such as easy access to money and cell phone service, must also be replaced.

However, while there exist established humanitarian community mechanisms for the emergency replacement of temporary critical infrastructure following a devastating disaster, the mechanisms for the creation of permanent replacement infrastructure following a disaster are woefully inadequate. National and international response teams, equipment, and systems exist to rapidly set-up (within the 1st days, weeks, and months after a disaster) temporary hospitals, health centers, shelters, warehousing, water and sanitation facilities, and feeding sites. The United Nations (UN) system, Red Cross and Red Crescent Movement, and many humanitarian non-governmental organizations (NGOs) have developed response mechanisms and tools to temporarily replace key infrastructure needed to deliver services that save lives and reduce suffering following an international crisis situation. While the humanitarian community is still lagging behind in its ability to deliver basic functional support in more urban settings, many lessons learned and some advances in temporary infrastructure replacement have been established following the 2004 Asian Tsunami,

(Continued on Page 31)

Air Operations in Response to a Disaster

by Captain Kevin Vislocky, State Emergency Operations Center (SEOC) Air Operations Coordinator, Florida Fish and Wildlife Conservation Commission, Public Safety Section

Disasters created by both man and by nature often necessitate a response utilizing helicopters and airplanes. The National Incident Management System (NIMS) provides for the establishment of an Air Operations Branch. The Operations Chief of the Incident/ Unified Command has the authority to establish an Air Operations Branch as warranted by the nature of the event and the availability of air assets.

Lessons learned during events such as Hurricane Katrina and the DeepWaterHorizon oil spill response support the concept of a unified coordination system which takes into account varied local, State, Federal, and private aviation operations. A unified coordination system enhances response efforts by providing a safer operating environment through flight coordination, reduced redundancy, and money saved by utilizing the most suitable aircraft for the specific mission.

An Air Operations Branch is valuable when the complexity of air operations requires additional support and effort or when the event requires mixing tactical and logistical use of helicopters and airplanes. The enhanced efficiency and effectiveness of air operations adds to incident response capability. Improved flight safety also results from the coordination of all flight operations in highly congested airspace within an event area.

Typically, the Air Operations Branch will fall under Operations in a response Incident Command System (ICS) structure. An Air Operations Coordinator or "Air Boss" would be established with the specific responsibilities of overseeing flight operations, airspace procedures, airspace management, aircraft scheduling, communications plans, tracking/ documentation, and operational mission coordination. The Air Operations Coordinator is responsible for all facets of air asset management and serves to ensure the safe, efficient, and effective use of aviation resources.

The Air Operations Branch must be flexible in design and the operation tailored to suit the type, size, scope, and complexity of the event. Event dependant, support positions can be added to assist the Air Operations Coordinator with responsibilities delegated to an Air Support Coordinator, an Air Operations Sourcing/Mission Coordinator, and an Air Support Facilities/Services Coordinator position. These positions support and augment the Air Operations Coordinator responsibilities. Staffing of these positions can often be accomplished through tapping into the expertise of local partners such as personnel from the U.S. Department of Transportation, the Civil Air Patrol (CAP), or the National Guard.

The Air Support Coordinator is responsible for the coordination of aviation operations which includes airport operations, infrastructure, aviation fuels and availability, and coordinates with other planners and organizations to establish and operate bases for aviation assets.

The Air Operations Sourcing/ Mission Coordinator assists the Air Operations Coordinator and is responsible for sourcing mission requests that are beyond the capabilities of staged air assets. This position closely coordinates with the Air Support Coordinator for both aviation facility and aviation services support to accomplish all planned missions.

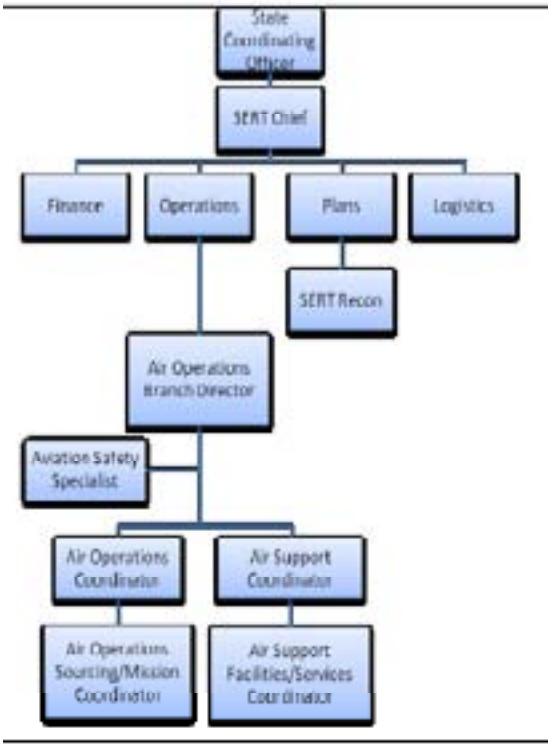
The Air Support Facilities/Services

(Continued on Page 14)

Air Operations *(Cont. from 13)*

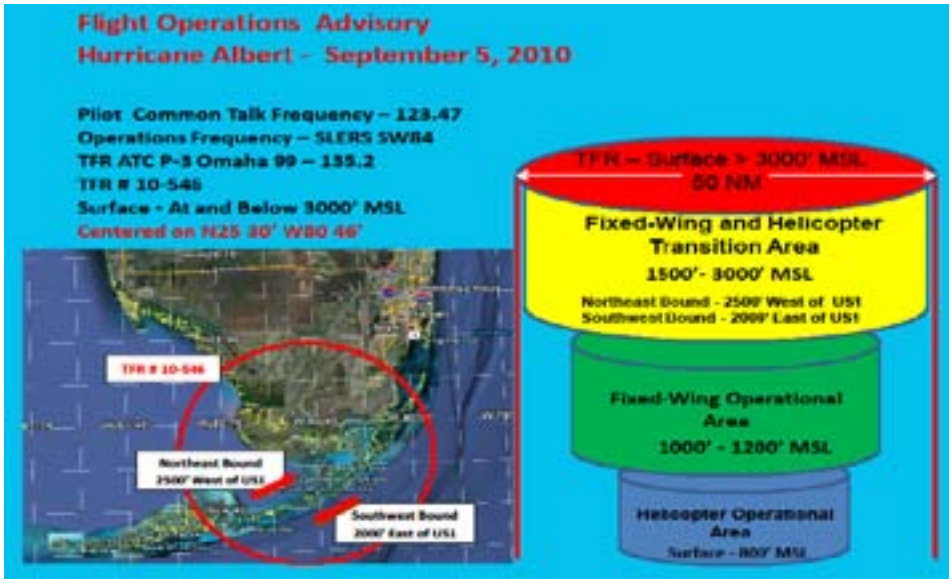
Coordinator assists the Air Support Coordinator and is responsible for sourcing Air Operations support needs beyond what is available through local or known facilities and suppliers.

The Air Operations Branch is responsible for integrating into event specific or disaster specific plans or guides, such as the controlling agencies Comprehensive Emergency Management Plan. Preplanning is critical to the successful implementation and execution of an Air Operations Branch. Prior to an event, the Air Operations Coordinator should have established a list of contacts, developed directories, and conducted coordination with Federal, State, and local agencies plus private-sector, volunteer, and NGOs with aircraft and/or aviation related assets and/or responsibilities.



Air Operations Organizational Structure – Typical

Pilot/Crew find a pictorial description of air operations procedures and restrictions useful for "quick glance" situational awareness.



The Air Operations Coordinator should identify all potentially available aviation assets and facilities within the State or area of responsibility. The Air Operations Coordinator should develop a directory of personnel available to support air operations disaster response planning and implementation efforts.

Clear, concise, and timely communication between the Air Operations Coordinator and the pilots and crew of responding aircraft is critical to safely completing missions assigned to the Air Operations Branch. The establishment of communications and operational plans should include the following guidelines:

- Keep the communications plan as simple and concise as possible. All communications should be in "clear text." This includes radio transmissions, briefings, and all command functions. Acronyms and abbreviations should be avoided. Current ICS Form 205 "Incident Communications Plan" and ICS Form 220 "Air Operations Summary" should be utilized and included in the communications plan.

- Keep aircraft cockpit management in mind at all times. It is imperative that all pilots and aviation support personnel be briefed on a daily basis using a consistent briefing format. The pilot briefing or advisory must include current and timely information from the Air Operations Coordinator pertaining to air operation procedures for the event. The briefing will include operating parameters, communication frequencies and procedures, any Temporary Flight Restrictions (TFR), fuel availability, and safety issues, etc. The briefing

(Continued on Page 15)

Air Operations *(Cont. from 14)*

provided to the pilot/crew should be a single point of contact supplying "one stop shopping" for all the information necessary to complete their assigned missions. This eliminates conflicting information or the need for additional efforts to secure information.

