Natural Hazards Observer

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What's Happened in Floodplain Management Since the '93 Mississippi Flood?

--an invited comment

Few people in the natural hazards business can forget the images of the Great Mississippi Flood of 1993. Week after week, TV screens were filled with scenes of millions of acres underwater and thousands of people forced from their homes by raging waters. The 1993 Mississippi flood was followed by another Mississippi flood in 1995, major floods in California in 1995 and again in 1997 and 1998, floods in Georgia and Alabama in 1994, in Texas in 1995, and in the eastern U.S. in 1996--each bringing destruction to both urban and rural areas. In the spring of 1997, national attention was focused on the Red River of the North and flooded office buildings burning in Grand Forks, North Dakota. Did we learn anything from the 1993 Mississippi Flood and the floods that have occurred since? Are we doing anything to reduce our floodplain vulnerability? What happened to the 1994 ***Sharing the Challenge*** report by the Interagency Task Force to Coordinate the Federal Flood Recovery Effort submitted to the

White House (see the ***Observer***, Vol. XVIII, No. 6, p. 10)?

Sharing the Challenge

As former members of that task force, we are frequently asked how many of the recommendations of the report have been carried out and what remains to be done. When asked about the report, rather than provide an enumeration of actions on report recommendations, we have preferred to examine the big picture and assess the overall progress in floodplain management. As readers may recall, ***Sharing the Challenge*** emphasized the need for responsibility and accountability for floodplain management to be shared among federal, state, and local governments and with the citizens of the nation. It also called for avoidance of unwise use of the floodplain, minimization of vulnerability when floodplains must be used, and mitigation of damage when floods do occur. All of those actions were to be focused on concurrent reduction of the flood vulnerability of the nation and the protection and enhancement of the natural resources and functions of floodplains.

Progress Made

In our view, in the years since the 1993 flood there has been positive action on many fronts. Education is improving. There is clearly greater national awareness of the hazards of flooding. Major flood specials have appeared on television and other news media. James Lee Witt, director of the Federal Emergency Management Agency, appears in television commercials reminding people of the flood risk and encouraging them to buy insurance.

Many state legislatures and executive agencies have examined their flood management policies and moved toward tighter controls. Federal and state governments have relocated over 12,000 families from Midwest floodplain locations (reaching a total of over 25,000 for the nation as a whole). State and federal agencies have acquired interest in over 250,000 acres of flood-prone land. Who, in 1992, would have thought that such relocations and land acquisition would have been possible?

In October 1994, Congress passed and the president signed a flood insurance reform act that addressed many of the issues raised by the 1993 flood. Flood insurance must now be purchased at least 30 days before the flood event (compared to five days prior to a flood in 1993). Pressure has increased on lenders to ensure that at-risk home buyers and owners purchase flood insurance. Insurance coverage is now available to help pay the costs of elevating or relocating substantially damaged buildings. Parallel changes for agriculture were embodied in the Crop Insurance Reform Act of 1994.

In its assessment of approaches to solving the flood problems of the upper Mississippi, a 1995 Corps of Engineers report validated the view that while structural flood control measures are an important part of an overall floodplain management program, they have limitations. The report noted that floodplains are best managed through a combination of structural and nonstructural measures that fully recognize the inherent risks of occupying flood-hazard areas.

In an effort to increase state and local sharing of the costs of flood-damage reduction efforts, in his 1995 budget submission to Congress, President Clinton proposed reductions in federal support of flood control construction activities. Unfortunately, Congress largely ignored his recommendations. The U.S. Environmental Protection Agency in-creased its support of basin management activities, and the 1996 Farm Bill included provisions to increase conservation activities in floodplains and riverine environments.

The federal government also has reformed a number of programs to remove subsidies and increase incentives to minimize vulnerabilities to flooding. Speaking for congressional committees examining the high costs of disaster recovery, Senator Ted Stevens and the late U.S. Representative Bill Emerson proposed that those at risk should take greater responsibility for avoiding hazards and sharing the costs of post-disaster recovery.

The 1996 Water Resources Development Act extended Corps authorities for nonstructural work under Public Law 84-99 and established requirements for floodplain management as part of Corps projects. The work of the Scientific Assessment and Strategy Team (SAST) initiated during the 1994 study has continued with the publication of several supplements to its initial report. It has also served as a model for other post-flood analyses and has clearly demonstrated the importance of integrating floodplain management into river basin planning.

Lessons from Recent Events

The California floods of 1995 sparked major hearings in that state's legislature over the approaches being taken to reduce the impact of frequent floods. Disastrous floods in 1997 on the Sacramento and San Joaquin Rivers and their tributaries reinvigorated the legislature, and additional hearings were held to develop legislation that would provide a balance between development and natural resource preservation in an environment of comprehensive flood management. In response to a charge from the state governor, a task force of state officials reported to him that a more holistic approach was required to deal with the continuing threat of floods and recommended a comprehensive water management planning effort for the region. Proposing both structural and nonstructural approaches, the task force report included recommendations that would require all those living behind levees providing less than 200-year protection to buy flood insurance and would increase the level of protection for urban areas above the federal flood insurance program standard of 100-year occurrences. These proposals would not have seen the light of day five years ago.

Following the 1997 flood on the Red River of the North, the International Joint Commission, a bi-national organization created by the U.S.-Canada Boundary Waters Treaty of 1909, established a task force to examine and report on the causes and effects of that flood and to identify measures that could be used to reduce future damage. The task force provided an interim report in December 1997 and indicated that a significant risk of flooding remains; that steps must be taken to improve, clarify, and coordinate flood policies throughout the basin and enforce a balanced approach to floodplain management; that major improvements must be made in the use of technology to improve forecasting, measurement, and

modeling; and that environmental concerns need to be addressed.

The Next Steps

In December 1997, the Western Governors' Association, representing 18 western states, adopted an ***Action Plan for Reducing Flood Risk in the West*** (see the ***Observer***, Vol. XXII, No. 3, p. 9). This plan generally endorsed the recommendations of ***Sharing the Challenge*** and specifically called on state and local jurisdictions to refrain from putting people and property at risk by avoiding development in the floodplain; move those at risk from the floodplain, when appropriate; share the risk among all levels of government and among flood-affected individuals; and treat the floodplain as part of a physical and biological system within the larger context of its watershed.

But floods will continue to occur and, unless more is done, so will damage. What still needs to be accomplished? We need a floodplain management act or an executive order that clearly lays out the floodplain management responsibilities at federal, state, and local levels. In the Mississippi River Basin the need for a comprehensive plan still remains, and until it is developed, the region will still be dealing with a loose amalgam of federal, state, and local flood damage reduction efforts. (At a March 1998 federal-state Mississippi River Summit, attendees committed to the development of this comprehensive plan and began formation of a task force to do so.) Complaints following the Red River flooding still point out that many people who could have purchased flood insurance and did not end up as well off as those that did. We continue to support payment for repetitive losses. Work has started on examining the ground rules for flood control projects to eliminate any structural bias, but the work is slow. We need to continue to exploit technology and all it offers us. Coordination of floodplain activities at the national level remains spotty.

In the aggregate, we believe we have made a great deal of progress. Still, we are all impatient and want action on all fronts now. However, when one considers that more and more people and organizations are endorsing a balanced structural/nonstructural approach and even avoidance of the unnecessary use of the floodplain, one must recognize clear progress. We all need to keep moving forward.

Gerry Galloway, National Defense University
Shannon Cunniff, Department of the Interior
John Kelmelis, U.S. Geological Survey
Mike Robinson, Federal Emergency Management Agency
Harry Shoudy, U.S. Army Corps of Engineers

Civil Engineers Warn of Dam Failure Risk

Many of America's dams have exceeded their intended lifespan, are in critical need of repair, and pose a serious safety risk, according to the American Society of Civil Engineers (ASCE). On March 6, 1998,

the ASCE released its ***1998 Report Card for America's Infrastructure*** (free via the Internet), which examines policy issues related to civil engineering structures in the U.S., including roads and bridges, mass transit, schools, dams, and waste management systems. The report notes that an alarming number of dams across the country are showing signs of age and lack proper maintenance. Downstream development is increasing. Most older dams were built without adequate spillways to release water in heavy rains, which causes water to run over the top. Inadequate spillway capacities are the most common deficiency and a major cause of dam failures. Dam safety officials estimate that thousands of dams are at risk of failing or are disasters waiting to happen.

The ASCE also points out that, in the past 10 years, more than 200 dam failures have occurred. Approximately 9,200 regulated dams nationwide are categorized as high-hazard, that is, their failure will likely cause significant loss of life and property. Thirty-five percent of these dams have not been inspected since 1990 or earlier. In addition, the owners or managers of a majority of these dams do not have emergency action plans in place for timely downstream warning and evacuation.

The ASCE estimates the average cost of repairing one unsafe dam as approximately $500,000, meaning that it would cost $1 billion to rehabilitate all unsafe dams nationwide. They recommend improving the ability of states to regulate dam safety, establishing state revolving funds for dam rehabilitation and repair, and requiring states to contribute 20% in matching funds.

The complete text of the report and related references are available from the *ASCE Web site: http://www.asce.org/govnpub/start.html*.

Do Natural Disasters Lead to the Deliberate Ending of Human Life?

On February 5, 1998, the ***New England Journal of Medicine*** (Vol. 338, No. 6, pp. 373-378) presented the paper "Suicide After Natural Disasters," by Etienne G. Krug, Marcie-Jo Kresnow, John P. Peddicord, Linda L. Dahlberg, Kenneth E. Powell, Alex E. Crosby, and Joseph L. Annest. The authors conducted an epidemiological study to determine whether natural disasters affect suicide rates and conclude that suicide rates increased in the four years after floods by 13.8%, in the two years after hurricanes by 31.0%, and in the first year after earthquakes by 62.9%. The authors computed rates for the entire United States and found that they were stable. However, the increases in suicide rates following disasters were found for both sexes and for all age groups. Interestingly, suicides rates did not change significantly following tornadoes or severe storms. The authors conclude that this increase in suicide rates following severe earthquakes, floods, and hurricanes confirms the need for mental health support after severe disasters.

Below, David Alexander, professor of Geography, University of Massachusetts at Amherst, comments on the research. His remarks are followed by a response from the study's authors.

Point: Does a Link Really Exist?

Considerable interest has been generated by a recent article in the ***New England Journal of Medicine*** that suggests there is a causal relationship between natural disasters and suicide rates. The latter are supposed to increase as a result of post-traumatic stress disorder and depression in the wake of catastrophe. I would urge caution in accepting these findings, for they may be hard to verify in both statistical and causal terms. The same is true of the impact of natural disasters on murder rates.

My interest in the field was first stimulated by an attempted murder that I witnessed three days after a major earthquake disaster. It occurred late one night in the eerie glow of a sodium street lamp. One man, who was evidently profoundly disturbed by the earthquake, had got his hands around the neck of another and was attempting to throttle him. His victim lost consciousness and was within seconds of losing his life when other survivors realized what was happening, and 20 or 30 of them jumped onto the attacker and immobilized him. The reader may wonder what I did at this time. I regret that I stood rooted to the spot by fear and amazement. Unfortunately, academic researchers are seldom men [or women] of action! The episode, and the disaster that preceded it, left me profoundly depressed, but instead of taking my own life I decided to conduct some research into the subject.

I looked at the rates of both attempted and successful murders and suicides for a selection of countries and regions that had been affected by natural disasters during the periods covered by the data. After weeks of poring over statistical bulletins I gave up, as I could find no demonstrable link. In the first place, both murder and suicide are normally highly seasonal phenomena. Typically, in western, economically developed countries suicides peak in spring, with a secondary peak in late summer and a trough at Christmas. These fluctuations are slightly more pronounced for the 20- to 30- year-old age-group and for males than females. Evidently, in springtime, a young man's fancy turns, not so much to love, as to doing away with himself! One can speculate for hours on why such trends exist, but the tables of data are mute about the causes. Though murders and suicides after disaster tend to be highly publicized events, they are usually too few to make a dent in the statistics and the additional numbers are easily subsumed into the gigantic fluctuations that would have occurred regardless of natural disaster. Thus, 43,000 people were injured and 300,000 left homeless by the Kobe earthquake of January 1995, but Japanese researchers reported only eight confirmed cases of suicide among the survivors.

Causality is a thornier problem than statistical validity. We may hypothesize that disasters provoke drastic psychological reactions that can lead to the deliberate ending of human life. But, equally, after natural catastrophe there may be more solidarity, social participation, policing, and mental health counseling, all of which mitigate against the drastic solution. In any case, who is to say that the suicide victim or murderer would *not* have done the deed in the absence of disaster?