• Utilize communications resources that already exist and are operational. Identify additional frequency resource support that can be utilized. All aircraft should have common compatible communications capabilities. Frequency assignments that are used should consider the mix of agency aircraft, which is critical when using both military and civilian assets. When military and civilian assets are in concurrent use, available resources to interface military aviation resources into civilian communications systems should be utilized. Typically all aircraft will have access to VHF frequencies to communicate with Air Traffic Control (ATC).

• Ensure the Incident Commander receives accurate and timely updates on mission status and operational issues of concern. Due to the variety of backgrounds of all users requiring information updates, the inclusion of aircraft types with pictorials and plain language descriptions aids in a clear understanding of what aircraft assets are being utilized and for what purpose.

• FAA Air Traffic Control radar coverage and flight following are often not available, especially for aircraft operating at lower altitudes. Whenever possible, provide for a single point aircraft flight following/tracking system. Individual Global Position System (GPS) position encoding satellite based transponders should be utilized in each aircraft. The ability to monitor aircraft position and status is extremely valuable for the Air Operations Branch in monitoring mission status and maintaining situational awareness. Aircraft tracking systems are available from several sources (Lipsey Logistics, Skywatch, SpiderTracks, Fleeteyes, etc.).

• Although the Air Operations Coordinator provides direction and coordination of aircraft, the command and control of aviation resources must remain the exclusive authority of the respective individual agencies or organizations providing the aircraft. Individual agency or organization Standard Operating Procedures (SOPs) and policies for the operation of the aircraft and use of the pilots/crew must be adhered. In addition, all applicable Federal Aviation Regulations (FARs) must be adhered.

Air support is often a necessity during disasters both large and small.

• Safety of operations is the paramount consideration in all operations. Each agency or organization participating in the operation will adhere to its own safety standards as well as the FARs. Consideration should be given to defining specific geographical areas of operations for individual agencies for specific types of missions to ensure adequate safety due to varied airspace operating requirements and differing aircraft performance factors. Each agency or organization should follow its own aviation mishap and investigation procedures. However, all aircraft mishaps, near midair collisions, and/or violations of Temporary Flight Restrictions (TFRs) should be reported to the Air Operations Branch.

The enhanced efficiency and effectiveness of air operations provided by an Air Operations Branch adds to the organizations disaster response capability. An Air Operations Branch with a unified coordination system and a documented plan of action prepared prior to the event facilitates a successful response.

Several sources for examples of pre-event Air Operations Branch planning are available. Suggested sources include the FEMA Aviation

(Continued on Page 32)

FEMA Communicates with the Public via Digital Billboards

by Ken Klein, Executive Vice President, Outdoor Advertising Association of America

Days after the Japanese earthquake, a U.S. House subcommittee summoned top Federal disaster officials to Capitol Hill to find out if America was ready for a similar mega-thrust. Could our nuclear plants hold up? Could America cope with two disasters at once? Generally, the subcommittee liked what it heard from lead-off witness Craig Fugate, Administrator of FEMA. Government can't do it all, said Fugate. The private sector is integral to disaster preparation, response, and recovery.

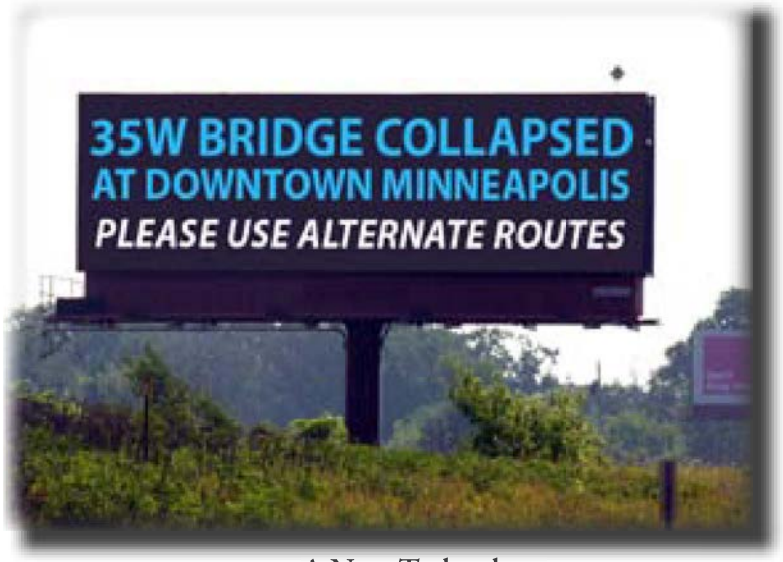
This theme — that government should view the private sector as a partner in dealing with disasters — prompted a question from a new member of Congress who came from the private sector. Freshman Congressman Richard Hanna, a builder from upstate New York, wanted to know if new high-tech (electronic) digital billboards could be used to deliver emergency messages.

Yes, said Fugate, who saw this concept work in Florida, where he was the State's emergency management leader before President Obama brought him to FEMA. Fugate gave this history lesson:

Emergency officials use high-tech billboards to communicate targeted messages on weather warnings, evacuations, shelter locations, and road detours. This public-private partnership was first activated in August of 2008 due to widespread flooding caused by Tropical Storm Fay. During a 10-day activation, 37 different emergency messages displayed on 75 digital billboards in 11 counties impacted by the storm.

Since 2008, the emergency alert notification system has been activated four times in Florida, relaying information on flash flood watches and warnings during severe tropical storms. This concept — quick display of emergency information on donated digital billboards — is also used elsewhere. For example, 10 digital billboards in Milwaukee, WI, displayed registration information for FEMA Individual Assistance after severe flooding in the fall of 2010 (FLOOD DAMAGE, Register Today, 1-800-621-FEMA).

Minneapolis Bridge Billboard in the Environment.



A New Technology

Nationwide, there are up to 400,000 billboards. Some 2,400 of them have been converted to digital displays, built with color LED lighting. Static images rotate every six or eight seconds, depending on State and local rules. Instead of swapping out paper or vinyl, operators of digital billboards change the message by computer.

When the eight-lane Interstate-35W Bridge collapsed during rush hour in Minneapolis (August 1, 2007), digital billboards displayed an alert in less than 15 minutes, at no cost to government. Within hours, the billboard message was updated, urging motorists to take alternate

(Continued on Page 17)

Digital Billboards *(Cont. from 16)*

routes. The next day, the Secretary of Transportation (Mary Peters) and both U.S. senators from Minnesota took note of the digital billboards, as in *this place seems organized*.

For emergency managers, the practical appeal of digital billboards is their speed, targeted reach, and flexibility.

A Standard Tool for Government

The digital billboard is evolving into a standard tool on behalf of safety and welfare. As Hurricane Irene roared toward landfall in late August, digital billboards in Wilmington, NC, showcased their ability to deliver specific, parochial information: the shelter on Market Street (a middle school) is "pet friendly." After the storm, FEMA displayed its help-line toll-free number in disaster areas, just as it did after spring tornadoes in the Southeast.

When Albuquerque faced a natural gas shortage in February, the city's public safety information officer wondered: *how quickly could an emergency message be displayed on digital billboards*? It took less than 45 minutes for the city to approve the message, recalls Mark Gilboard at Clear Channel Outdoor in Albuquerque.

Hurricane Alert.

FEMA in North Carolina 2011.

The next day, the city "told us to revert to regular messaging. The public's response to the crisis was incredible. Household natural gas usage was greatly reduced," Gilboard said.

Law Enforcement

In 1996, broadcasters in Texas launched an alert network as a memorial to nine-year-old Amber Hagerman, who was kidnapped and murdered. The AMBER Alert system is now managed by the National Center for Missing & Exploited Children (NCMEC), an arm of the U.S. Department of Justice. By 2008, the national center recognized the ability of digital billboards to communicate with motorists, and signed a Memorandum of Understanding with the outdoor advertising industry.

Since June 2008, more than 600 AMBER Alerts have been transmitted to digital billboards, using software that targets by Zip Code. "The hours immediately following an abduction are critical to law enforcement efforts. The speed and flexibility of digital billboards make the outdoor advertising medium a vital component of the AMBER Alert network," says Robert Hoever of NCMEC. The Federal Bureau of Investigation (FBI) has captured more than 40 fugitives as a result of tips generated by digital billboards.

The Old as New

Marketers consider outdoor advertising the oldest mass medium, pre-dating print, broadcast, and certainly the internet. Ironically, the old is the new for those responsible for public safety. Some emergency managers, after their initial experience with this new tool, are scratching their heads pondering this question: what if you send an emergency message to a digital billboard but the power is

(Continued on Page 32)

Post-Disaster Rebuilding of Critical Infrastructure

by Bob Prieto, Fluor

The post-disaster environment changes both engineering and construction requirements as well as the framework within which it is undertaken. These changes drive post-disaster program and project managers to address different considerations than those encountered on a more traditional global scale program while simultaneously dealing with the added constraints imposed by an evolving logistical situation. This article looks at how the engineering and construction model changes post-disaster and how various logistics affecting activities are modified from those employed on global scale infrastructure construction programs undertaken in a non-disaster environment.

Simplified Critical Infrastructure Engineering and Construction Project Model

In order to understand how the engineering and construction project model changes post-disaster, it is first necessary to construct a simplified model for the non-disaster scenario. Such a simplified model is reflected in Figure 1 and includes a set of project inputs which are transformed at a project site, within a well defined framework, to deliver the desired project outputs. Framework elements include business, project environment and setting, social and stakeholder frameworks, and economic and political frameworks.

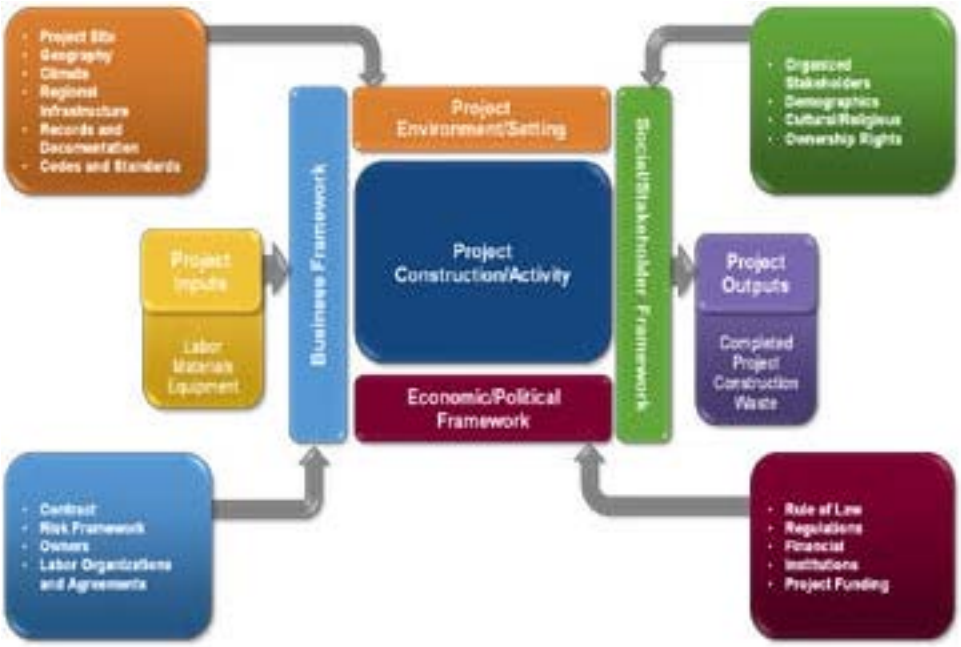


Figure 1.

In the non-disaster scenario project, inputs simplistically include labor, materials, and equipment. Outputs from the engineering and construction process include not only the completed project but also a significant amount of construction waste (25 percent of construction inputs). Composition of the various framework elements is shown in Figure 1.

Site based factors further constrain how project inputs are transformed into the desired project outputs within this constraining and defining framework. The transformation process is also enabled through a set of required site services, the esprit de corps built among the project team, and the know how the contractor and his management and technical experts bring to bare.

How the Critical Infrastructure Engineering and Construction Model Changes Post-Disaster

Disasters change each element of this model and activities normally undertaken are modified by post-disaster logistics constraints as well as modify post-disaster logistics themselves. Let us look now at each element of the simplified model described above and how it is modified post-disaster starting with project

(Continued on Page 19)

Post-Disaster *(Cont. from 18)*

inputs themselves (see Figure 2).

Each of the basic inputs from our simplified model (labor, materials, and equipment) is modified post-disaster and several new input considerations become significant. These modified and new input factors are shown in Figure 2.

Disaster Changes Business Framework

Disaster changes the business framework, introducing new factors into basic construction contract considerations, significantly altering risk frameworks that the program or project team may experience; creating new de facto owner groups different than those the engineering and construction team and broader community may be used to engaging with; and creating new challenges with various labor organizations.

Specific modifications to the "simplified" model may include the various items shown in Figure 3.

Figure 3.

Disaster Changes Project and Environmental Setting Framework

Disasters, in particular broader scale disasters, fundamentally alter the project and environmental setting. Site access will be constrained in new and potentially evolving ways, basic site and regional geography may be fundamentally modified, and the regional infrastructure, at whatever level, that projects rely on to meet many of their basic needs may now be non-existent. Basic assumptions under the "simplified" pre-disaster model are no longer valid. Changes to the various components of this framework element are reflected in Figure 4 (see Page 20).

Disaster Changes Social and Stakeholder Framework

Social and stakeholder frameworks undergo some of the most significant changes post-disaster, often in ways that are not readily visible. These changes impact each of the components that comprise this framework element. Traditional problem resolution mechanisms may breakdown and new sources of concern or conflict emerge. Displaced populations, transient relief and reconstruction populations, and a re-emergence or strengthening of cultural or tribal

(Continued on Page 20)

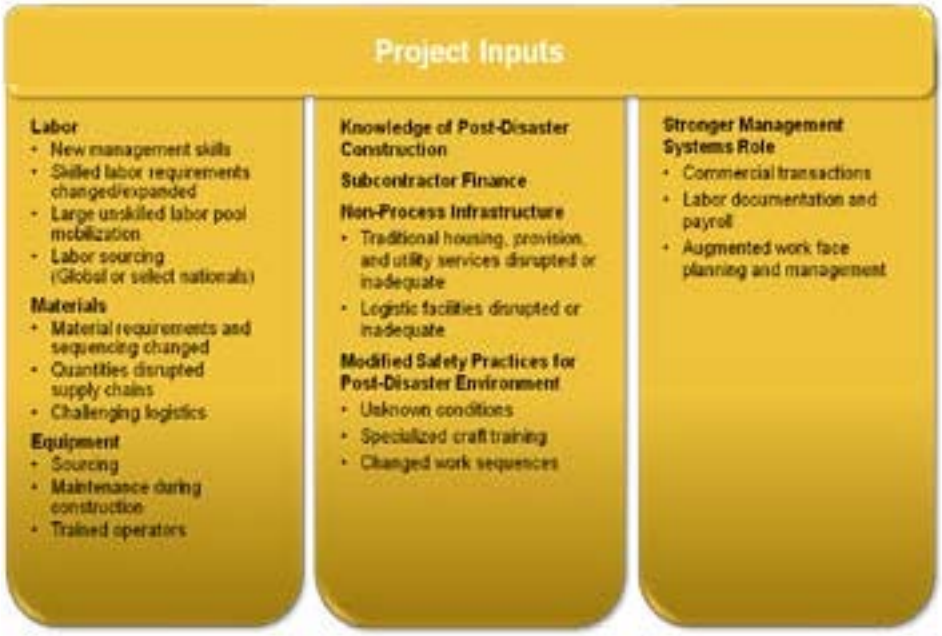


Figure 2.

Post-Disaster *(Cont. from 19)*

issues compound the difficulty in undertaking the engineering and construction activities needed to respond and reconstruct post-disaster. Often the debilitating and corrosive impacts of corruption are more sharply felt. Changes to specific framework components are shown in Figure 5.

Disaster Changes Economic and Political Framework

The destructive impact of a disaster on economic activity that existed pre-disaster is easy to understand. Harder to come to grips with is the trajectory of economic activity post-disaster. This trajectory is often shaped by political functionality and the extension of politics into every aspect of life and every decision essential to post-disaster relief and recovery as shown in the modified framework element in Figure 6 (see Page 21).

Post-Disaster Project and Construction Activity

Post-disaster project and construction activity must now occur at a site where traditional inputs and project frameworks have been modified and special challenges are present. These special challenges include debris removal and potential reuse to mitigate ever present logistical challenges; changed psychology both with respect to decision-

(Continued on Page 21)

Figure 5.

Figure 4.

Post-Disaster *(Cont. from 20)*

making and risk taking but also with respect to a labor force that itself may be displaced or suffering the loss of close relatives; and changed liability concerns as one of the first things to grow post-disaster is uncertainty, which is a root cause of much liability (see Figure 7).

The corrosive effects of corruption may be controlled or compounded by governmental leadership and enablement. These are real issues. The construction environment is inherently dangerous and post-disaster uncertainties only exacerbate these concerns. Finally, post-disaster construction activities face modified output requirements from more traditional non-disaster construction.

Post-Disaster Construction Outputs

Traditional construction activities are focused on creating new facilities, usually "permanent" in nature. Post-disaster constructed projects may take on a wider range of time frames including temporary, transitional, and permanent dimensions.

Figure 6.

Figure 7.