As with the victims of heart attack (acute myocardial infarction), there *is* an apparent causal link with disaster, but the figures are generally too small in relation to the usual trends for one to be very definite about it. Moreover, how long after disaster can a suicide or murder take place in order to be linked with

it? On the one hand, traumatic events can lead to the taking of life many years later (for example, Primo Levi committed suicide more than 40 years after he was released from Auschwitz, and apparently as a delayed reaction to his incarceration there). But on the other hand, the longer the time that elapses, the more likely it is that factors unconnected with the disaster will intervene to sway the balance.

In short, it is all part of the mystery of the human condition.

David Alexander, Professor of Geography, University of Massachusetts at Amherst

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Counterpoint: Suicide Rates Increase after Natural Disasters

We thank Dr. Alexander for his interest in our study of suicide after natural disasters.(1) We analyzed suicide rates in 377 U.S. counties affected by a single natural disaster between 1975 and 1993. Comparisons were made between pre- and post-disaster suicide rates for the disaster counties and for the entire United States. We found that suicide rates increased in the four years after floods by 13.8% ($p<0.001$), in the two years after hurricanes by 31.0% ($p<0.001$), and in the first year after earthquakes by 62.9% ($p<0.001$). Rates computed in a similar manner for the entire United States increased by less than 1.3%. We concluded from our study that suicide rates increase after severe earthquakes, floods, and hurricanes. Our findings highlight the importance of suicide as a public health outcome of natural disasters.

Dr. Alexander urges caution in accepting these findings and states that they are difficult to verify in both statistical and causal terms. While it is true that some of the previous studies on the psychological effects of disasters are methodologically weak and inconclusive,(2) our study utilized rigorous epidemiological and statistical methods. The population included in our study was large--19,453,931 people lived in the 377 counties at the time of the disasters. Baseline information was available, which allowed us to compare suicide rates before the disasters with rates after the disasters. We also compared suicide rates in the affected counties with those of a control group (the entire United States). Previous research has not been able to find a link between suicides and natural disasters, in part, because the focus has been on only one disaster (e.g., Hurricane Andrew) and the population affected by the disaster has been too small to make significant comparisons between pre- and post-disaster suicide rates.(3),(4) Research that has examined countries or regions, such as that conducted by Dr. Alexander, is also not likely to find a link between suicides and natural disasters. The entire population of a country is rarely affected by a disaster; therefore, the effects of the disaster on suicide rates are not likely to be detectable at the country or region level--a point demonstrated in our study (again, rates for the entire U.S. increased by less than

1.3%).

Dr. Alexander raises a number of other issues, including the seasonality of suicide rates; the possibility that factors other than the disaster may have precipitated the suicides; and the possibility that after a natural catastrophe there may be more solidarity, social participation, and mental health counseling. While it is true that suicide rates peak in the spring months, seasonality is not an issue in our study because we used annual, instead of monthly, suicide data. Trends over several years were also taken into account by comparing rates in disaster counties to rates in the United States as a whole.

We do not know the precise reasons why people commit suicide in the aftermath of a natural disaster. More research is clearly needed in this area. The patterns seen in our data do not support the notion that the suicide victims would have done the deed in the absence of the disaster. Finally, counter to what Dr. Alexander has hypothesized, previous research shows a decrease in the feeling of social support and integration after a natural disaster.(5)

Dr. Alexander concludes that, in short, [suicide] is all part of the mystery of the human condition. Here too we have to disagree. Suicide is an important public health problem. It is our duty as public health officials to understand suicidal behavior and to prevent it.

Etienne G. Krug, M.D., M.P.H.
Linda L. Dahlberg, Ph.D.
Centers for Disease Control and Prevention

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2. Bromet, E., and Dew, M.A.. Review of Psychiatric Epidemiologic Research on Disasters, ***Epidemiological Review*** 1995, 17: 113-9.

3. Imamura, K. Mental Health in Japan [letter]. ***Lancet*** 346 (8973): 509-510.

4. Lew, E.O., and Wetli C.V. Mortality from Hurricane Andrew, ***Journal of Forensic Science*** 41 (3): 449-52.

5. Kaniasty, K., Norris, F., and Murrell, S.A., Received and Perceived Social Support Following Natural Disaster, ***Journal of Applied Psychology*** 20: 85-114.

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The Internet Page(s)

These are some of the latest Internet resources we've discovered. For a list of selected Internet/Web sites dealing with hazards and disasters, see *http://www.colorado.edu/hazards/sites/sites.html*.

Desertification Web Sites

[Adapted from ***Tiempo***, a newsletter on global warming published by the International Institute for Environment and Development and the University of East Anglia]

http://ag.arizona.edu/OALS/oals/oals.html
http://ag.arizona.edu/OALS/ALN/ALNHome.html
The first URL is the home page of the Office of Arid Land Studies, University of Arizona. The site offers information about the office and its many programs and announcements, as well as access, via the second URL, to the ***Arid Lands Newsletter***, an informative bulletin covering desertification and related issues.

http://ag.arizona.edu/OALS/IALC/Home.html
http://ag.arizona.edu/OALS/IALC/links/1stlevel.html
The International Arid Lands Consortium (IALC) is an independent, nonprofit research organization supporting ecological sustainability in arid and semiarid lands worldwide. The first page listed above provides information about the IALC's mission, activities, and member institutions. It also offers the IALC on-line newsletter and a directory of arid lands researchers. The second URL provides numerous links to other Internet resources dealing with arid lands and desertification.

Wind Engineering Web Sites

[Adapted from ***The Wind Engineer***, the newsletter of the American Association for Wind Engineering]

http://www.civil.buffalo.edu/wind/windhp.html
The Department of Civil Engineering, State University of New York at Buffalo, maintains several pages of wind engineering information on the World Wide Web. They include general information about wind

hazards, a list of wind engineering meetings, links to wind-related Web sites, a list of information sources for residential wind damage and wind-resistant design, information about the American Association for Wind Engineering (AAWE), copies of the AAWE newsletter, and the complete text of the AAWE report ***Wind Engineering: New Opportunities to Reduce Wind Hazard Losses and Improve the Quality of Life in the USA***.

http://rongo.ce.jhu.edu/aawe/
The home page of the AAWE (see above) is available at this address.

http://www.nd.edu/~nathaz
The Natural Hazards Laboratory at the University of Notre Dame studies the effects on structures of wind, waves, earthquakes, and other natural phenomena. The lab is currently developing a program for undergraduates to participate in hazard engineering research, as well as a database related to this research, and information about both projects is available from this site.

http://www.ce.ttu.edu/wind/main.html
Texas Tech University is the home of the Wind Engineering Research Center, which conducts interdisciplinary research on the effects of wind on civil engineering infrastructure, including buildings, bridges, transmission-line towers, and various other structures. The center's Web site provides a complete description of the institution's programs, lists center publications, explains research and other projects that have been undertaken, offers research data and findings, and provides links to other useful Internet resources.

Volcanoes

http://volcanoes.usgs.gov/
http://www.avo.alaska.edu
http://vulcan.wr.usgs.gov/home.html
http://hvo.wr.usgs.gov/
http://quake.wr.usgs.gov/VOLCANOES/LongValley
The U.S. Geological Survey (USGS) Volcano Hazards Program Web site encompasses pages entitled Hazards Posed by Volcanoes (What They Are, Where They Are, Their Effects); About the Volcano Hazards Program (Monitoring Volcanoes, Reducing Volcanic Risk, Highlights, USGS Volcano Observatories); Volcanoes of the United States (Current Activity, Historic Eruptions); and Products, Services, and Information (Photoglossary, Warning Schemes, Selected Products, Frequently Asked Questions). In addition, the Volcano Hazards page is linked to the individual volcano observatory sites (Alaska, Cascades, Hawaii, and Long Valley), each of which offers additional information about both the volcanic hazards of their specific region and volcanoes generally.

http://www.usgs.gov/education/learnweb/volcano/index.html
For persons wanting to teach or learn volcano basics, the USGS also offers this Volcanoes in the

Learning Web page, which includes basic information about volcanoes, volcano lesson plans and teaching activities, and links to several Internet-based activities, including a virtual reality model of Mount St. Helens.

Wildfire

http://www.neotecinc.com/wildfire
http://www.neotecinc.com/wildfire/safetysummary.html
The ***Wildfire Magazine*** Web site, which we've mentioned before, offers all kinds of information about the incendiary hazard, including excerpts and previews from the magazine; recent wildfire news; a wildfire calendar of meetings, training, and other events; lists and catalogs of publications and journals available from the International Association of Wildland Fire; databases, directories, and bibliographies; access to the association's library services; tips on wildfire safety; and much more. Of particular note, the site now includes the complete recommendations, abstracts, and some complete papers from the Canada/U.S. Fire Safety Summit held in Rossland, British Columbia, last fall.

http://www.nifc.gov
The National Interagency Fire Center, in Boise, Idaho, is the nation's primary logistical support center for wildland fire suppression. The center is home to federal wildland fire experts from such diverse fields as fire ecology, fire behavior, technology, aviation, and weather. Working together and in concert with state and local agencies, NIFC's role is to provide national response to wildfire and other emergencies and to serve as a focal point for wildland fire information and technology. The NIFC Web site provides current fire information (including daily incident management situation reports, National Weather Service fire weather forecasts, and national fire news), information about and links to cooperating agencies, and other information about NIFC projects.

Floods

http://water.swc.state.nd.us/Devils_Lake/home.html
The Devil's Lake On-line Web site is a unique Internet offering, focusing on a single emerging flood hazard--the rising waters of this upper Great Plains lake. Produced by the North Dakota State Water Commission, the site includes assorted situation reports; news from and about the various groups, organizations, and governmental agencies dealing with the flooding; and the full text of ***Devils Lake Flood, Managing the Problem***--a document prepared by a broadly based flood task force that outlines a multifaceted strategy to combat the problem.

http://www.paweekly.com/paw/morgue/1998_Feb_11.home.html
The ***Palo Alto Weekly*** newspaper provided extensive coverage, including background information, of recent El Niño-related floods in the San Francisco Bay area. We found one article--FEMA Map Proves Nearly Accurate--particularly interesting; it discusses how actual flooding in the Palo Alto area accurately reflected flooding predicted by FEMA/Federal Insurance Administration Flood Insurance Rate Maps. (The hard copy edition of the newspaper includes an actual map overlay comparing the two

areas).

http://www.outlook.noaa.gov
This page from NOAA's National Weather Service (NWS) Hydrological Program presents the hydrological outlook for various regions of the country, including information on possible spring flooding. The site also offers recent Department of Commerce/NOAA/NWS news releases on potential flooding, other information from the Office of Hydrology and NWS, and, a new page on the Department of Commerce's contribution to the Natural Disaster Reduction Initiative (NDRI--see below).

Everything Else

http://www.csc.noaa.gov/
http://www.csc.noaa.gov/gisbib
http://www.csc.noaa.gov/CID
http://www.csc.noaa.gov/test/alabama_cd.html
The NOAA Coastal Service Center (CSC) Web site includes several resources, available from the URLs above, that could be useful to coastal hazard managers:

- An ***International Bibliography of GIS Applications for Coastal Managers***, including over 1,200 entries;
- ***The Coastal Information Directory***, which includes a search tool for simultaneously locating sources of coastal data and information from various databases throughout the country;
- Information about, and an on-line preview of, a CD-ROM on coastal hazards.

The CSC site also provides information about CSC library services, coastal mapping and remote sensing, grant opportunities, the Coastal Change Analysis Program, and other CSC projects. Additional information about these resources is available from the *NOAA Coastal Services Center, 2234 South Hobson Avenue, Charleston, SC 29405-2413; (803) 974-6200, (800) 789-2234; fax: (803) 974-6224; e-mail: clearinghouse@csc.noaa.gov*.

http://www.ceos.noaa.gov
The Committee on Earth Observation Satellites (CEOS) conducts a Disaster Management Support Project to strengthen natural and technological disaster management on a worldwide basis by fostering improved use of existing and planned earth observation satellite data. Supporting the committee's work, the National Oceanic and Atmospheric Administration has launched this Web site to provide ongoing satellite data on volcanic ash, floods, tropical storms, wildfires, El Niño, earthquakes, droughts, and oil spills. It also provides special coverage of emerging crises, such as the recent fires in Indonesia, as well as background information about the project.

http://www.sustainable.doe.gov
The Department of Energy's Center of Excellence for Sustainable Development redesigned Web site

includes an extensive section on disaster planning that contains segments on key principles, case studies, codes/ordinances, articles/publications (lots of good ones), educational materials, and other resources. These pages offer information on how long-term community sustainability can be incorporated into disaster preparedness, mitigation, and recovery.

http://www.ema.gov.au

The redesigned Emergency Management Australia (EMA) Web site includes sections on personal safety; school resources; government policy and programs; general emergency management information; current issues in emergency management; the Australian International Decade for Natural Disaster Reduction program; upcoming conferences, training, and other events (searchable by date, subject, etc.); and research and program grants available from EMA.