Pressures to use disaster debris in construction may modify certain design and construction choices and considerations related to not adding to this material problem are only heightened post-disaster. Social dimensions of the "triple bottom line" of sustainability take on increased importance as part of the overall disaster recovery process (see Figure 8 on Page 33).

Conclusion

Post-disaster engineering and construction program and project management activities are significantly modified from non-disaster activities. Changes to the fundamental project model employed in the management of these types of programs and projects requires a fundamental re-think of skill sets, management processes, risks, and constraints. In addition, these changes collectively significantly change

(Continued on Page 33)

The Attack on Flight 253, the Haiti Earthquake, and the Japanese Disaster: A Longitudinal Look at Emotional Reactions, Risk-Related Behaviors, and Support for Policy Measures

by William J. Burns,* Catherine Reilly,* and Paul Slovic*

Introduction

Researching the public's emotional reaction to different threats is important to our understanding of how people respond to a crisis. We report a longitudinal analysis of public response to the terrorist attempts on Flight 253 as well as the Haiti earthquake and the earthquake, tsunami, and nuclear accident in Japan. Specifically, we track both the level and change of people's emotional reactions to these crises. We also examine perceptions and support for a number of policy measures to enhance security in airports.

Methodology

Flight 253 and Haiti Earthquake: We conducted a survey regarding Flight 253 and the earthquake in Haiti, with a diverse panel of over 600 individuals of whom more than 400 completed six waves of data collection. Specifically, data were collected on December 31, 2009 (N=609),January 21 (N=754), February 24 (N=737), May 12 (N=691), September 20 (N=637), and December 13, 2010 (N=652). This ongoing internet panel was developed by Decision Research through word-of-mouth and internet recruiting. Participants were paid for their participation. Non-respondents (panelists invited to participate but who chose not to) did not differ significantly from respondents in their demographic characteristics. The response rate for each wave averaged about 75 percent.

Our online questionnaires ranged from 80 to 130 closed-ended questions. These questions investigated the participant's fear, perceived risk, risk-related behaviors, and support for different and relevant policy measures related to the crises surrounding the terrorist attempts on Flight 253, Times Square, the Haiti earthquake, the BP oil spill, and the trauma caused by the ongoing financial crisis. In this paper, we focus on the public's emotional reaction to the attempted attack on Flight 253 and the public's trust in DHS's handling of this event. We also look at the emotional response to the earthquake in Haiti. For example, questions regarding fearfulness to fly and postponing traveling included "how fearful would you be about traveling on an airplane right now?" with a four point scale ranging from "not at all fearful" to "very fearful" and "how likely are you to postpone air travel as a direct result of this event?" with a four point scale ranging from "will not postpone" to "very likely to postpone." We based our estimate of intention to postpone only on those who indicated they had plans to travel prior to this event.

Questions regarding DHS's handling of the crisis included "in your opinion, how effectively have security officials handled this security incident since it was discovered?" with a five point scale ranging from "not at all effectively" to "extremely effectively." Regarding airport security, we used questions such as "to what extent would you support the use of more invasive measures such as the use of whole body imaging devices to screen passengers at airports, assuming that images will be appropriately blurred to protect privacy?" with a five point scale ranging from "strongly oppose" to "strongly support."

Regarding the public's emotional response to the earthquake in Haiti, an example question concerning sadness was "how sad do you feel about the earthquake that has taken place in Haiti?" with a four point scale ranging from "not at all sad" to "very sad." Fear and anger were measured similarly. A question regarding willingness to donate was "how likely are you to donate money to help the earthquake victims in Haiti?" with a five point scale ranging from "very unlikely" to "I've already donated money to help the earthquake victims of Haiti." Regarding perceived efficacy of donating, an example question was "If you were to donate money, to

(Continued on Page 23)

Psychological Responses *(Cont. from 22)*

what extent would your donation make a difference for these earthquake victims in Haiti?" with a five point scale ranging from "my donation would make no difference" to "my donation would make a very large difference."

Japanese Disaster: We used a similar panel to query respondents about the Japanese disaster that began with the earthquake on March 11, 2011. Specifically, we collected data on March 15, 2011 (N=630) and April 22, 2011 (N=559). We asked a wide range of questions pertaining to perceived risk, emotional reaction, perceptions of preparedness, and risk-related behaviors with respect to this disaster. In this paper, we report on people's emotional response to this crisis. We were specifically interested in differences in reaction to the earthquake and tsunami versus the nuclear disaster. An illustrative question for sadness was "how sad do you feel about the earthquake and tsunami that have taken place in Japan?" with a four point scale ranging from "not at all sad" to very sad." Fear and anger were measured similarly.

Results

The Terrorist Attempt on Flight 253: Following the incident on Christmas day, 36 percent reported moderate to high levels of fear with respect to air travel and 26 percent indicated they would postpone air travel as a result (see Table 1). There was a decrease in fear and intentions to postpone over time, with the steepest decline occurring soon after the incident. Following the terrorist attempt in Times Square, respondents reported a small increase in their fear of flying. When asked about their reaction to the attempted bombing in Times Square, 29 percent reported moderate to high levels of fear with respect to visiting a major city and about the same reported they would postpone their plans. Fear and intentions to postpone travel to a major city decreased over time, with the steepest decline occurring soon after the event.

Regarding trust in DHS's handling of the attempted terrorist attack on Flight 253, about 63 percent reported a moderate to very high trust in DHS to reduce the threat of terrorism. This trust remained constant over the duration of our study. A majority indicated that DHS communicated moderately to extremely effectively about the attack on Flight 253 (and later about the Times Square incident). Support for full body scanners was strong, with 41 percent of respondents somewhat supporting and 39 percent strongly supporting their use. In December 2010, this support dropped to 64 percent (full body scanner now created a very revealing visual image). Respondents indicated that if it were discovered that the scanners were not 100 percent effective, their opposition would increase markedly. Support for the enhanced pat-down procedures was similar to the support for the new scanners. A solid majority of our respondents indicated that removing shoes or restricting the amount of liquid carried on the plane was only somewhat likely or even not likely to prevent a terrorist attack.

The Earthquake in Haiti: We looked at sadness, fear, and anger in response to the earthquake in Haiti. Just following the Haiti earthquake, 80 percent reported moderate to high sadness about Haiti (see Table 2 on Page 24). Decline in sadness about Haiti was marked, especially directly following the event. In contrast, the Haiti earthquake did not inspire high levels of fear or anger. Immediately after the earthquake, 22 percent of respondents reported moderate to high fear and 19 percent reported moderate to high anger. Like sadness, respondents' fear and anger declined quickly directly following the event.

(Continued on Page 24)

Date of Collection	Fearful to Fly	Intention to Postpone Flying
	(Moderate-Very)	(Likely-Very likely to postpone)
December 31, 2009	36%	26%
January 21, 2010	31%	25%
February 24, 2010	24%	20%
May 12, 2010	27%	20%
September 20, 2010	22%	13%
December 13, 2010	23%	16%

Table 1: A depiction of the level and change in fearfulness toward flying following the terrorist attempt on Flight 253.

Psychological Responses *(Cont. from 23)*

We also examined the relationships between people's emotional reactions to the earthquake, perceived efficacy of donating, and their willingness to donate to victims in Haiti. The correlations between sadness, fear, anger, and perceived efficacy of donating and willingness to donate are all positive ranging from weak to moderately strong (see Table 3). Notice that sadness and perceived efficacy of donating are moderately correlated with willingness to donate whereas correlations with fearfulness and anger are quite small. The linear regression model depicting these relationships is Y = .17 + .60 (Sadness) - .05 (Fearfulness) + .06 (Anger) + .49 (Perceived Efficacy of Donating); R2 = .24 with sadness and perceived efficacy of donating being statistically significant at the .001 level.

Table 3: Relations among emotional reactions, perceived efficacy of donating and willingness to donate to victims in Haiti.

Factors Affecting Donations	Donated or Likely to Donate
Sadness	.41
Fearfulness	.16
Anger	.14
Perceived Efficacy of Donating	.36

Japanese Disaster: We again looked at sadness, fear, and anger in response to the earthquake, tsunami, and nuclear disaster in Japan. A few days after the earthquake and tsunami in Japan, 80 percent of respondents reported feeling moderately to very sad about these events (see Table 4 on Page 34). Considerably fewer said they were moderately or very fearful (40 percent) or moderately or very angry (23 percent) about these natural disasters. A month later, all three measures had declined. In contrast, 74 percent of respondents reported they were moderately to very sad about the nuclear disaster versus 50 percent for fear and 33 percent for anger. Decline in sadness and fearfulness for this nuclear disaster was similar to the earthquake and tsunami. However, anger did not decline during this period.