The EMA site also provides direct access to the Australian Emergency Management Institute (AEMI) library catalog, comprising 10,000 items and about 12,000 abstracts of journal articles, and to copies of ***INFOrecent***, AEMI's quarterly bulletin of information on new publications and other materials received by the library.

The site is linked to the Australian Hazards Research and Researcher Database--*http://www.es.mq.edu.au/NHRC*--a fully searchable on-line index that includes synopses, complete contact information, and other details about various hazards research projects in the Australia-South Pacific region.

http://www.agso.gov.au/geohazards/hazards.html

Also from down under, this page from the Australian Geologic Survey Organisation (AGSO) offers information on urban geologic hazard risk and vulnerability assessment, earthquake research and seismic hazards, natural hazards mapping in Australia, nuclear test monitoring and geomagnetic research, and regional volcanism and tectonics. Several products and services are available on-line, including a guide to landslide survival and property protection.

http://www.rsc.ca/idndr/

The Canadian National Committee (CNC) for the International Decade for Natural Disaster Reduction (IDNDR) was established under the auspices of the Royal Society of Canada and the Canadian Academy of Engineering to develop a national program to mitigate natural disasters in Canada and to provide leadership in pursuing that goal. The committee now publishes its newsletter, ***Action***, exclusively on the CNC-IDNDR Web site. The site also offers background information about the committee and its work, lists upcoming events and new publications, and provides links to other useful sites and sources of information.

http://rmlectc.dri.du.edu/npstc/

Formed May 1, 1997, the National Public Safety Telecommunications Council (NPSTC) is a federation of associations and government agencies involved with and concerned about public safety telecommunications. The NPSTC Web site includes more information about the council, press releases, the full text of the National Institute of Justice report, ***State and Local Law Enforcement Wireless***

Communications and Interoperability, and several other reports.

http://WWW.nena9-1-1.org/
This is the Web site of the National Emergency Number Association (NENA)--an organization with over 5,000 members concerned about the effective use of 911 emergency telephone communications. NENA's mission is to foster the technological advancement, availability, and implementation of a universal emergency telephone number system. The association promotes research, planning, training, and education in order to further the protection of human life, the preservation of property, and the maintenance of general community security.

http://www.contingencyplanning.com
Contingency Planning and Management magazine now offers this Web site--a global information network for the business continuity community. Users can search the magazine section index for a broad range of articles on business continuity subjects, browse a knowledge base section for information on products and services available from over 500 suppliers, participate in an on-line forum, receive purchasing advice, take a look at surveys of personnel involved in contingency planning, and participate in user surveys (the site is currently soliciting opinions regarding mitigation incentives).

The National Disaster Reduction Initiative

http://www.outlook.noaa.gov/ndri.htm
The National Disaster Reduction Initiative (NDRI) is a federal interagency effort involving several important new or expanded activities to mitigate and reduce the costs of natural disasters. Developed by the National Science and Technology Council's Subcommittee on Natural Disaster Reduction, the enterprise is part of the Clinton administration's effort to apply the tools of federal agencies to save lives, reduce costs, and lower the risks of natural disasters.

To support NDRI, an allocation of about $155 million in new funds has been proposed for fiscal year 1999. Among the requests, the Federal Emergency Management Agency (FEMA) has asked for an additional $20 million to support Project Impact (see the ***Observer***, Vol. XXII, No. 3, p. 10). The Department of Commerce's Economic Development Administration (EDA) is seeking $14 million to jump-start postdisaster economic recovery assistance and to aid mitigation planning. The U.S. Geological Survey would add $15 million to support development of the Global Disaster Information Network (GDIN--see the ***Observer***, Vol. XXII, No. 4, p. 3). The Departments of Agriculture and Interior would add an additional $22 million for research on forest fire management. The National Institutes of Science and Technology would gain an additional $3 million for wind, seismic, and fire research. And the Army Corps of Engineers would receive an additional $25 million for ecosystem restoration, flood hazard mitigation, and its Challenge 21 program to pursue nonstructural approaches to flood damage reduction.

The National Oceanic and Atmospheric Administration's FY 1999 budget request includes $55 million under NDRI for new activities in two critical areas: 1) providing the best possible warnings and information to prevent damage and permit escape during hazard events, and 2) providing information and techniques to lower the vulnerability and increase the resiliency of people and property before and after events. These efforts would result in more accurate and timely warnings and forecasts for weather-related and other natural disasters and the provision of information on the risks and costs of natural disasters in the nation's valuable coastal communities--some of the areas hardest hit by natural hazards. The budget increase will also support the development of techniques to mitigate the impacts of other natural hazards, measures to reduce the introduction and spread of nonindigenous species that threaten coastal fisheries, and research for dealing with other coastal hazards such as harmful algal blooms and the growing hypoxic dead zone in the Gulf of Mexico.

[Adapted in part from the ***NCCEM Bulletin***--the newsletter of the National Coordinating Council on Emergency Management]

Washington Update

FEMA Announces Results of Evaluation of State Disaster Readiness

According to the Federal Emergency Management Agency (FEMA), states have the basic capabilities in place to respond to disasters. On March 5, 1998, FEMA released its national study, ***The State Capability Assessment for Readiness Under the Federal/State Performance Partnership Agreement*** (1998, 144 pp., free), which contains a report to the Senate Committee on Appropriations that outlines FEMA's efforts to assess national emergency management capabilities as well as state levels of preparedness. It also discusses federal and state strategies to improve areas that are not meeting state expectations and requirements.

FEMA and the National Emergency Management Association (NEMA) jointly developed the Capability Assessment for Readiness (CAR), and from June to August 1997, 56 states, territories, and insular areas evaluated their capabilities in 13 emergency management functional categories. Detailed results for each category are presented in the report. According to FEMA, the use of CAR has resulted in a national set of performance criteria, all of which have been overwhelmingly accepted by the states as a baseline, and several states plan to use the results in the development of their state strategic plans.

State Strengths

Overall, the emergency management functions that demonstrated the greatest strengths are:

- **Laws and authorities**--the legal authorities for the development and maintenance of an emergency management program, including definition of emergency management powers,

authorities, and responsibilities;
- **Exercises**;
- **Operations and procedures**; and
- **Finance and administration**;

The areas that scored particularly well related to radiological and chemical stockpile emergency preparedness, military support planning between states and military installations, and state implementation of federal public assistance and hazard mitigation grants.

Areas Needing Improvement

The functions needing greater attention include:

- **Resource management**--the prompt and effective use of personnel and equipment for essential emergency functions;
- **Hazard identification and risk assessment**, and
- **Logistics and facilities**--the essential facilities and services to support response and recovery operations.

Areas most needing improvement included activities related to response to terrorist incidents, disaster housing, and coordination between state emergency management agencies and the private sector.

The Middle Ground

The remaining areas that were evaluated include:

- **Hazard management**--implementing a systematic approach to eliminating or mitigating the impacts of significant threats to a jurisdiction;
- **Planning**--developing, promulgating, and maintaining a comprehensive emergency management plan, action plans, and mitigation plans;
- **Direction, control, and coordination**--ensuring the capabilities of the chief executive and key officials to manage response and recovery operations;
- **Communications and warning**;
- **Training**; and
- **Public education and information**.

Finally, the study concluded states that faced higher risk from hurricanes, floods, chemical stockpile, and nuclear power facilities had higher capabilities than other states, confirming that the special emphasis placed on mitigation and preparedness for these hazards by the federal government and the states has contributed to a much higher level of readiness.

Copies of the report are available from the *FEMA Publications Distribution Facility, 8231 Stayton*

Drive, Jessup, MD 20794; (800) 480-2520 or (800) 646-3484; fax: (301) 497-6378. Copies are also available via the World Wide Web at *http://www.fema.gov/pte* in PDF format, and an Adobe Acrobat™ viewer is required.

Witt Announces Ice Storm Recovery Plan

On March 14, 1998, FEMA released the federal action plan ordered by President Clinton for the long-term recovery of the Northeast following extensive ice storms in January, ***A Blueprint for Action: The President's Plan for Recovery from the January 1998 Ice Storm in Maine, New Hampshire, New York and Vermont*** (1998, 27 pp., free).

Developed by the President's Long-Term Recovery Task Force, the plan identifies six critical concerns that must be addressed for long-term recovery to be successful. The primary concern is loss of electrical power that caused loss of lives, commerce, and agricultural production. Other concerns are damage to forests and trees, the effects on recreation and tourism, health and safety issues, and special population needs.

In response, the president's plan directs:

- FEMA to incorporate construction upgrades in the permanent restoration of eligible damaged utilities to help reduce the risk of subsequent storm-related power outages;
- The U.S. Department of Energy to spearhead an effort with FEMA, the U.S. Department of Agriculture's (USDA) Rural Utilities Service, and the Army Corps of Engineers Cold Regions Research and Engineering Laboratory to develop a strategy for protecting utilities from future ice storm losses;
- USDA and the Small Business Administration to review their legislative authorities and disaster delivery processes to identify potential federal assistance or private insurance that may supplement recovery efforts;
- USDA's Forest Service to form an integrated partnership between federal and state agencies for developing a recovery and restoration strategy for rural and urban trees, forests, and ecosystems that were devastated by the ice storms;
- The U.S. Department of Housing and Urban Development, the U.S. Department of Commerce's Economic Development Administration, and all other federal agencies with long-term recovery functions to assist the affected areas in choosing the most suitable route to recovery;
- FEMA to follow up the task force effort with a retreat this summer to monitor the progress of the plan and to identify other, as yet unknown, long-term impacts; and
- USDA to develop immediately a single point of contact to serve as an ombudsperson to affected states and as a participant in Disaster Recovery Center operations.

The plan also discusses recommendations for long-term recovery objectives and details the wide range of grants, loans, and technical assistance the federal government offers.

A printed copy of the plan can be ordered from the FEMA Publications Distribution Center at the address on the previous page. In addition, a Microsoft Word™ format document can be downloaded from the FEMA Web site: *http://www.fema.gov/library/ne_lt_pln.doc*.

FEMA Revises Flood Insurance Booklet

FEMA recently published a new version of its booklet, ***Answers to Questions About the National Flood Insurance Program*** (1998, 63 pp., free) to reflect changes mandated by the National Flood Insurance Reform Act of 1994 (see the ***Observer***, Vol. XIX, No. 2, p. 8). Intended to provide the public with basic information about flood insurance, the booklet addresses all facets of the National Flood Insurance Program (NFIP), including flood insurance requirements for property owners, details of coverage, and procedures for filing claims. It also provides information on community requirements for participation in the program, flood hazard assessments, and mapping.

In addition to answering the most frequently asked questions about flood insurance, the booklet lists other NFIP publications; addresses and telephone numbers of NFIP and FEMA regional offices and state coordinating agencies; and sources of technical data and materials, including floodplain management studies, flood insurance rate maps, and flood mitigation guidelines for individuals and communities.

Copies of the booklet can be obtained from the *FEMA Publications Distribution Facility, 8231 Stayton Drive, Jessup, MD 20794; (800) 480-2520 or (800) 646-3484; fax: (301) 497-6378*. The full text of the booklet is also available on FEMA's Web site: *http://www.fema.gov/nfip/*.

GAO Looks at Federal Disaster Mitigation Efforts

Most hazard mitigation, like politics, is local, although state and local governments do not always undertake mitigation activities. So stated Stanley Czerwinski, Associate Director of the General Accounting Office, Housing and Community Development Issues, Resources, Community, and Economic Development Division, as he testified recently before the House of Representatives on federal disaster mitigation. His comments are available in the recently released report, ***Disaster Assistance: Information on Federal Disaster Mitigation Efforts*** (Statement for the Record, GAO/T-RCED-98-67, 1998, 9 pp., free).

Czerwinski notes that local mitigation efforts are often inhibited by local sensitivity to building code enforcement and land-use planning, conflict between mitigation and development goals, and individual perceptions that the possibility of a disaster is low.

He also discusses the various forms of assistance FEMA provides for mitigation, including grants, training, funding for mitigating damage to facilities, funding for purchasing and converting flood-prone properties to open space, federal flood insurance, and programs aimed at reducing losses from earthquakes and fires. In recent years, FEMA has developed a 15-year mitigation strategy and established five-year mitigation objectives within that strategy.

Czerwinski believes that, under existing approaches, it is uncertain that federal funds are effectively targeted to projects where the risk of loss is greatest. This is due to limitations on risk data and to the many disparate sources of hazard mitigation funds. He concludes that the extent to which mitigation projects will result in federal dollar savings is uncertain, depending upon the actual incidence of future disasters and the extent to which the federal government will subsidize the resulting loss.

Copies of this report are available from the *GAO, Document Distribution Division, P.O. Box 6015, Gaithersburg, MD 20884-6015; (202) 512-6000; fax: (301) 258-4006; e-mail: info@www.gao.gov; WWW: http://www.gao.gov*. The complete text of the report is also available via the Internet at *http://www.access.gpo.gov*.

NAPA Recommends Cautious Approach to Seismic Safety

Congress recently requested that the National Academy of Public Administration (NAPA) assist FEMA in identifying ways to make federal standards to improve the seismic safety of federally owned and leased buildings apply to other existing buildings. The panel examined a number of alternatives, mentioned in our last issue (see the ***Observer***, Vol. XXII, No. 4, p. 8), and concluded that a cautious and carefully targeted approach would be the best option to pursue. However, in that issue we neglected to provide enough information on the important conclusions of that effort.

Thus, the panel recommended this approach include:

- Using federal aid planning programs strategically to encourage seismic rehabilitation, particularly in states and territories with very high, high, or moderate risk;
- Emphasizing incentives and voluntary compliance, rather than mandates for reducing risk in existing buildings;
- Targeting the use of current federal standards to a limited number of federal aid and regulatory programs.
- Using existing federal aid to assist in the development of state and territorial earthquake information, awareness programs, coordination efforts, and their ability to address seismic issues;
- Improving performance measures in the National Earthquake Hazard Reduction Program;
- Incorporating seismic safety programs into multihazard emergency management programs;
- Publicizing good mitigation practices;
- Providing federal technical assistance on seismic safety;

- Requiring the use of the current federal standards for seismic safety in existing buildings under 33 selected federal aid programs that support community development and public facilities repair and renovation; and
- Conducting further studies to identify other opportunities for improving seismic safety.

The full report is no longer available. However, copies of the summary can be requested by sending a fax to *Bruce McDowell, NAPA, 1120 G Street, N.W., Suite 850, Washington, DC 20005-3821; (202) 347-3190; fax: (202) 393-0993; WWW: http://www.napawash.org.*

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Introducing EPC's NHEMATIS Project

Over the last few years, Emergency Preparedness Canada (EPC), in cooperation with several public- and private-sector partners, has been conducting extensive research on risk assessment and vulnerability regarding natural hazards in Canada. Because this is the International Decade for Natural Disaster Reduction, the Office of the Senior Scientific Advisor of EPC has embarked on a series of projects to be completed by the end of the decade. One such project, the Natural Hazards Electronic Map and Assessment Tools Information System (NHEMATIS), involves the development of a centralized, automated facility for the collection, presentation, and analysis of natural hazard information for Canada. NHEMATIS is being combined with data about population and infrastructure to enable diverse risk and vulnerability analyses.

NHEMATIS is intended to provide a number of significant benefits, including shared knowledge among hazard experts and national, provincial, and local organizations concerned about emergency preparedness and planning. It will also be a means of integrating the knowledge of professionals from complementary disciplines to support research. The system is currently in the third year of a four-year development process being conducted by a consortium of private companies and federal agencies.

NHEMATIS integrates an expert system rule base, geographic information system (GIS), relational databases, and quantitative models. When complete, the system will integrate information on all types of natural hazards, capture location-specific information, provide multi-layer analysis, and permit hazard-impact assessment modeling on selected areas of interest and hazard types. The current version of NHEMATIS provides:

- Advanced models for predicting earthquake damage due to shaking, liquefaction, landslides, and fire;
- A tool for estimating building damage due to earthquakes and other hazards;
- Tools for analyzing floods and landslides as separate hazards;
- Methods for incorporating advanced GIS techniques into analyses to enable increasingly accurate, realistic damage predictions for all hazards, but particularly for tornadoes;
- The capability to produce useful maps based on various hazard impacts;
- Extensive geographic databases for five main study areas (Vancouver, Regional Municipality of Ottawa-Carleton, Edmonton, Montreal, and Fredericton) and, additionally, a British Columbia regional study area to demonstrate the use of NHEMATIS at this broader scale;
- An enhanced user interface for selecting and managing study areas, specifying hazards, and creating map outputs; and
- New features made available by ArcView™ 3.0 GIS software.

Future development of NHEMATIS will focus on working with potential end users and further refining both the system and understanding of how it can best be packaged and used. For more information about

the NHEMATIS project, contact *Chris Tucker, Emergency Preparedness Canada, Second Floor, Jackson Building, 122 Bank Street, Ottawa, Ontario, Canada K1A 0W6; (613) 991-7071; fax: (613) 996-0995; e-mail: deval1@fox.nstn.ca*; or visit the *Emergency Preparedness Canada Web site: http://hoshi.cic.sfu.ca/epc/index.html*; or the *NHEMATIS Web site: http://www.essa.com/nhematis/index.html*.

EIIP Virtual Forum Expands Schedule

The Emergency Information Infrastructure Partnership (EIIP) recently enhanced its Virtual Forum Internet site with new software and upgrades that triple its audience capacity while permitting more effective discussion groups and mail lists. The EIIP uses these communication tools to promote sharing of information among emergency managers, educate users about the latest developments in emergency management programs and tools, and encourage networking. The EIIP also recently announced expansion of its Virtual Forum weekly schedule that allows emergency professionals to participate on-line three days a week:

- *Tuesdays, 1:00 p.m. (Eastern time)*--Informal brown bag session designed to promote open discussion of issues, education regarding on-line resources, and technical assistance.
- *Wednesdays, 12:00 noon (Eastern time)*--Moderated live on-line events, featuring speakers addressing a wide variety of emergency management topics.
- *Thursdays, 8:00 p.m. (Eastern time)*--Roundtable unmoderated discussions on a Topic of the Week with guest speakers.

For additional information, see the Virtual Forum Web site: *http://www.emforum.org* or contact *Avagene Moore, EIIP Coordinator, 1017 Hayes Road, Lawrenceburg, TN 38464-4007; (615) 762-4768; fax: (615) 762-7359; e-mail: amoore@emforum.org*; or, *Ashley Streetman, EIIP Outreach Coordinator, e-mail: astreetman@emforum.org*.

On the Line

Emergency Management Assistance Teams: Calling for the Cavalry During a Crisis

The local emergency manager is sound asleep. The alarm clock blinks 2:58 a.m. In two minutes, he will be jolted awake by a phone call reporting that several hazardous materials tank cars have derailed and the plume being generated by the released product may soon threaten the inhabitants of a small town in the northern half of his county. (When he's awake, he is the emergency manager of one of the more populous counties in Kansas, and his office is in a large governmental complex in the middle of the largest city in the county.) He is about to wish he had taken that early retirement.

The phone jangles.

A few frantic minutes later, he wipes his bleary eyes and speeds to the scene of one of the most dangerous hazardous materials spills in Kansas history. The spill threatens the lives and livelihoods of an entire town of 5,000 residents. The vapors released from the wrecked railroad tanker cars force the evacuation of all residents in a matter of a few hours. Soon, he finds himself not only acting as the county's emergency manager, but also the public information officer, resource manager, shelter coordinator, first responder support officer, and after the event, National Transportation Safety Board investigation team member.

This real-life event recently took place in Kansas in the jurisdiction of a fellow emergency manager, prompting me to evaluate numerous incidents I had heard about, read about, and participated in over the years. Many times I had listened sympathetically to the frustrations of emergency managers from the fiscally strapped, low-resource counties of rural Kansas who reported they had almost no capability to respond to large emergencies or disasters--especially no professional emergency management assistance to help them at a disaster scene. In particular, I realized how helpful it would be to be able to draw on the knowledge and expertise of others in the field who had dealt with similar incidents in the past.

Emergency Management Assistance Teams

A possible answer to these problems came to me--Emergency Management Assistance Teams (EMATs)--mutual aid for emergency managers.

My training prior to becoming an emergency manager was in the fire service, so the use of mutual aid agreements in emergency management seemed an obvious practice to adopt. Speedy support and response to other jurisdictions has long been a common practice in the fire service, performed without a second thought. I had been involved in many such sorties and fully understood how well they worked.

With this mutual aid concept as a foundation, I developed a short set of guidelines to define quick-response EMATs. I then introduced the idea at a meeting of the Northeast Emergency Coordinators of the Kansas Emergency Management Association (KEMA) in the fall of 1997. The idea met with strong support. Later, the president of KEMA agreed to take the concept to the KEMA Board of Directors and to the annual conference, which will be held September 16-18, 1998, in Wichita, where it will be introduced for discussion and further study.

The Proposal

The proposed EMAT guidelines are as follows:

- **Purpose**--the purpose of an Emergency Management Assistance Team (EMAT) is to assist a local emergency manager in the control of an emergency or disaster.

- **Definition of Emergency Management Assistance Teams**--EMATs are groups of local professional emergency managers (city and county) organized by KEMA management areas.

- **Concept of Operations**--when a large-scale emergency or disaster occurs, professional help is often needed quickly, and just as often is not available. EMATs are an attempt to get professional help quickly on site and to assist the emergency manager in need in the early and time-critical phases of a disaster. This does not mean that EMATs are quick response teams in the classic sense of small squads that go rapidly to an emergency scene and extinguish fires, rescue victims, apply first aid, etc.

  The mission of an EMAT is to arrive as quickly as possible after the call for assistance and to help the local emergency manager through the late response and early recovery periods of the crisis in an advisory and supervisory capacity.

  Activities of EMAT members may include: establishing a joint information center, serving as the public information officer, serving as a safety officer, assisting in shelter operations, assisting in donations management, supervising emergent volunteers, locating resources, coordinating various emergency responders, and supervising damage assessment. Other activities are clearly possible.

- **Requesting Assistance**--when a local emergency manager decides that assistance is needed from an EMAT, that person may request such help by contacting their local dispatch center and asking that the area EMAT be activated. The dispatch center will keep on file the current contact numbers for all members of the area EMAT and all the EMATs across the state.

- **Responding to the Request**--when called to respond, available EMAT members will proceed to the incident site, report to the emergency manager who requested the response, and begin the work assigned.

- **Releasing the EMAT**--EMAT members may return to their jurisdictions at their own discretion after notifying the local emergency manager.

If Emergency Management Assistance Teams are implemented statewide, victims of disasters will receive the best assistance available. In addition, besieged emergency managers across Kansas (and other states that might adopt similar agreements) may someday be able to breathe a sigh of relief--as EMAT cavalry come to their rescue.

Mike Penner, Emergency Management Director, Olathe, Kansas

For further information on this concept and updates on its implementation, contact the author at the *Office of Emergency Management, Box 768, Olathe, KS 66051; (913) 782-4500; fax: (913) 397-6370; e-*

mail: dmfd87a@prodigy.com.

Delaware's Donation to Hazards Research

Every year at this time, the Natural Hazards Center receives a generous donation of recent publications from the Disaster Research Center (DRC) at the University of Delaware, which engages in social science research on natural and technological disasters.

To purchase any of the preliminary papers listed below, contact the *DRC, Publications, University of Delaware, Newark, DE 19716; (302) 831-6618; fax: (302) 831-2091; e-mail: susan.castelli@mvs.udel.edu; WWW: http://www.udel.edu/DRC/*. Add 10% to all orders for shipping.

#246 ***Policy Issues for Post-Disaster Mitigation: The Need for a Process***, by Joanne M. Nigg. 1996. 8 pp. $5.00.

#247 ***Research Based Criteria for Evaluating Disaster Planning and Managing***, by E.L. Quarantelli. 1997. 34 pp. $5.00.

#248 ***Coming to Terms with Community Disaster***, by Russell R. Dynes. 1997. 27 pp. $5.00.

#249 ***Sociological Theories and Disaster Studies***, by Robert A. Stallings. 1997. 22 pp. $5.00.

#250 ***Emergency Response Following the 1994 Northridge Earthquake: Intergovernmental Coordination Issues***, by Joanne M. Nigg. 1997. 8 pp. $5.00.

#251 ***Comments on the Second Assessment***, by Russell R. Dynes. 1997. 4 pp. $5.00.

#252 ***The Computer Based Information/Communication Revolution: Ten Problematical Issues and Questions They Raise for Disaster Planning and Managing***, by E.L. Quarantelli. 1997. 16 pp. $5.00.

#253 ***Research Overview: Emergency Response***, by Kathleen J. Tierney. 1997. 8 pp. $5.00.

#254 ***The Disaster Research Center (DRC) Field Studies of Organized Behavior in the Crisis Time Period of Disasters***, by E.L. Quarantelli. 1997. 22 pp. $5.00.

#255 ***The Lisbon Earthquake of 1755: Contested Meanings of the First Modern Disaster***, by Russell R. Dynes. 1997. (Page count not available.) $5.00.

#256 ***Future Disaster Trends: Implications for Programs and Policies***, by E.L. Quarantelli. 1997. 50

pp. $5.00.