Discussion

Our results suggest that salient threats, such as occurred on Flight 253, in Haiti, or Japan, affect people emotionally and may influence their intentions to behave in risk-avoiding manners. Sadness is the predominant emotion when reporting on natural disasters occurring to other people. For both the earthquake in Haiti and the earthquake and tsunami in Japan as many as 80 percent of respondents were moderately or very sad about these disasters. There was less fear and still less anger expressed for the natural disasters in Haiti and Japan. For Haiti, sadness and perceived efficacy of donating were moderately related to willingness to donate to victims of the earthquake. It appears that intentions to donate are related to both the sadness people feel about the crisis, and the assessment people make about the likely beneficial outcomes of their donations.

Sadness will be present wherever human suffering is widespread. However, fear and anger tend to increase when terrorism or technological accidents are involved, even if these events are happening to others. Technological accidents often involve mismanagement, as in the case of Japan, and terrorism involves malevolence, as in the case of Flight 253. Mismanagement and malevolence increase perceptions of threat and can spark outrage. Notice that fear and especially anger were higher for the nuclear accident in Japan than they were for the earthquake and tsunami. Regarding change in emotional reactions to these crises, sadness, fear, and in most cases anger appear to decrease over time and have their steepest descent directly following the event.

(Continued on Page 34)

Date of Collection	Sadness	Fearfulness	Anger
	(Moderate-Very)	(Moderate-Very)	(Moderate-Very)
December 31, 2009	na	na	na
January 21, 2010	80%	22%	19%
February 24, 2010	70%	17%	14%
May 12, 2010	63%	14%	15%
September 20, 2010	54%	12%	13%
December 13, 2010	54%	15%	16%

Table 2: A depiction of level and change in sadness, fear and anger toward the Haiti earthquake.

The Limits and Challenges of Law and Regulatory Approaches to Natural Disasters

by Obijiofor Aginam*

Introduction

Earlier work published by this author in 2009 stated that "recent emerging and re-occurring natural and man-made disasters around the world reinforce the potency of the forces of humanity's destruction as depicted by *The Four Horsemen of the Apocalypse* — Conquest, War, Famine/Pestilence/Drought/Mass Starvation, and Death."[1] Throughout the millennia of recorded history, human societies have grappled with natural disasters: cyclones, tornados, hurricanes, floods, tsunamis, earthquakes, volcanic eruptions, forest fires, and many others. In recent times, climatic changes have resulted in life-threatening drought, famine, rainfall variations, and the shrinking of fresh watercourses. These disasters, albeit differing in magnitude and scale, and also depending on the resilience of the affected society, have often resulted in unimaginable human suffering, and unquantifiable humanitarian catastrophe as a result of the collapse of the core institutions and infrastructure of the affected society.

Emerging and Re-Occurring Natural Disasters

As no human society is completely immune to natural disasters, examples of the devastation caused by disasters abound in every region of the world. In Japan, the Hanshin Earthquake ("Kobe earthquake" as it is commonly known outside of Japan) of January 17, 1995, and the recent triple disaster (earthquake, tsunami, and the Fukushima Daiichi nuclear crisis) in the Tohoku region claimed thousands of lives, and devastated the livelihoods of societies at the epicentre of the disasters. Before these recent disasters in Japan, the Kanto earthquake of 1923 was estimated to have claimed about 140,000 lives.

In December 2004, a tsunami, with its epicentre off the west coast of Sumatra, Indonesia, triggered a series of devastating tsunamis on the Indian Ocean coasts, killing thousands of people and causing extensive damage in Indonesia, Sri Lanka, India, and Thailand.

In August 2006, Hurricane Katrina, one of the deadliest hurricanes in the history of the United States, devastated the city of New Orleans, caused extensive damage along the entire Mississippi coast, and led to the loss of over 1,500 lives. In May 2008, Cyclone Nargis flattened buildings, claimed over 100,000 lives, and rendered over 1 million people homeless in Myanmar.

The recent earthquakes in Turkey, New Zealand, and Haiti, past and recurring hurricanes and tornadoes in the Americas and the Caribbean, severe floods, famine and drought in parts of Africa, and the efforts to mitigate these disasters have raised very complex human security[2] challenges: breakdown of essential infrastructure, mass starvation, acute hunger, and lack of the other essential necessities of life. For some disasters occurring within the boundaries of nation-states governed by authoritarian regimes, there are allegations of "crime against humanity," especially where the regime wilfully constitutes an impediment to humanitarian assistance from the international community.

(Continued on Page 26)

1. See Obijiofor Aginam, "The Right to Health in Emergencies: Natural or Man-Made Disasters," in Andrew Clapham and Mary Robinson, (eds.), *Realizing the Right to Health*, (2009), 173-181 at 173. On the Four Horsemen of the Apocalypse, see Brian D. Vos, "The Four Horsemen of the Apocalypse," *The Outlook*, 56(4) , (June 2006), 16-20.
2. Commission on Human Security, *Human Security Now* (New York: 2003); Report of the UN Secretary — General, Kofi Annan, *In Larger Freedoms* (New York: UN, 2005).

Humanitarian Assistance *(Cont. from 25)*

Natural Disasters and Human Security Challenges

Natural disasters often bring together the two components of human security: "freedom from fear" (as in the case of authoritarian regimes) where the State — by its actions — impedes humanitarian assistance from the international community; and "freedom from want" where natural disasters, even in a nation-state that is very well governed democratically, would still inevitably lead to hunger, disease, infrastructure collapse, and lack of almost all the essential necessities of life and dignity.

During disasters, the overwhelming burden of human security problems (disease, hunger, starvation, and death) is borne by vulnerable groups who are least able to afford medical treatment and preventive measures, and whose governments have the least capacity to meet these urgent needs. Disasters raise serious human security questions for the international community. In situations like the Indonesian tsunami, although international humanitarian response was remarkable, serious problems were nonetheless encountered in distributing humanitarian aid. So what are the potentials, limits, and challenges of legal and regulatory approaches to disaster mitigation?

The Limits of Legal and Regulatory Approaches to Disaster Mitigation

International legal instruments, including human rights treaties, contain numerous provisions that protect and promote basic human rights to the essential necessities of life: health, food, housing, and education.[3] Although these normative provisions abound in international legal instruments, realizing, protecting, enforcing, and promoting them both in ordinary times, and in disaster situations, can be exceedingly complex.

For instance, in an emergency situation following a natural disaster, the human right to health can be used to monitor and access the humanitarian response by local, regional, national, and international actors. Every international legal instrument that provides for the right to health stresses the need for "international assistance and cooperation." This is because disasters often overwhelm local capacity and infrastructure for health-care delivery. A disaster, as observed by the World Health Organization Collaborating Centre for Research on the Epidemiology of Disasters (CRED), is "…a situation or event, which overwhelms local capacity, necessitating a request to national or international level for external assistance."[4] As unforeseen and often sudden events, disasters cause "great damage, destruction and human suffering."[5] The key questions remain: is there an obligation on the affected state to accept external "humanitarian" assistance without delay where a significant percentage of its population is vulnerable to starvation, unnecessary suffering, and imminent death? Do other states have an obligation to offer humanitarian assistance to a state hit by a disaster?

The Guiding Principles for the provision of humanitarian assistance, as set out in UN General Assembly Resolution 48/182 (1991), affirm that the "sovereignty, territorial integrity and national unity of States must be fully respected in accordance with the Charter of the United Nations. In this context, humanitarian assistance should be provided with the consent of the affected country and in principle on the basis of an appeal by the affected country."[6] However, even though "[e]ach State has the responsibility first and foremost to take care of the victims of natural disasters and other emergencies occurring on its territory,"[7] what happens if that state cannot or does not take care of its own population? Here the international community has to grapple

(Continued on Page 35)

3. Article 25(1) of the Universal Declaration of Human Rights (1948); Preamble, Constitution of the World Health Organization, signed on July 22, 1946, entered into force on April 7, 1948; the International Covenant on Economic, Social, and Cultural Rights (ICESCR) 1966; and the Convention on the Rights of the Child (1989).
4. CRED's "EMDAT: International Emergency Disasters Database" website, http://www.emdat.be/ExplanatoryNotes/glossary.html.
5. Ibid.
6. "Strengthening of the coordination of humanitarian emergency assistance of the United Nations," General Assembly Resolution A/RES/46/182, December 19, 1991, Annex, paragraph 3 (emphasis added), available at http://www.un.org/documents/ga/res/46/a46r182.htm.
7. UN Resolution 46/182, paragraph 4.

Legal Insights

Fraud and Disasters

by Kelly Frailing, Ph.D., Assistant Professor of Criminal Justice,
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Introduction

The topic of fraud in the wake of disasters has received little attention. In fact, researchers have only recently turned their attention to the different types of crime that occur after disasters.[1] While reports, anecdotal and otherwise, of post-disaster violence and looting capture the attention of the public, fraud has gone relatively unstudied. A careful examination of fraud in the wake of 9/11, Hurricane Katrina, and the Deepwater Horizon oil spill should help demonstrate that this crime may be commonly associated with disasters and if not with the disasters themselves, then with the responses to them. This paper also posits an explanatory theory for fraud in the wake of disasters, one that contains prescriptions for combating this crime.

Fraud in the Wake of 9/11

The events of September 11 need no summary here. Less than two weeks after the attacks, Congress established the Victim Compensation Fund (VCF). The VCF was given over $5 billion by Congress to distribute to the families of those who had been injured or killed in the attack. Its designated Special Master was Kenneth Feinberg. The awarding scheme was based on victims' presumptive future earnings minus any assets, such as life insurance, and plus a pain and suffering payment. As of June 2003, the average award for death of a relative in the 9/11 attacks was nearly $1.5 million.[2] In order to receive these awards, claimants had to follow a number of steps. In the case of a deceased relative, claimants had to produce an original death certificate; a document confirming that the deceased was at one of the designated sites of attack; a court document designating the claimant as recipient of funds on the victim's behalf; and proof that notice of the claim had been made to all relevant parties. The steps were similar for those seeking personal injury compensation. Once the VCF received and verified this documentation, it calculated and issued the award. The average time from submission of documents to award was 35 days.[3] By December 22, 2003, the sunset date to file a claim, the VCF had received approximately 7,300 claims and had paid out $2.6 billion to claimants.[4] VCF staff attempted to check for fraudulent claims as paperwork was submitted. For example, they checked terrorist watch lists and suspicious 9/11 charities for names of claimants, they verified the authenticity of court documents, and they did a background check on claimants, including verification of their income and assets.[5] Even with these safeguards in place, some claims were suspected of being fraudulent. When the Office of Inspector General (OIG) audited the VCF, it found that 17 of the 792 claims

(Continued on Page 28)

1. See D.W. Harper and K. Frailing (eds.), *Crime and Criminal Justice in Disaster*, Durham, NC: Carolina Academic Press, (2010).
2. U.S. Department of Justice, *The September 11 Victim Compensation Fund of 2001*, Office of the Inspector General, (October 2003), 3-6, available online at: http://www.usdoj.gov/oig/reports/plus/a0401/final.pdf.
3. Ibid., 9.
4. U.S. Department of Justice, *9/11 Victim Compensation Fund Pays over $2.6 Billion to Date,* (April 1, 2004), available online at: http://www.usdoj.gov/opa/pr/2004/April/04_civ_207.htm.
5. U.S. Department of Justice, *The September 11 Victim Compensation Fund of 2001*, Office of the Inspector General, (October, 2003), iv, available online at: http://www.usdoj.gov/oig/reports/plus/a0401/final.pdf.

Legal Insights *(Cont. from 27)*

under review at the time were potentially fraudulent. Eight of these were passed on to the OIG's Fraud Detection Office for further investigation and subsequent legal action.[6] That said, the OIG also found that the procedures in place to review claims were sufficient to guard against fraud. VCF staff noted that requiring multiple official documents as part of the claim was particularly important in minimizing fraud.[7]

Fraud in the Wake of Hurricane Katrina

The events surrounding the Hurricane Katrina disaster are familiar to readers. The levee system in New Orleans failed shortly after Katrina made landfall on August 29, 2005. The city flooded and remained underwater for two weeks. The response to the storm at all levels (Federal, State, and local) was a spectacular failure and partially because of that response, FEMA attempted to make emergency assistance available to all those directly affected by Katrina. Nearly a million people in Louisiana registered with FEMA in September 2005 alone and a total of over $1 billion was distributed to FEMA registrants during that time.[8] Obtaining benefits from FEMA in the wake of Katrina was nearly effortless. All one needed was a phone or Internet access and some patience. After taking a variety of information, including name, Social Security Number, Social Security Numbers of dependents, home address, evacuation address, estimations of property damage, and employment situation, FEMA staff would then ask for bank account details. Within several days, emergency assistance funds in the amount of $2,000 were directly deposited into the claimant's bank account. In some cases, future payments from FEMA did not require any additional contact with the agency. Considering the ease with which money could be obtained from FEMA and the complete lack of a verification process for claims, it is little wonder that FEMA benefit fraud was widespread and long lasting after Katrina. In response to the ease with which victims could obtain monetary assistance, the Hurricane Katrina Fraud Task Force (HKFTF) was established shortly after the storm. Several agencies were partners in the Task Force, including the FBI, the U.S. Department of Justice, and the Postal Service. These agencies worked with local and State law enforcement and prosecutors to deter, detect, and punish fraud. The number of people federally charged with Katrina fraud continues to rise. Thirty six were charged in October 2005, up to 212 by February 2006, up to 412 by September 2006, up to 768 a year later in September 2007, and up to 1,360 in September 2010, more than five years after Katrina made landfall. The majority of those charged were accused of perpetrating fraud against FEMA or the American Red Cross.[9] Those charged with FEMA or Red Cross fraud were in no way limited to the area immediately impacted by Katrina or to the adjacent areas. Of the 1,360 people charged with fraud in the wake of Katrina, 875 of them were charged in Louisiana, Mississippi, or Texas, meaning an additional 485 people across the United States were also charged, 97 in California alone.[10]

Fraud in the Wake of the Deepwater Horizon Oil Spill

In April 2010, the Deepwater Horizon oil rig exploded in the Gulf of Mexico, killing 11 workers. The explosion caused the rig to sink and several days later, a leak in the oil pipeline served by the rig and owned by BP was detected. Oil continued to leak into the Gulf at a rate of thousands of barrels a day. It was not until July that a

(Continued on Page 29)

6. Ibid., v, vii.
7. Ibid., 12.
8. U.S. Department of Homeland Security, Office of Inspector General, *A Performance Review of FEMA's Disaster Management Activities in Response to Hurricane Katrina*, Report by the Department of Homeland Security's Office of Inspector General, (March 2006), available online at: http://www.dhs.gov/interweb/assetlibrary/OIG_06-32_Mar06.pdf.
9. K. Frailing, "Fraud following the September 11, 2001 and Hurricane Katrina Disasters," In D. W. Harper and K. Frailing (eds.), *Crime and Criminal Justice in Disaster*, Durham, NC: Carolina Academic Press, (2010), 139-160; and U.S. Department of Justice, *Hurricane Katrina Fraud Task Force: Fifth Anniversary Report to the Attorney General*, (September 2010), available online at: http://www.justice.gov/criminal/katrina/docs/09-13-10katrinaprogress-report.pdf.
10. U.S. Department of Justice, *Hurricane Katrina Fraud Task Force: Fifth Anniversary Report to the Attorney General,* (September 2010), available online at: http://www.justice.gov/criminal/katrina/docs/09-13-10katrinaprogress-report.pdf.

Legal Insights *(Cont. from 28)*

permanent cap was placed on the broken pipeline; by then, approximately 4.4 million barrels of oil had spewed into the Gulf's waters.[11] BP's public relations in the wake of the spill were lackluster at best and contributed to a negative public image of the company. Many people, from fishermen to oystermen and shrimpers, as well as hoteliers and those in related professions, depend on the Gulf for their livelihoods. An estimated $2.5 billion in fishing revenue was lost in Louisiana, Mississippi, and Alabama as a result of the spill and an estimated $3 billion in tourism revenue was lost in Florida alone.[12] In May 2010, BP promised to pay all legitimate claims for lost revenue due to the spill, but declined to clarify what would constitute a legitimate claim. The government directed BP to establish a $20 billion compensation fund and put Kenneth Feinberg in charge of disbursing claims for reimbursement. Feinberg, who was the Special Master of the VCF after 9/11, promised to pay all claims quickly, saying individuals' claims would be paid in 48 hours of filing and businesses' claims would be paid within a week.[13] However, complaints started to surface almost immediately from those who submitted claims and were given much less money than they requested in their filings. By the summer of 2010, there were several indicators that fraud against this fund would not be unexpected. First, BP had to be directed to establish the fund, indicating it may not have wanted to pay claimants. Second, the speed with which Feinberg promised payment meant that claims could not be fully investigated before payment was made. Not helping matters on this point is the fact that many fisherman, oystermen, and shrimpers operate cash businesses and do not keep detailed business records. Third, those worried that they might not be fully compensated by BP may have engaged in fraud in order to fully recover their losses. It is little surprise, then, that by January 2011, over 7,000 of the 481,000 claims made to BP were suspected of being fraudulent. The U.S. Department of Justice was investigating these suspicious claims and by that time, had already indicted eight fraudsters. Nevertheless, Feinberg has called the Gulf Coast Claims Facility a success, noting that over $3 billion had been paid to over 168,000 claimants.[14]