#257 ***Business Disruption, Preparedness and Recovery: Lessons from the Northridge Earthquake***, by Kathleen J. Tierney and James M. Dahlhammer. 1997. 16 pp. $5.00.

#258 ***Financial Crisis in the Context of Disaster Theory: Recent U.S. Case Studies***, by Patrick Dynes and Russell R. Dynes. 1997. 25 pp. $5.00.

#259 ***Establishing a Global Disaster Information Network (GDIN): Problematical Aspects***. 1997. 12 pp. $5.00.

#260 ***Emergency Response: Lessons Learned from the Kobe Earthquake***, by Kathleen J. Tierney and James D. Goltz. 1997. 15 pp. $5.00.

#261 ***Natural Hazards and Disasters***, by Joanne M. Nigg and Dennis Mileti. 1997. 50 pp. $5.00.

Conferences And Training

Below are the most recent conference announcements received by the Hazards Center. A comprehensive list of hazard/disaster meetings is posted on our World Wide Web site: *http://www.colorado.edu/hazards/conf.html.* While we make every effort to ensure that the following Web-site addresses are accurate and up to date, periodically they are changed without our knowledge. If you find that one of our addresses is no longer working, please let us know by sending an e-mail to *hazctr@colorado.edu*.

15th Annual Conference of the ALERT (Automated Local Evaluation in Real Time) Users Group. Palm Springs, California: May 26-29, 1998. The ALERT group is made up of users and others concerned with the operation of automated flood warning systems. The conference includes information about both the various systems available and their application. More information is available from *Dennis Gibbs, President, ALERT Users Group, c/o Santa Barbara County Water Agency, 123 East Anapamu Street, Santa Barbara, CA 93101; (805) 568-3543.*

GCIP Mississippi River Climate Conference. Sponsors: The GEWEX (Global Energy Water Cycle

Experiment) Continental-Scale International Project (GCIP), together with the NOAA Office of Global Programs, the Department of Energy, the American Geophysical Union, and the American Meteorological Society. St. Louis, Missouri: June 8-12, 1998. One focus of this conference is societal and environmental responses to climate variability and predictions. For details, see *http://www.ogp.noaa.gov/gcip/miss/missceleb.html*. Questions may also be directed to *Adrienne Calhoun, GCIP Project Office, NOAA Office of Global Programs, Silver Spring, MD 20910; (301) 427-2089, ext. 511; e-mail: calhoun@ogp.noaa.gov*.

1998 Association of Contingency Planners (ACP) International Symposium. Breckenridge, Colorado: August 24-26, 1998. The 1998 ACP symposium will include workshops on business recovery, community preparedness, disaster recovery planning, emergency management, computer applications, security issues, and voice and telecommunications use. Additional information is available from *Linda Haag, 1998 ACP Symposium, P.O. Box 3943, Englewood, CO 80155-3943; (303) 768-4369; fax: (303) 768-3191; WWW: http://www.acp-international.com*.

Disaster and After: An International Conference on the Practicalities of Information Service in Times of War and Other Catastrophes. Bristol, U.K.: September 4-6, 1998. This meeting will focus both on the difficulties of re-establishing and maintaining libraries and other information services affected by major catastrophes and on the issues faced by these services when documenting such calamities. For details, contact *Philip Thomas, 25 Bromford Gardens, Westfield Road, Edgbaston, Birmingham, U.K.; tel: +44 (0)121 454 0935; fax: +44 (0)121 454 7330; e-mail: pzdt@btinternet.com; WWW: http://www.la-hq.org.uk/conf.htm*.

Earthquake Prognostics World Forum on the Seismic Safety of Big Cities: Program of Action Against the Impact of Impending Earthquakes. Sponsors: International Commission on Earthquake Prognostics and the Turkish Earthquake Foundation. Istanbul, Turkey: September 21-25, 1998. The aim of this conference is to use lessons learned from recent events in order to focus available scientific and technical knowledge on preventive measures and disaster preparedness. It will address new approaches to understanding earthquake activity, hazard assessment, risk analysis and evaluation, protection measures, disaster preparedness and emergency control, public awareness and preparedness, earthquake scenarios for big cities, protection of cultural heritage, and seismic risk in environmental planning. For more information, contact *M. Hasan Boduroglu, Istanbul Technical University, Faculty of Civil Engineering, 80626 Maslak, Istanbul, Turkey; tel: +90-212-285-3797; fax: +90-212-285-6656; e-mail: bodurogl@sariyer.cc.itu.edu.tr; WWW: http://www.ins.itu.edu.tr/eaee/bigcities98.htm l*.

National Association of Flood and Stormwater Management Agencies (NAFSMA) 20th Anniversary Annual Meeting and Workshops. Denver, Colorado: September 22-26, 1998. The annual NAFSMA conference is a one of the nation's chief venues for the exchange of information and insight concerning flood and stormwater management. Details are available from *NAFSMA, 1401 Eye Street, N.W., Suite 900, Washington, DC 20005; (202) 218-4122*.

1998 Association of State Dam Safety Officials (ASDSO) Annual Conference. Las Vegas, Nevada:

October 11-14, 1998. The ASDSO invites all persons involved in ensuring dam safety to attend this year's annual conference and share their experiences. The conference will include presentations on seismic design and rehabilitation, as well as case studies of dam design and performance in seismic areas. For more information about the conference, contact *ASDSO, 450 Old Vine Street, Second Floor, Lexington, KY 40507; (606) 257-5140; fax: (606) 323-1958; e-mail: damsafety@aol.com*.

1998 Annual Meeting of the Eastern Section, Seismological Society of America. Millersville, Pennsylvania: October 19-20, 1998. Papers dealing with all aspects of seismology, seismicity, historical earthquakes, tectonics, seismic hazards, induced earthquakes, wave propagation, earth models, earth structure, earthquake engineering, sociological aspects of earthquakes, emergency management, public information, and education about earthquakes are invited, especially those with applications to eastern North America. The abstract deadline is September 18, 1998. Tentative theme sessions include: seismicity associated with continental rifts; current status of networks; induced seismicity; crustal structure and tectonics; building codes, earthquake engineering, and insurance; and earthquake hazards and emergency management. The conveners welcome suggestions for other theme sessions. Persons desiring more information or further announcements should contact *Charles K. Scharnberger, Department of Earth Sciences, Millersville University, P.O. Box 1002, Millersville, PA 17551-0302; (717) 872-3289; fax: (717) 872-3985; e-mail: cscharnb@uorander.millersv.edu; WWW: http://seismosoc.org/ssa/*.

Institute for Business and Home Safety (IBHS) Annual Congress. Orlando, Florida: October 22-23, 1998. The IBHS Congress focuses on key issues currently facing disaster management and mitigation, and speakers typically include national leaders in this field from government, private industry, and academia. For details about this year's congress, contact *IBHS, 73 Tremont Street, Suite 510, Boston, MA 02108-3910; (617) 722-0200; fax: (617) 722-0202; WWW: http://www.ibhs.org*.

Disaster Management: Crisis and Opportunity. Sponsor: Center for Disaster Studies, James Cook University. Cairns, Australia: November 1-4, 1998 (note: these are revised dates). This meeting will examine the many hazards and diverse communities at risk in the Asia-Pacific region. Topics include: hazard warnings and response, planning issues, community vulnerability, hazard awareness education, monitoring and forecasting, recovery, tourist industry implications, policy and institutional constraints, and economic impacts. For more information, contact the *Center for Disaster Studies, P.O. Box 6811, James Cook University, Cairns, Queensland 4870, Australia; tel: +61 7 4042 1215; fax: +61 7 4042 1214; e-mail: linda.berry@jcu.edu.au; WWW: http://www.tesag.jcu.edu.au/cds/cdsweb.htm*.

Local Authorities Confronting Disasters and Emergencies (LACDE) 1998 Annual Conference. Vina del Mar, Chile: November 30-December 3, 1998. Local Authorities Confronting Disasters and Emergencies (LACDE) is a nonprofit, international executive association that was formed following an initial international conference held in 1994. The aims of the organization are to increase the effectiveness of local authorities in coping with disasters and emergencies; to promote the study of disasters; to assist local authorities with related objectives; to develop international relationships among local authorities to prepare for potential disasters; to establish and maintain a permanent office for the collection, study, and

distribution of information in the field of disasters and emergencies; and to cooperate with the United Nations and other international organizations in matters of common interest. For more information about this third LACDE conference, contact *LACDE, Union of Local Authorities in Israel, 3 Heftman Street, Tel Aviv 61200, Israel; tel: 972-3-695-5024; fax: 972-3-691-6821; e-mail: ulais@netvision.net.il; WWW: http://www.ladpc.gov.il*.

Sixth U.S.-Japan Workshop on Urban Earthquake Hazard Reduction. Sponsors: Earthquake Engineering Research Institute (EERI) Committee on Urban Earthquake Hazard Reduction and the Japan Institute of Social Safety Science. Kobe, Japan: January 12-14, 1999. This workshop will provide an opportunity for participants to evaluate advances in response, recovery, and mitigation in the U.S. and Japan following the Northridge and Kobe earthquakes; to strengthen and expand existing collaborative relationships that have evolved over the past two decades between U.S. and Japan researchers and government officials; to identify issues that would benefit from greater collaborative research or professional interaction; and to publish findings for other researchers and practitioners. The meeting will be followed by a field tour of recovery and reconstruction projects in Kobe. The organizers seek abstracts on emergency response, health and societal impacts, recovery and reconstruction, and the built environment. Abstracts are due June 15. For detailed information, contact *Susan Tubbesing, Executive Director, EERI, 499 14th Street, Suite 320, Oakland, CA 94612-1934; (510) 451-0905; fax: (510) 451-5411; e-mail: skt@eeri.org; WWW: http://www.eeri.org*.

CPM '99: Contingency Planning and Management 1999 Annual Conference: Sponsor: ***Contingency Planning and Management*** *Magazine. New Orleans, Louisiana: April 21-23, 1999*. CPM '99 features both a conference and trade show on business continuity planning. The program includes novice and advanced classes on many aspects of contingency planning, and the organizers are currently seeking presentation proposals--particularly those addressing physical concerns, information technology/ telecommunications, resource management, and human issues. For details, contact *CPM '99, WPC Expositions, 84 Park Avenue, Flemington, NJ 08822; (908) 788-0343, ext. 135; fax: (908) 788-9381; e-mail: CPM99@witterpublishing.com; WWW: http://www.contingencyplanexpo.com*.

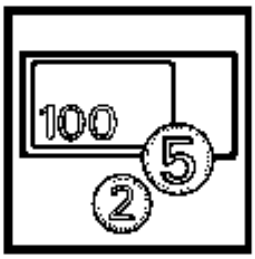
PROMIT 98 International Expo: Solutions for Natural and Man-Made Disasters and National Mitigation Summit. Chicago, Illinois: May 11-13, 1999. This conference will cover products, systems, services, technologies, programs, and authorities to reduce the costs and effects of natural and technological disasters and acts of terrorism. For more information, contact the *National Building Protection Council, 6300 Park of Commerce Boulevard, P.O. Box 3051, Boca Raton, FL 33487-8229l; (561) 988-0932; fax: (561) 241-1247; e-mail: nbpc@nbpc.org; WWW: http://www.promit.com*.

Eighth Canadian Conference on Earthquake Engineering. Vancouver, British Columbia, Canada: June 13-16, 1999. The Canadian Conference on Earthquake Engineering features presentations on topics for everyone from engineers to planners to geologists and others interested in the many aspects of seismic hazards to the built environment. A call for abstracts, due May 31, 1998, has been issued. For information, contact: *8th CCEE Conference Secretariat, c/o Department of Civil Engineering, University of British Columbia, 2324 Main Mall, Vancouver, B.C., Canada V6T 1Z4; fax: (604) 822-*

6901; e-mail: 8ccee@civil.ubc.ca; WWW: http://www.civil.ubc.ca/home/eq/conferences/.

Tenth International Conference on Wind Engineering (10ICWE). Copenhagen, Denmark: June 21-24, 1999. The International Conference on Wind Engineering provides a world-wide forum for the exchange of information regarding recent developments in, and applications of, wind engineering. The organizers are currently seeking papers in several broad areas: wind and civil engineering, wind climate, experimental methods, wind energy, industrial aerodynamics, risk and social impact, and codes and regulations. All papers will be published in a volume of conference proceedings, to be available at the conference. Selected papers will be reviewed for possible publication in the ***Journal of Wind Instrumentation and Engineering and Industrial Aerodynamics*** (***JWEIA***). Abstracts are due August 5, 1998. More information is available from the *10th International Conference on Wind Engineering, Danish Maritime Institute, Hjortekaersvej 99, DK-2800 Lyngby, Denmark, attn: Aage Damsgaard; tel: +45 45 87 93 25; fax: +45 45 87 93 33; e-mail: icwe99@danmar.dk; WWW: http://www.danmar.dk/icwe99*.