Conclusion

While more study in this area is certainly needed, rational choice theory appears to be a good explanatory theory for the crime of fraud in the wake of disasters.[15] Rational choice theory holds that people weigh the costs and benefits before engaging in a crime.[16] Rational choice theory contains prescriptions for reducing crime, most importantly target hardening. Consider what a hard target the VCF was after 9/11, especially as compared to FEMA after Katrina and the BP compensation fund after the oil spill. The effort needed to successfully commit fraud against the VCF was much higher than it was for either FEMA or BP. Numerous official documents were needed for a VCF award, as was face to face contact with officials to obtain them. The documents were then carefully scrutinized by VCF

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11. A. Monaghan, "BP Oil Spill: '4.4m Barrels' Leaked into Gulf of Mexico, According to Independent Study," *The Telegraph*, (September 23, 2010), available online at: http://www.telegraph.co.uk/finance/newsbysector/energy/oilandgas/8021225/BP-oil-spill-4.4m-barrels-leaked-into-Gulf-of-Mexico-according-to-independent-study.html.
12. B. Walsh, "Gulf of Mexico Oil Spill: No End in Sight for Eco-Disaster," *Time*, (May 1, 2010).
13. E. Fleming, "Last Day to File Claim with BP for Individuals and Businesses," WWNO, (2010). available online at: http://www.publicbroadcasting.net/wwno/news.newsmain/article/7054/0/1689436/Gulf.Oil.Spill/Last.Day.To.File.Claim.With.BP.For.Individuals.and.Businesses.
14. B. Skoloff, H.R. Weber, and D. Capiello, "Potential Scams Top 7,000 in BP Oil Spill Compensation Claims," *Times Picayune*, (January 27, 2011), available online at: http://www.nola.com/news/gulf-oil-spill/index.ssf/2011/01/potential_scams_top_7000_in_bp.html.
15. Even if rational choice theory is the best explanatory theory for post-disaster fraud, it may not be the best for other post-disaster crimes. Looting in particular may be better explained by routine activities theory, the three components of which are motivated offenders, suitable targets, and effective guardianship or a lack thereof. See K. Frailing and D. W. Harper, "Fear, Prosocial Behavior and Looting: The Katrina Experience," In D. W. Harper and K. Frailing (eds.), *Crime and Criminal Justice in Disaster*, Durham, NC: Carolina Academic Press, (2010), 89-105.
16. D. Cornish and R. Clarke, "Crime as a Rational Choice," In F. T. Cullen and R. Agnew (eds.), *Criminological Theory: Past to Present*, Los Angeles, CA: Roxbury Publishing Company, (1986), 278–283.

Planning and Response *(Cont. from 6)*

areas, prioritize facilities for reconstitution, and facilitate requests for assistance.

One request asked for DHS to collect and distribute the procedures for obtaining credentials and gaining access to State, local, territorial, and tribal jurisdictions in areas affected by the storm. The rapid posting of this information on HSIN-CS facilitated the response and recovery process after the storm passed.

NPPD stood down the CI CAT on the afternoon of August 30 and returned PSAs to steady-state operations on August 31. PSAs located in highly damaged areas that experienced lengthy disruptions continued to support partners throughout recovery.

Preparing for Future Incidents

DHS is constantly working with our partners at the Federal, State, local, territorial, and tribal levels of government, and with the private sector, to improve coordination and enhance the resilience of the Nation's critical infrastructure. Taking steps to be better prepared for the next emergency will help ensure a more robust response and a faster recovery. Working within the NIPP framework, DHS oversees a robust exercise program to help strengthen these vital relationships, which includes national and regional exercises, allowing participants — both public and private — to validate emergency plans and practice carrying out their incident management responsibilities. They also promote coordination and information sharing between all levels of government, and private sector owners and operators. In coordination with State and local partners across the country, DHS develops customized exercises focused on the activities of the 18 critical infrastructure sectors.

NPPD also plays a large role in the National Exercise Program and its annual National Level Exercises by ensuring the coordinated integration of private sector partners into exercise planning. NPPD also works with participants to capture lessons learned from these exercises to tailor future exercise series to different partners and improve incident management activities internally.

Meaningful partnerships are essential to the protection and resilience of the Nation's critical infrastructure before, during, and after an emergency. Working within the NIPP framework, NPPD, the DHS Private Sector Office, and FEMA build enduring partnerships that can adapt to an evolving threat environment. As Secretary Napolitano has noted, homeland security is a shared responsibility, and each of us has a role to play. By continuing to work with those that own, operate, and oversee the protection of critical infrastructure, we can help keep the American people safe and secure. ❖

International Response *(Cont. from 12)*

2010 Haiti Earthquake, and 2011 Japan Tsunami.

However, there still exists a debilitating gap that is rarely closed following a major disaster. Transitioning from temporary infrastructure replacement (1-6 months after a disaster) to permanent infrastructure reconstruction (6 months to 5 years after a disaster) is a major weakness within the humanitarian response community that remarkably we fail to address year after year and disaster after disaster. Planes with relief supplies are quick to arrive but the debris clearing machines and heavy equipment rarely arrive in time or to the scale needed. Roads are damaged and unusable for months and years after a disaster, impeding both emergency response and reconstruction efforts. Humanitarian response funding is rapidly used to save lives and reduce suffering, leaving less funding to address the longer-term and more permanent solutions needed to replace destroyed infrastructure. As a result, many of those affected by a disaster find themselves years after a disaster still using the dilapidated temporary infrastructure replacement mechanisms that were not intended to be used to meet the long-term needs of those affected by a disaster.

Thus, there is a need to significantly adjust the international humanitarian community's approach to infrastructure reconstruction following disaster situations. While the nation affected rightly must take the lead in any reconstruction, more focused and innovative approaches to reconstruction infrastructure replacement is needed. The humanitarian community can derive greater focus by empowering more humanitarian agencies to take a lead role in reconstruction and also by opening up a more transparent reconstruction process to the private sector. Indeed, in most of these disaster reconstruction cases, domestic and international private sector entities are usually the only ones with the ability to deliver the needed results swiftly enough.

Given the level of funding involved in reconstruction, respected and independent entities can be utilized to provide the technical support needed for infrastructure reconstruction efforts while ensuring the highest possible level of accountability. This process should be led by the host nation with the technical support and guidance provided by respected humanitarian agencies from within the UN system or beyond. In some rare instances, when the host government determines that it is unable to lead the reconstruction process, leadership from a leading national or international reconstruction entity should be available to more substantively support the host government.

In most cases, the critical components of this work can be tendered through a rapid competitive bidding process so that reconstruction activities start as soon as possible and are transparent in their implementation. These reconstruction processes must be more transparent and more carefully managed according to accounting and contracting standards without restricting the flow of support from international donors to the host government. While some of the key components (host nation governments, international organizations with technical resourcing related to reconstruction, and a viable private sector) to solving the problem described above currently exist, there is currently no coherent, responsive, or leading mechanism through which reconstruction efforts are managed.

If this type of coherent, systematic, and transparent process to reconstruction were more firmly established, as opposed to the ad hoc manner in which it is currently handled leading to generally poor results, large-scale and wide reaching positive impact could become a reality. As it stands today, the international humanitarian community will again be wondering after the next earthquake or tsunami as to why it just takes so long to even start the reconstruction process. ❖

Critical Infrastructure Protection Month

On November 30, 2011, President Barack Obama proclaimed December 2011 as Critical Infrastructure Protection Month. In his proclamation, President Obama implored the people of this Nation to "recognize the importance of protecting our Nation's critical resources and to observe this month with appropriate events and training to enhance our national security and resilience."

To read the complete Presidential Proclamation, please visit http://www.whitehouse.gov/the-press-office/2011/11/30/presidential-proclamation-critical-infrastructure-protection-month-2011.

For more information on Critical Infrastructure Protection Month and how to become more involved in protecting this Nation's critical infrastructure, please visit http://www.dhs.gov/files/programs/national-critical-infrastructure-protection-month.shtm.

Air Operations *(Cont. from 15)*

Branch Operations Manual, the FAA Airspace Management Plan for Disasters, and the Florida State Emergency Response Team, or SERT, Air Operations Branch Guide. ❖

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Digital Billboards *(Cont. from 17)*

out?

In May — as part of mock hurricane exercises in Florida — Brevard County's emergency management officials simulated the power outage to a digital billboard. The idea was to test if a generator could keep the digital billboard operational. Within 10 minutes, power was transferred from the generator to the digital billboard, and it was fully functional. So yes, if need be, digital billboards could deliver emergency messages when other media may not be available. ❖

FBI Bank Robber Billboard 2009.

Post-Disaster *(Cont. from 21)*

the logistical characteristics of such programs while simultaneously significantly modifying the broader logistical space within which the disaster has occurred. Even the most basic project activities have the potential to significantly affect project and regional logistics and even the best intentioned relief and recovery activities have the ability to impact response and recovery in today's highly engineered, built environment.

Figure 8.

The challenges of this changed environment can be met through concerted action by the engineering, construction, government, and NGO sectors. Specific recommendations include:

1) Government and NGO community must plan for assisting in post-disaster recovery by:
- Providing accessibility to the sites of critical infrastructure;
- Maintaining awareness of global logistics chain;
- Ensuring availability of specialized construction equipment, contracts, and materials;
- Developing well-documented system with clear interface points; and
- Preplanning and rehearsing response and recovery scenarios for high-probability events.

2) Engagement with engineering and construction community must begin pre-disaster through:
- Pre-placed contracts;
- Earliest mobilization to disaster zone; and
- Early activation of logistics chains.

3) Post-disaster period requires streamlined decision frameworks such as:
- Decision authorities at project and disaster site; and
- Logistical-affecting processes may act as barrier in post-disaster scenario.
  - o Examples are customs, building permits, and liability legislation.
  - o Consider a standard "modified" logistical template for local government consideration. ❖

Legal Insights *(Cont. from 29)*

staff, thereby increasing the costs of committing this crime. Emergency assistance from FEMA was much easier to obtain; the minimum yield after half an hour on the phone was $2,000. Though not quite as effortless as FEMA benefits, BP compensation money was still fairly easy to obtain after the spill, especially with Feinberg's promise that claims would be processed so quickly. Under the rational choice rubric, the costs of these crimes are much lower.

Even when timely monetary relief after a disaster is of the utmost importance, it still behooves agencies to work together to check claims for possible fraud. This saves time, money, and resources in the future, as well as helps prevent the revictimization of disaster victims, who may be legitimate claimants to relief but nonetheless subject to intense scrutiny because of the actions of fraudsters. Several things are necessary for agencies to work together. These include shared databases, efficient communication systems, and an established protocol for checking each part of the claim (for example, the Social Security Administration checks Social Security numbers, and the Postal Services checks addresses). Absolutely crucial to being able to rapidly and efficiently check claims in the time of a disaster is having the protocol to do so set up before a disaster strikes. The importance of this point cannot be stressed enough. It will be well nigh impossible to establish an effective claim checking system during disaster or immediate post-disaster conditions. Therefore, it is imperative that agencies at especially Federal but also State and local levels have a plan in place prior to a disaster if they wish to reduce and even prevent the crime of fraud. ❖

Psychological Responses *(Cont. from 24)*

This is consistent with what Burns, Peters, and Slovic[1] found following the collapse in the financial markets in September 2008. There appear to be psychological (hedonic adaptation) as well as sociological mechanisms (communities intervene) at work that produce this phenomenon. By way of a policy recommendation, effectively communicating with the public during a crisis may facilitate people's natural tendencies to recover and get back to normal. There may be an optimum window following a mishap where crisis communication can do much good. It is, therefore, imperative during this period that statements to the public be measured in their tone and calibrated with respect to the actual risk. ❖

Table 4: A depiction of level and change in sadness, fear, and anger toward the disaster in Japan.

Disaster		Sadness	Fearfulness	Anger
		(Moderate-Very)	(Moderate-Very)	(Moderate-Very)
Earthquake/ Tsunami	March 15, 2011	80%	40%	23%
	April 22, 2011	66%	30%	19%
Nuclear Accident	March 15, 2011	74%	50%	33%
	April 22, 2011	64%	37%	34%

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[1] W.J. Burns, E. Peters, and P. Slovic, "Risk Perception and the Economic Crisis: A Longitudinal Study of the Trajectory of Perceived Risk," *Risk Analysis*, (forthcoming, 2011).

Humanitarian Assistance *(Cont. from 26)*

with the tension between state/territorial sovereignty, and humanitarian intervention which has now been addressed in the emerging norm of the "Responsibility to Protect."[8]

This scenario, as exemplified in the attitude of the government of Myanmar towards international humanitarian assistance after Cyclone Nargis, presents a difficult conundrum in realizing the right to health in emergencies. In the wake of Cyclone Nargis, opinions were sharply divided on whether the norm of "Responsibility to Protect" should be invoked to deliver food, medicine, and other essential supplies to the affected population in Myanmar.[9]

In other emergency situations, where governments accept external humanitarian assistance, difficult questions remain on the coordination and implementation of humanitarian assistance.

Towards an Effective Disaster Response Framework: The Way Forward

Being essentially westphalian, the international system operates on an anarchical interstate framework. "Intervention" by one state in the affairs of another, even when its overwhelming mission is to deliver humanitarian assistance in times of emergency, can be extremely politicized. Due to "national interests" and ideological and other differences, the governments of Iran, Myanmar, and Afghanistan under the Taliban, for instance, would flatly refuse any humanitarian assistance from the United States and other "Western" powers. Humanity will continue to live with natural disasters: cyclones, tornados, hurricanes, floods, tsunamis, earthquakes, volcanic eruptions, forest fires, chemical spills, and other climate change-induced calamities. The question is how to cope with and mitigate their impact on vulnerable populations within the territories of nation-states.

As a basic first step, the international community must re-think how to improve the effectiveness of humanitarian assistance and how to better coordinate response to disasters. Academic and policy debate, thus far, has narrowly focused on the impediments of state sovereignty to basic human rights codified in international legal instruments, as well as the right to "intervene" to deliver humanitarian assistance. The right of access to victims of natural disasters has operated on a patch-work of laws and frameworks. In a recent exhaustive and insightful study, the International Federation of Red Cross and Red Crescent Societies comprehensively articulated the law and legal issues in international disaster response.[10] This ambitious work points the way forward on most of the difficult issues that impede the delivery of humanitarian assistance: problems with visas and work permits for doctors, nurses, and other humanitarian workers; customs procedures for clearance of relief materials and essential supplies like medicines, food and water; transportation and movement of equipment; as well as how to balance sovereignty and humanitarian concerns using both hard law and soft law approaches. The study also includes a survey of the relevant treaties and soft-law provisions that aid humanitarian work and the challenges of using these mechanisms in various regions of the world, given each region's specific social and economic context. The study also highlighted lessons learned from responses to past disasters as a way to improve future responses by the international disaster response community. All of these issues have to be addressed holistically by all actors: states, international organizations, and non-state actors that work on response to natural disasters. ❖

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8. See *The Responsibility to Protect: Report of the International Commission on Intervention and State Sovereignty*, (Ottawa: IDRC, 2001).
9. For a discussion of these opinions, see Obijiofor Aginam, note 1.
10. International Federation of Red Cross and Red Crescent Societies, *Law and Legal Issues in International Disaster Response: A Desk Study* (Geneva: 2007).

Wildfires *(Cont. from 11)*

sensor systems orbiting overhead, allowing for comparison and calibration of those resources with the data collected by the Ikhana's more sensitive instruments. The aircraft flew seven precisely timed cross-calibration underpasses of NASA's TERRA and AQUA satellites. Ikhana data verified through comparison with sensor collections aboard the satellites will prove valuable when in applications for new space-based methodologies for fire observations and will enhance current space-based capabilities and measurements. The Western States Fire Mission flights flown by Ikhana were follow-on missions similar to a NASA campaign flown in 2006 with the General Atomics Aeronautical Systems Altair unmanned aircraft system.

In late October of that year, NASA received a request for wildfire support from the California Governor's Office of Emergency Services and the National Interagency Fire Center because Santa Ana winds in Southern California were fanning a number of wildfires. The Esperanza Fire Incident Command Center requested NASA's imaging and fire-mapping assistance. For a 16-hour period on October 28 and 29, Altair flew over the arson fire that claimed the lives of five firefighters. The wildfire sensor collected and transmitted more than 100 images and 20 data files containing the location of the fire perimeter. These data were used by the Esperanza Fire Incident Command Center to map fire behavior and direct resources to critical areas.

More recently, the Autonomous Modular Sensor was installed on a modified King Air B200 to support the U.S. Forest Service and the California Department of Forestry and Fire Protection. This enables more ease of operation in the National Airspace System.

NASA Dryden worked closely with the FAA to obtain FAA approval for and coordination of the Altair and Ikhana flights into the National Airspace System. ❖

For more information about Hernan D. Posada, please visit http://www.nasa.gov/centers/dryden/news/Biographies/Pilots/posada.html.

Earthquakes *(Cont. from 10)*

earthquake hazards; and promoting the adoption of earthquake hazards reduction measures in vulnerable areas. NEHRP legislation pending in the 112th Congress also places an emphasis on earthquake hazard mitigation. In addition to the traditional research on where, how, and why earthquakes occur, the legislation would call for research on the institutional, social, behavioral, and economic factors that influence how risk mitigation is implemented. ❖

The Center for Infrastructure Protection and Homeland Security (CIP/HS) works in conjunction with James Madison Univerity and seeks to fully integrate the disciplines of law, policy, and technology for enhancing the security of cyber-networks, physical systems, and economic processes supporting the Nation's critical infrastructure. The Center is funded by a grant from the National Institute of Standards and Technology (NIST).

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