Twelfth World Conference on Earthquake Engineering. Sponsor: New Zealand National Society for Earthquake Engineering and others. Auckland, New Zealand: January 30-February 4, 2000. The aim of this conference is to bring together professionals and researchers from around the globe involved in the broad range of disciplines that focus on reducing the impacts of earthquakes on developed and natural environments. Abstracts are due September 1998. Additional information is available from the *Conference Secretariat, 12WCEE Organising Committee, c/o Convention Management, P.O. Box 2009, Auckland, New Zealand; tel: (649) 529-4414; fax: (649) 520 0718; e-mail: 12wcee@cmsl.co.nz; WWW: http://www.cmsl.co.nz/12wcee*; also see *http://www.eeri.org/Meetings/12WCEE.html*.



Contracts and Grants

An Investigation of Interaction Between Human and Automation Elements in Alerting Systems. Funding Agency: National Science Foundation, $50,000, 12 months. Principal Investigator: *Pamela McCauley-Bell, Industrial Engineering Department, University of Central Florida, Orlando, FL 32816-0150; (407) 823-6092; e-mail: bell@iems.engr.ucf.edu.*

This project will examine research conducted previously by the principal investigator on high risk, complex, automated systems for monitoring and controlling various environments. It will explore techniques and methods for successful human and intelligent system interaction with respect to

emergency alerting systems. It will evaluate human performance, including response time and accuracy of results, in response to alarm situations with and without the presence of an intelligent agent.

On-Line Weather Studies: Introduction to the Atmosphere Through the Use of Internet-Delivered Meteorological Information. Funding agency: National Science Foundation, $125,000, 24 months. Principal Investigators: *Ira W. Geer and Robert S. Weinbeck, American Meteorological Society, 45 Beacon Street, Boston, MA 02108-3631.*
In this project, the American Meteorological Society (AMS) will develop and implement a one-semester, introductory college-level, on-line, distance learning course on the fundamentals of atmospheric science in which students study weather as it happens. The course will include learning activities delivered via the Internet that use simulation modules and a weather-forecasting module. The AMS staff will produce the on-line component of the course and be available to local instructors for assistance.

Role of Insurance and Other Policy Instruments in Managing Catastrophic Risk. Funding agency: National Science Foundation, $388,839, 24 months. Principal Investigators: *Howard C. Kunreuther and Paul R. Kleindorfer, Risk Management and Decision Processes Center, The Wharton School, University of Pennsylvania, Philadelphia, PA 19104-6375; (215) 898-7607; fax: (215) 573-2070; e-mail: kunreuther@wharton.upenn.edu.*
Kunreuther and Kleindorfer will examine the roles of the private and public sectors in managing catastrophe risks due to natural hazards. The goal is to develop a feasible program for minimizing future losses through mitigation while enhancing the availability and reliability of financial protection against damage from natural hazards. Alternative incentive programs for encouraging property owners to adopt cost-effective mitigation measures will be designed and evaluated. Also, new private capital market initiatives, as well as public sector sources of funds when large-scale earthquakes or hurricanes occur, will be examined. The aggregate impact of both loss reduction intiatives and risk bearing and pooling policies will be evaluated using science-based micro-modeling approaches.

NSF Representation on Performance-Based Design Project Steering Committee. Funding agencies: National Science Foundation and Federal Emergency Management Agency (FEMA), $6,880, nine months. Principal Investigator: *Susan K. Tubbesing, Earthquake Engineering Research Institute, 499 14th Street, Suite 320, Oakland, CA 94612-1928; (510) 451-0905; fax: (510) 451-5411; e-mail: skt@eeri.org; WWW: http://www.eeri.org.*
As part of a cooperative agreement with FEMA, the Earthquake Engineering Research Institute (EERI) will produce an action plan outlining the necessary steps that must be taken to develop performance-based engineering design criteria and the tools necessary for engineers to communicate performance concepts to building owners, building officials, and other professionals. FEMA intends to use the plan to initiate a Performance-Based Design Program for new and existing construction. This funding will support a representative to the project steering committee to present the engineering research perspective.

GIS Applications in Tsunami Hazard Mitigation. Funding agency: National Science Foundation, $49,995, 12 months. Principal Investigators: *Philip L. Liu and Stephen D. DeGloria; 223 Hollister Hall,*

Cornell University, Ithaca, NY 14853-2801; (607) 255-5090; e-mail: plliu@bridge.tn.cornell.edu.

This project focuses on establishing the framework of a geographic information system (GIS) for tsunami hazard mitigation, using Hilo, Hawaii, as the site for preliminary development. Although the occurrence of a tsunami cannot be accurately predicted, it is necessary to focus on reducing damage through the use of the Tsunami Warning System and sound coastal zone management policies. GIS technology provides a tool for managing data and presenting results in a manner useful for disaster planning, hazard mitigation, and rehabilitation strategy. This project will develop a tool for use by engineers and planners to visualize data used in tsunami modeling to determine potential flooding areas, evacuation routes, and potential damage to structures and utilities in affected areas.

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Recent Publications

All Hazards

Financial Risk Management for Natural Catastrophes. *Neil R. Britton and John Oliver, editors. 1997. 283 pp. $50.00 (Australian). Purchase from Mary Chamond, Aon Group Australia Limited, Level 12, The Landmark, 345 George Street, Sydney 2000, Australia; fax: +61+2+9650 0210; e-mail: mary.chamond@aon.com.au.*

This volume is the proceedings of a seminar held in Australia in 1997 to examine the roles of insurance and reinsurance in managing disaster risk. It contains papers that explore funding of major disasters through traditional insurance, developments in catastrophe modeling, developing viable risk rating systems for natural hazards in Australia, thunderstorms as insured hazards, climate variability and its implications for insurance, managing catastrophic risks through insurance and mitigation, Canadian risk-based management, financial innovations, pricing of catastrophe risk, and business continuity planning.

Disaster Resource Guide. *Published annually. Free to qualified professionals with responsibilities relating to emergency management, disaster recovery, and business continuity, otherwise $5.00 per copy. For more information, contact the* ***Disaster Resource Guide****, P.O. Box 15243, Santa Ana, CA 92735; (714) 558-8940; fax: (714) 558-8901; WWW: http://www.disaster-resource.com.*

This guide is a catalog of resources for anyone who deals with disaster prevention, mitigation, response, and recovery. It provides information relating to facility issues, human concerns, crisis response, planning and management, and information technology. It includes advertising from vendors, articles by professionals in various disaster-related fields, lists of conferences and expositions, contact information for professional organizations, and an Internet directory.

Journal of Personal and Interpersonal Loss. *Vol. 3, No. 1 (January-March, 1998). Published quarterly. Annual subscriptions: $139.00, institutions; $54, individuals. To subscribe, contact the* ***Journal of Personal and Interpersonal Loss,*** *1900 Frost Road, Suite 101, Bristol, PA 19007; (215) 785-5800; fax: (215) 785-5515.*

This special issue of the ***Journal of Personal and Interpersonal Loss*** is devoted to Theoretical and Empirical Issues in Disaster Research. Papers focus on aspects of loss and trauma associated with tragic events, including attributions about the causes and consequences of cataclysmic events; psychosocial, ecological, and community perspectives on disaster response; a model of coping effectiveness after organizational disasters; the Aum Shinrikyo cult and subway nerve gas incidents; structure and organization of research efforts following the Oklahoma City bombing; and losses from the bombing of Pan Am Flight 103.

Disaster Planning and Recovery: A Guide for Facility Professionals. *Alan M. Levitt. 1997. 417 pp. $60.50. Copies can be purchased from John Wiley & Sons, Inc., Distribution Center, 1 Wiley Drive,*

Somerset, NJ 08875-1272; (800) 225-5945; fax: (732) 302-2300; e-mail: catalog@wiley.com; WWW: http://www.wiley.com.

Disaster Planning and Recovery shows facility management professionals how to prepare for, cope with, and recover from disasters. Levitt examines the roles and obligations of facility professionals in disaster planning and recovery, discusses why a disaster planning and recovery strategy is necessary, and outlines the problems inherent in disaster planning and methods for measuring performance. He then describes risk management, mitigation, hazard analysis, contingency planning, communication, myths and perceptions, creating checklists for the various phases of an event, and conducting a vulnerability assessment.

GIS and Applications of Remote Sensing to Disaster Management*. 1998. 700 pp. $100.00. Copies can purchased from Stuart M. Leiderman, Environmental Response, P.O. Box 382, Durham, NH 03824; (603) 862-0280; e-mail: leidermn@christa.unh.edu. Please specify preference for spiral-bound with acetate cover or three-whole- punched in binder.*

In January 1997, the National Aeronautics and Space Administration and the Federal Emergency Management Agency held a conference on remote sensing, geographic information systems (GIS), and disaster management. This volume contains the papers from presentations made in four primary areas: information requirements for disaster management, remote sensing for disaster management, current and future GIS applications, and the application of these remote sensing, GIS, and modeling systems to disaster management. This volume also includes extensive appendices of related Web sites that list organizations, agencies, satellites and instrumentation, analytical systems, computer software, disaster events, general databases, and other links of interest.

Severe Weather

Weather and People*. Michael D. Morgan and Joseph M. Moran. 1997. 200 pp. $37.33. Available from Prentice Hall Engineering, Science, and Math, Corporate Sales Department, One Lake Street, Upper Saddle River, NJ 07458; (800) 382-3419 or (201) 236-7156; fax: (201) 236-7141; e-mail: corpsales@prenhall.com; WWW: http://www.prenhall.com.*

Weather and People explores how extreme weather events affect human comfort and safety. In particular, the authors emphasize the human physiological response to atmospheric stressors, the nature of weather hazards, and ways to alleviate or avoid potentially dangerous weather conditions. Topics include: temperature and human comfort, comfort indexes, hazards of exposure to ultraviolet radiation, human responses to changes in air pressure, seasonal affective disorder, extreme weather patterns, thunderstorms, tornadoes, hurricanes, and winter weather.

Hurricanes

After the Hurricane: Linking Recovery to Sustainable Development in the Caribbean*, by Philip R. Berke and Timothy Beatley. 1997. 232 pp. $49.95, plus $4.00 shipping. Available from the Johns Hopkins University Press, 2715 North Charles Street, Baltimore, MD 21218-4363; (800) 537-5487 or (410) 516-6998; fax: (410) 516-6968; secure Internet transaction (encrypted): http://www.press.jhu.edu/*

press/books/titles/f97/f97beaf.htm.

Drawing on three years of extensive field research in Jamaica, Antigua, Montserrat, and St. Kitts and Nevis, the authors offer a detailed analysis of the effects of two major hurricanes--Gilbert in 1988 and Hugo in 1989. Focusing on postdisaster recovery, Berke and Beatley explore the opportunities offered by the recovery period for strengthening local institutions to provide for long-term social, economic, and physical development. They show how economic aid can be channeled beyond immediate needs to help provide long-term development initiatives and suggest ways of rethinking traditional approaches to aid and recovery programs. Chapters examine the global problem of natural disasters, the concepts of recovery and sustainable development, the influences of institutional response on household recovery in Jamaica, the devastation and its aftermath in Montserrat, the differential recovery and development capacities in St. Kitts and Nevis, recovery without development in Antigua, and linking recovery with sustainable development.

"Factors Inhibiting a National Hurricane Policy." Thomas A. Birkland. ***Coastal Management*** *25, No. 4 (1997): pp. 387-403. Back issues of the journal are available for $55.00 prepaid from the Subscription Department, Taylor & Francis, 1900 Frost Road, Suite 101, Bristol, PA 19007; (800) 821-8312, ext. 117; fax: (215) 785-5515; e-mail: jorders@tandfpa.com*.

During the years 1960 to 1990, at least 25 very damaging hurricanes struck the U.S. while the same period witnessed at least 38 damaging earthquakes. The author points out that, while both types of disasters are similar in their destructive potential, since 1977 the federal government has subsidized the National Earthquake Hazard Reduction Program (NEHRP), while a similar program to address the hurricane problem has yet to be created through federal legislation. Although the Federal Emergency Management Agency (FEMA) has assembled a group of activities under an internally created and directed Hurricane Program, nothing has been codified in statute law and it was not a significant part of FEMA's budget and activities prior to Hurricane Andrew. This article provides an overview of the policy context of natural disaster policymaking, reviews past federal legislation that has addressed the hurricane hazard, and presents a comparative analysis of the reasons for the differences between federal policies involving earthquake and hurricane mitigation. The analysis involves factors such as geographic distribution of the hazards, overlapping coastal issues, local political and economic pressures, and multiple forms of hurricane damage.

Coastal Zone Management

The Pacific Northwest Coast: Living with the Shores of Oregon and Washington*. Paul D. Komar. 1998. 195 pp. $18.95.*

Living with the Coast of Alaska. *Owen Mason, William J. Neal, and Orrin H. Pilkey, with Jane Bullock, Ted Fathauer, Deborah Pilkey, and Douglas Swanston. 1998. 350 pp. $19.95.*

Both books can be obtained from Books Fulfillment, Duke University Press, Box 90660, Durham, NC 27708-0660; (919) 688-5134; fax: (919) 688-2615; WWW: http://www.duke.edu/web/dupress.

The Pacific Northwest Coast provides information about the coast of the Pacific Northwest, its geological setting, the effects of ocean processes on beaches and cliffs, and the ever-present problem of erosion. Komar examines the lessons taught by geological and cultural history regarding this area's

coastal resources, detailing human inter-action with the coast, erosion caused by early settlers, the development and destruction of the Bayocean Spit, the disastrous effects of the 1982-1983 El Niño, and the notorious failure of a construction project on the unstable bluffs at Jump-Off Joe. Komar emphasizes the potential harm to human projects and the natural heritage of the coast while providing the knowledge necessary to find a safe home near the shore while preserving its beauty.

Living with the Coast of Alaska examines that state's coastline, which stretches through bays, fjords, and around islands for 45,000 miles. It describes the dynamic nature of seismic events and coastal processes, and the multiplicity of potential impacts from a unique combination of geology, climate, and the sea. Earthquakes, volcanic eruptions, tsunamis, avalanches, glacial advances, storm surges, flash flooding, wind channeling, and shoreline erosion combine with human-caused hazards such as oil spills, fire, and mining accidents to make living with danger a way of life in Alaska. The authors provide information on federal and state laws and programs regarding natural disasters and coastal zone management as well as suggestions for the design and construction of buildings. For private, public, and commercial developments, the authors provide a manual to help Alaskans make informed decisions to minimize damage and danger.

FACT: Florida Assessment of Coastal Trends*. 1997. 256 pp. Free. Order from the Florida Coastal Management Program, Florida Department of Community Affairs, 2555 Shumard Oak Boulevard, Tallahassee, FL 32399-2100; (850) 922-5438. This report is also available free via the Internet at http://www.fsu.edu/~cpm/FACT97/index.html.*

FACT was developed under the guidance of the Florida Coastal Management Program as the nation's first coastal environmental indicator system, intended to provide a means of evaluating Florida's progress in protecting its coastal areas; furnish a basis for making strategic decisions about programs and financial resources; and present information about coastal issues and problems to other decision makers and the general public. Nine strategic issues facing Florida's coastal areas are quantified: growth, disruption of coastal physical processes, coastal threats and hazards, ecosystems, fresh water allocation, sustainable uses, balancing public and private uses of resources, preserving cultural and aesthetic resources, and encouraging public awareness and involvement. Of particular interest to ***Observer*** readers, the section on Coastal Threats and Hazards includes social indicators regarding change in storm evacuation clearance times, insured value of property in coastal hazard areas, number of residents with hurricane experience, population at risk due to hurricane-induced flooding, and potential industrial hazard risks, including oil and hazardous materials spills and population in proximity to nuclear power plants.

Floods

The Legacy of the Flood of '93: A Working Conference on the Occupational and Environmental Health and Safety Issues*. PB97-162408. 1994. 91 pp. $25.00, paper; $10.00, microfiche. Copies can be obtained from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161; (800) 553-6847 or (703) 487-4650; fax: (703) 321-8547; e-mail: orders@ntis.fedworld.gov.*

This report contains the proceedings of a conference coordinated by the Great Lakes Center for

Occupational and Environmental Health and Safety at the University of Illinois at Chicago. Some of the major concerns that emerged during the conference include: recovery from the economic impacts of the flood (estimated to take five years); both the physical and organizational work environments of disaster response workers are unpredictable, hazardous, and subject to sudden change; and federal communication pathways failed during the flood, whereas information communication pathways were effective. The program included presentations and discussions on interagency responses, experiences of state and local governments, exchange of information, social and economic impacts, establishing a flood response network and clearinghouse, preventing illness and injury, and improving disaster response services.

A Natural Approach for Flood Damage Reduction and Environmental Enhancement*. Constance E. Hunt. Special Report 97-S005. 1997. 34 pp. $21.50, paper; $10.00, microfiche. Available from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161; (800) 553-6847 or (703) 487-4650; fax: (703) 321-8547; e-mail: orders@ntis.fedworld.gov.*

This document looks at the natural storage approach to floodplain management, which relies largely on the ability of the landscape to store and gradually release water and on additional flood storage and conveyance in the floodplain. This approach contrasts with the traditional rapid conveyance approach, which provides protection against floods by increasing the rate at which water moves off the landscape, thus preventing the water from accumulating on protected areas. The latter approach reduces the duration of a flood while increasing its peak. Hunt describes an emerging approach to flood management in the Upper Mississippi River Basin that retains water on the upland landscape and focuses on allowing historical floodplains to again provide storage and conveyance benefits for reducing flood peaks. Under this approach, floodplains are also used for filtering water and providing habitat for fish and wildlife. At the same time, vulnerable structures are removed from the 100-year floodplain.

Risk-Based Evaluation of Flood Warning and Preparedness Systems: Volume 1: Overview. *Yacov Y. Haimes, Duan Li, Vijay Tulsiani, James H. Lambert, and Roman Krzysztofowicz. IWR Report 96-R-25. 1996. 94 pp. $25.00, paper, $10.00, microfiche.*

Volume 2: Technical. *Yacov Y. Haimes, Duan Li, Vijay Tulsiani, James H. Lambert, and Roman Krzysztofowicz. IWR Report 96-R-26. 1996. 168 pp. $35.00, paper; $14.00, microfiche.*

Available from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161; (800) 553-6847 or (703) 487-4650; fax: (703) 321-8547; e-mail: orders@ntis.fedworld.gov.

These reports are products of the U.S. Army Corps of Engineers' Risk Analysis for Water Resources Investments Research Program, which is managed by the Corps' Institute for Water Resources in Alexandria, Virginia. The ***Overview*** describes the nontechnical aspects of four methods that assist in the design and evaluation of flood warning and preparedness systems. These methods address 1) the integration of structural measures and flood warning and preparedness; 2) multi-objective decision tree analysis; 3) performance characteristics; and 4) selection of an optimal flood warning threshold. The ***Technical*** volume contains sections that correspond to the methods described in the ***Overview,*** but which also contain the mathematical details that would be needed for an application of the methodologies. Both reports describe how the systems were applied to three Pennsylvania communities.

***Risk-Based Analysis for Flood Damage Reduction Studies**. Manual EM 1110-2-1619. 1996. 71 pp. Free to U.S. residents. To obtain, send a request on letterhead to the U.S. Army Corps of Engineers, Publications Depot, 2803 52nd Avenue, Hyattsville, MD 20781-1102.*

Corps policy has long been to acknowledge risk and the uncertainty inherent in forecasting floods and flood impacts and to plan accordingly. Historically, flood planning relied on analysis of the expected long-term performance of flood damage reduction measures, on the application of safety factors, on designing for worst-case scenarios, and on other indirect solutions to compensate for uncertainty. Advances in statistical hydrology and the widespread availability of high-speed computerized analytical tools now makes it possible to describe 1) the uncertainty in hydrologic, hydraulic, and economic functions; 2) the uncertainty in the parameters of the functions; and 3) the uncertainty in results when the functions are used. Procedures described in this manual lead to the estimation of expected costs and benefits of proposed flood damage reduction measures, a description of the uncertainty in those estimates, and quantitative and qualitative representations of the likelihood and consequences of exceedance of the capacity of selected measures. The Corps suggests that the careful communication of analysis results will better inform the public about what to expect from flood damage reduction projects and thus ultimately lead to better decision making.

***Toward a New National Weather Service: Assessment of Hydrologic and Hydrometeorological Operations and Services**. 1996. 51 pp. Free. Request copies from the Transition Program Office, National Weather Service, National Oceanic and Atmospheric Administration, 1325 East-West Highway, Silver Spring, MD 20910; (301) 713-1090; fax: (301) 713-1002.*

In 1995, the National Weather Service Modernization Committee (NWSMC) of the Commission on Engineering and Technical Systems of the National Research Council was asked to review and assess the need for improvements in the National Weather Service's hydrology and hydrometeorology products and services, particularly as they relate to flash flood forecasts and warnings. This report contains the results of that effort. It provides an introduction to and background on these programs, an evaluation of the NWS program as well as its management and operational support, and conclusions and recommendations. Recommendations are made for the precipitation processing system, precipitation forecasts, flash flood guidance, the weather forecast office hydrologic forecasting system, data management, data source reliability, products and services, program responsibilities and perceptions, availability of the advanced weather interactive processing system, research and development, advisory groups, professional qualifications of staff, and outlook.

***The National Dam Safety Program Act: Implementation Plan**. 1997. 62 pp. Free. Request from the Federal Emergency Management Agency (FEMA), Publications Distribution Facility, 8231 Stayton Drive, Jessup, MD 20794; (800) 480-2520 or (800) 646-3484; fax: (301) 497-6378.*

The Water Resources Development Act of 1996 (Public Law 104-303) established a National Dam Safety Program and named the FEMA director as coordinator of the program. This implementation plan was developed in response to that law. The plan outlines two major goals to be reached by the program by the year 2002: 1) significantly reduce the risk of loss of life, injuries, economic costs, and destruction of property that result from dam failures; and 2) substantially increase public awareness of dam failure risks. The plan recommends activities related to leadership, research, training, assistance to states, and inventorying dams nationally to achieve these goals.

Earthquakes

Riding Out Future Quakes: Pre-Earthquake Planning for Post-Earthquake Transportation System Recovery in the San Francisco Bay Region*. Jeanne Perkins, Ben Chuaqui, and Edward Wyatt. 1997. 198 pp. $25.00, plus $5.00 shipping. Publication No. P97002EQK. California residents, include 8.25% sales tax. Order from the Association of Bay Area Governments, P.O. Box 2050, Oakland, CA 94604-2050; (510) 464-7900; fax: (510) 464-7979; e-mail: shaky@abag.ca.gov.*

Predictions from this study indicate that there are at least eight likely future earthquakes that will have more adverse impacts on the Bay Area's transportation system than those experienced after the Loma Prieta or Northridge events. Furthermore, the study predicts almost 900 road closures following a magnitude 7.1 quake on the northern Hayward fault--over six times the closures experienced in either the Loma Prieta or Northridge quakes. ***Riding Out Future Quakes*** assesses the street and freeway disruptions following the 1989 and 1994 events, discusses the modeling techniques used to develop projections of seismically-caused transportation system disruptions, identifies the key transportation users in emergency situations, provides data about the location of key facilities and related planning considerations, overviews the current preparedness activities of transportation providers, and presents a detailed description of projected transportation disruptions for 11 Bay Area earthquakes. Appendices provide six checklists for planning actions (transportation providers, utilities, emergency services, local government, private companies and residents, and general) as well as data on road closures after the Loma Prieta and Northridge quakes.

The Loma Prieta, California, Earthquake of October 17, 1989--Building Structures*. Mehmet Çelebi, editor. U.S. Geological Survey Professional Paper 1552-C. 1998. 190 pp. $16.00, plus $3.50 shipping. Available from the U.S. Geological Survey, Information Services, 25286 Federal Center, Denver, CO 80225; (800) 435-7621; fax: (303) 202-4693; e-mail: infoservices@usgs.gov; WWW: http://www.usgs.gov.*

Although many of the papers in this volume are technical in nature, addressing the engineering aspects of building performance during the Loma Prieta earthquake, others may be of interest to ***Observer*** readers. These include A Summary of Unreinforced Masonry Buiding Damage Patterns--Implications for Improvements in Loss Estimation Methodologies, by Brett Lizundia and William T. Holmes; Housing Repair and Reconstruction After the Earthquake, by Mary C. Comerio; and Impact of the Earthquake on Habitability of Housing Units, by Jeanne B. Perkins and Ben Chuaqui.

Earthquake Spectra*, Vol. 13, No. 4 (November 1997). Annual subscriptions: $100.00, individuals; $150.00, institutions. To subscribe, contact the Editor,* ***Earthquake Spectra****, Earthquake Engineering Research Institute, 499 14th Street, Suite 320, Oakland, CA 94612-1934; e-mail: eeri@eeri.org; WWW: http://www.eeri.org.*

This issue of ***Earthquake Spectra*** is devoted to loss estimation, particularly its application to emergency response, risk management, and hazard mitigation. The articles in this special theme issue examine the rapid developments in computer science and geographic information system technology that provide powerful new tools for loss estimation. Specifically, they provide the capability to compile, analyze,

modify, and display extensive digital inventories and permit analyses of extensive geographical databases that were not possible a decade ago. Topics include: methods for evaluating the socio-economic consequences of large earthquakes, seismic risks to highway systems, development of a national earthquake loss estimation methodology, direct and indirect economic losses from earthquakes, estimation of losses to buildings, the use of hazard maps in the Northridge earthquake, seismic mircrozonation and loss estimation, real-time loss estimation as an emergency response decision support system, and loss estimation and asset distribution.

Methodologies for Evaluating the Socio-Economic Consequences of Large Earthquakes. *Anne S. Kiremidjian, et al. Technical Report No. 126. 1997. 247 pp. $40.00. To purchase, contact the John A. Blume Earthquake Engineering Center, Department of Civil Engineering, Stanford University, Stanford, CA 94305-4020; (415) 723-4150; fax: (415) 725-9755; e-mail: earthquake@ce.stanford.edu.*

This report describes the development of a comprehensive regional damage and loss estimation method that was created for evaluating the socio-economic impacts of large earthquakes and for identifying high-risk facilities through the use of advanced computational tools. This project was undertaken over a three-year period by a team of researchers assembled by the nonprofit organization, California Universities for Research in Earthquake Engineering (CUREe). Sections describe regional hazard methods, collateral hazard models, regional inventory methods, building and lifeline damage functions, identification of critical facilities, and the economic feasibility of seismic rehabilitation.

Proceedings--Fifth United States/Japan Workshop on Urban Earthquake Hazard Reduction: Recovery and Reconstruction from Earthquakes. *Publication No. 97-A. 1997. 455 pp. $25.00, plus $5.00 shipping. Copies can be purchased from the Earthquake Engineering Research Institute, 499 14th Street, Suite 320, Oakland, CA 94612-1934; (510) 451-0905; fax: (510) 451-5411; e-mail: eeri@eeri.org; WWW: http://www.eeri.org. California residents, add 8.25% sale s tax.*

Held January 15-17, 1997, in Pasadena, California, this meeting was the fifth in a series of joint workshops convened by EERI and the Japan Institute of Social Safety Science. Workshop objectives included the identification of 1) areas where recent earthquakes have broadened the understanding of response, recovery, and reconstruction practices; 2) areas of practice where the understanding of effective repair procedures, planning, or policy processes is inadequate and where additional research should be focused; and 3) specific lessons that have emerged from the study of response and reconstruction processes in the Kobe, Northridge, and Loma Prieta quakes. Nearly 80 plenary papers, expanded abstracts, and group summaries appear in the workshop's proceedings volume. The papers are grouped under the following categories: Earthquake Response, Post-Earthquake Housing, Financing Mitigation and Recovery, Recovery and Reconstruction, Seismic Risk, Emergency Response, Built Environment, Housing, Planning, Health Care of Victims, Lifelines, and Economic Recovery.

Ethical Issues and Earthquake Risk Reduction. *Bret Lizundria and Marjorie Greene, Editors. 1998. 70 pp. $7.00, plus $3.00 shipping. California residents, add 8.25% sales tax. Order from the Earthquake Engineering Research Institute, 499 14th Street, Suite 320, Oakland, CA 94612-1934; (510) 451-0905; fax: (510) 451-5411; e-mail: eeri@eeri.org; WWW: http://www.eeri.org.*

Ethical behavior, conceptually and in its practical application, is an important, but often

unacknowledged component of earthquake risk reduction. When ethical challenges arise, most earthquake hazard practitioners are left to face them alone--their ensuing decisions formed largely from intuition and previous experience. To address this problem, the Earthquake Engineering Research Institute (EERI)--under the leadership of its Seismic Ethics Committee--embarked on a project to formally examine many of the ethical issues that occur. This EERI Endowment Fund White Paper views seismic mitigation ethics broadly, highlighting the diversity of considerations, obligations, and constraints facing the various stakeholders in mitigation decisionmaking. The document is organized in three basic sections. Section I discusses major paradigms of applied ethics, with consideration given to individual rights, fairness or justice, utilitarianism, the common good, virtue ethics, professional responsibilities, risk disclosure, and approaches to dealing with highly complex problems. Section II presents observations gleaned from a workshop held in August 1997 which utilized hypothetical case studies to focus on issues such as the duty to disclose threats to public health, safety, and welfare; conflicts of interest; whistle-blowing; the influence of uncertainty on decisionmaking; and the interaction and differences between law and ethical responsibility. The third section describes future directions that discussions of ethics might pursue, while an appendix presents the case studies discussed at the workshop.

Animals and Disasters

Participation of Veterinarians in Disaster Management, ***Journal of the American Veterinary Medical Association,*** *Vol. 210, No. 3, pp. 325-328. Sebastian E. Heath, Jean Hooks, Kerri Marshall, Richard Dorn, Robert D. Linnabary, and Jacob Casper.*

An Overview of Disaster Preparedness for Veterinarians, ***Journal of the American Veterinary Medical Association****, Vol. 210, No. 3, pp. 345-348. Sebastian E. Heath, Richard Dorn, Robert D. Linnabary, Jean Hooks, Jacob Casper, and Kerri Marshall.*

Integration of Veterinarians into the Official Response to Disasters, ***Journal of the American Veterinary Medical Association****, Vol. 210, No. 3, pp. 349-352. Sebastian E. Heath, Richard Dorn, Robert D. Linnabary, Jacob Casper, Jean Hooks, and Kerri Marshall.*

Epidemiologic Study of Cats and Dogs Affected by the 1991 Oakland Fire, ***Journal of the American Veterinary Medical Association****, Vol. 212, No. 4, pp. 504-511.*

Concerns for Pets and Owners in Disasters*. Sebastian E. Heath.*

Consideration for the Sheltering of Pets (Pet Friendly Shelters). *Sebastian E. Heath.*

Free reprints of these articles are available from Sebastian E. Heath, Assistant Professor, Veterinary Disaster Medicine, Veterninary Pathobiology Department, Purdue University, 1243 Veterinary Pathobiology, West Lafayette, IN 47907-1243; (765) 496-3102; fax: (765) 494-9830; e-mail: seh@vet.purdue.edu.

The first article examines the history of veterinarians' participation in disaster management, beginning in 1948, then looks at current and future issues for the field.

The second article, An Overview of Disaster Preparedness for Veterinarians, discusses the priorities of disaster management, aspects of disaster preparedness, state and local disaster preparedness, federal programs, financial issues in disasters, and working with volunteers and the news media.

The third articles discusses the integration of doctors of veterinary medicine into local disaster response. It provides information on requesting assistance, the incident command system, agencies and services involved with animal issues during federally declared disasters, warnings and alerts, public information, evacuation and security, long-term recovery, and restoration of veterinary practices.

The Epidemiologic Study of Cats and Dogs Affected by the 1991 Oakland Fire was undertaken to identify risk factors of pets for being lost, found, adopted, or reunited with their owners. Although little is known about how major disasters affect pet populations, this study examined the results of a centralized phone line and record bank, the Oakland Firestorm Pet Hotline, which was set up for callers to animal shelters requesting information related to pets affected by the fire.

Concerns for Pets and Owners in Disaster looks at the problems related to pet ownership in disasters. It draws on the research of the Purdue School of Veterinary Medicine's research on this topic. Interestingly, as many as 25% of pet owners refuse to evacuate out of concern for their animals. In contrast, as many as 30-50% of owners will leave their pets behind, and a substantial number of these owners will then attempt to rescue their pets later. The article also looks at animal sheltering issues and offers recommendations regarding public health, animal health, and community planning.

Consideration for the Sheltering of Pets asks three questions: Is public health improved by offering to shelter pets? Is animal health improved by offering to shelter pets? and Is it cost effective to offer sheltering of pets? It concludes with guidelines for operating pet friendly shelters.

Electronic Stuff

Construction Quality and Earthquake Damage*. 1997. 46 slides. $70.00, Earthquake Engineering Research Insitute (EERI) members, $80.00, non-members.*
EERI Slide Collection CD-ROM. *1998. 1,700 images. $350.00, EERI members; $400, non-members.*
Northridge Earthquake CD-ROM. *1997. 800 pp. Includes two-volume reconnaissance report, slide set, and excerpts from EERI videotape. $50, EERI members; $75, nonmembers.*
All three items can be ordered from the Earthquake Engineering Research Institute (EERI), 499 14th Street, Suite 320, Oakland, CA 94612-1934; (510) 451-0905; fax: (510) 451-5411; e-mail: eeri@eeri.org; WWW: http://www.eeri.org. Orders must be prepaid, and California residents must add 8.25% sales tax.

The slide set focuses on what provides good performance by a building in an earthquake. It illustrates construction techniques in the field as well as the consequences of poor construction and inspection, and includes examples of steel, concrete, masonry, and wood frame construction as well as nonstrucutral elements. The set comes with an eight-page script.

The first CD-ROM provides the digitized version of over 60 slide sets produced by EERI, including images from all major earthquakes that have occurred since 1983 and many photographs from earlier quakes. Images also address building safety, seismic performance of buildings, earthquake-resistant design, liquefaction, and hazard mitigation.

The Northridge CD contains over 800 pages of facts, observations, figures, and images relating to the scientific study of the Northridge earthquake. Users can search the entire text, and copy and print all of the text and images on the CD.

***No Way Out**. VHS. 26 minutes. 28-page instruction guide. $27.00.*
***Danger! Debris Flow.** VHS. 14 minutes. $27.00.*
Obtain from the Los Angeles County Department of Public Works, Public Affairs, 900 South Fremont Avenue, Alhambra, CA 91803; (626) 458-4089; attn: Jan Komuro. Checks should be payable to the Los Angeles County Department of Public Works.
These videos are part of an ongoing effort by Los Angeles County to increase awareness regarding flood control channel safety. Distributed to various agencies and schools in the region, ***No Way Out*** is an updated version of a 1993 video that comes with a new instructional guide. Due to increased flooding this year from El Niño-related storms, the L.A. County Office of Education and Department of Public Works undertook this effort to warn youths and families about the dangerous conditions in and around flood control channels, rivers, and arroyos during rainy periods. It contains footage of attempted swift water rescues, and the instruction guide includes a discussion of the dangers of flood control channels, lesson ideas, suggested classroom activities, a channel map, photos, and flood-related facts and figures.

The second video, ***Danger! Debris Flow***, which consists of a video and science/safety lessons for grades 7 to 12, looks at the potentially deadly but little known storm hazards related to flash floods and debris flows in mountain canyons.

***Alabama Coastal Hazards Assessment CD-ROM**. 1998. Free. Copies can be requested from the NOAA Coastal Services Center, 2234 South Hobson Avenue, Charleston, SC 29405; (800) 789-2234; e-mail: clearinghouse@csc.noaa.gov; WWW: http://www.csc.noaa.gov.*
This CD features a digital library of geographic information system-based data that outlines the threats to Baldwin and Mobile counties along the Gulf of Mexico, as well as an analysis of what can be done to prevent and minimize damage. The project is the result of a partnership among the NOAA Coastal Services Center, the Federal Emergency Management Agency, the South Alabama Regional Planning Commission, the Alabama Department of Economic and Community Affairs, and the Alabama Department of Environmental Management. The disk provides information on demographics; flood zones; hurricane storm surge protections; emergency evacuation routes; historical disaster data;

applicable federal, state, and local laws; emergency shelter locations; and growth trends. The program is designed to accept updated information, and data is accessible for statewide and political boundaries.

Let's Get Geophysical

If you're looking for pictures of geophysical events, such as earthquakes, tsunamis, volcanoes, and hurricanes, the National Geophysical Data Center (NGDC) is another great resource. This center offers a broad selection of posters, CDs, slide sets, and publications on such topics as deep sea drilling, space satellite environmental data, earthquake data, earthquake damage, erosion of landforms, recent tsunamis, volcanic eruptions and their impacts, auroras and other lights from space, and hurricanes and cyclones.

For a complete list of their offerings, contact the *NGDC, 325 Broadway, E/GC4, Boulder, CO 80303-3328; e-mail: info@ngdc.noaa.gov; WWW: http://www.ngdc.noaa.gov.*

Who We Are

The Hazards Center

The NATURAL HAZARDS RESEARCH AND APPLICATIONS INFORMATION CENTER was founded to strengthen communication among researchers and the individuals and organizations concerned with mitigating natural disasters. The center is funded by the National Science Foundation, Federal Emergency Management Agency, National Oceanic and Atmospheric Administration, U.S. Geological Survey, U.S. Army Corps of Engineers, U.S. Forest Service, Environmental Protection Agency, U.S. Department of Transportation, National Aeronautics and Space Administration, and the Institute for Business and Home Safety. Please send information of potential interest to the center or the readers of this newsletter to the address below. The deadline for the next ***Observer*** is *May 22, 1998*.

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