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Natural Hazards OBSERVER

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NOAA's ROLE IN COASTAL HAZARDS

—an invited comment

As part of the 1982 National Oceanic and Atmospheric Administration reorganization, the Coastal Hazards Program was joined with the Coastal Zone Management Program in the new Office of Ocean and Coastal Resource Management (OCRM). This change is expected to bring about a closer relationship between Coastal Zone Management (CZM) programs and the coastal hazards assistance offered by various components of NOAA.

During the past three years, our Coastal Hazards Program's primary accomplishments have been in storm evacuation, cooperating with states and other federal agencies in producing storm evacuation maps and shoreline movement maps, and supporting evacuation studies in coastal high hazard areas. In these tasks, NOAA program personnel have dealt mostly with state and local disaster preparedness personnel, and very little with state coastal zone management personnel who are concerned primarily with mitigating the effects of coastal hazards. Although

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our involvement in evacuation will continue, we plan to play a stronger role in providing technical support to state coastal zone managers, and thereby provide support to a larger part of the coastal hazards community.

At present, OCRM is struggling with the question of how best to provide assistance in coastal hazards in the future. We have begun with the following activities:

- Assessing the future direction of coastal hazards in NOAA and making recommendations to NOAA's management
- Coordinating the National Weather Service storm surge modeling with state CZM programs
- Compiling the coastal hazards accomplishments of state CZM programs
- Forming a task force to study the program, formulate a plan, and provide technical assistance to the states, while continuing our coordination efforts both within NOAA and with other federal agencies

Future issues of the ***Natural Hazards Observer*** will contain details of successful coastal hazards projects by state Coastal Zone Management programs, and the future direction of NOAA's Coastal Hazards Program.

Dennis Carroll
National Ocean Service
NOAA

CALIFORNIA WETLANDS

In no other state has the destruction of wetlands from rapid urban development been so nearly complete as in California. Over the last 50 years, some regions within the state have experienced the loss of 95% of their tidelands, mudflats, and marshes. Only during the past decade have concerned citizens brought pressure to bear on legislators and developers to recognize the damage and to preserve and protect the remaining habitat. However, the science of wetland restoration and enhancement is young and based on a haphazard experience of success and failure. To summarize and share what knowledge does exist, and to address problems and constraints on present abilities to restore such systems, a workshop was held in February of 1982 at the California State University at Hayward and attended by 250 representatives of universities, government agencies, consulting firms, and environmental groups.

An informative volume of proceedings has now been published that reflects the extensive exchange of views at the meeting. Eight major papers are included, ranging from legal and institutional constraints on wetlands enhancement, and engineering wetlands for circulation, sedimentation and water quality, to the colonization and monitoring of salt marsh faunas. For each topic, responses are made by two or more panelists who reviewed the papers. Transcripts of subsequent audience discussion reveal the questions raised. Abstracts from the poster session and an extensive list of references complete the volume.

Obtain ***Wetland Restoration and Enhancement in California,*** Michael Josselyn, editor, free from *California Sea Grant College Program A-032, University of California, La Jolla, CA 92093.*

SOUTHEASTERN EARTHQUAKES

Over the last decade, scientific interest in and investigation of seismicity in the southeastern United States has intensified. The seismic record of the region is dominated by the 1886 Charleston earthquake, and since 1973 the U.S. Geological Survey has been conducting extensive field work to try to discover the cause of that intraplate quake. Through an understanding of the historic and modern seismicity at Charleston and of the tectonic dynamics of the area, the USGS hopes to determine whether that earthquake zone differs tectonically from other parts of the Southeast. That will enable an evaluation of the potential for additional large earthquakes in Charleston and the rest of the region.

Significant among the recent projects have been multidisciplinary studies of the material recovered from three test holes; seismic-reflection and seismic-refraction surveys; regional studies of radiometric, aeromagnetic, gravity and deep-well data; and continued monitoring and analysis of the seismicity of the greater Charleston area. The results of 20 of these investigations are presented in ***Studies Related to the Charleston, South Carolina, Earthquake of 1886—Tectonics and Seismicity,*** edited by Gregory S. Gohn. Several chapters treat the distribution and origin of pre-Cretaceous rocks and structures beneath Coastal Plain sediments in the Charleston area; others discuss the possible relationships of the various pre-Cretaceous structures to faults near Charleston

that have a history of Cretaceous and Cenozoic movement.

U.S. Geological Survey Professional Paper #1313 is available for $15.00 from the *Distribution Branch, U.S. Geological Survey, 604 South Pickett Street, Alexandria, VA 22304.*

The ***Bulletin of Seismicity of the Southeastern United States*** has been issued semi-annually since 1977 with data supplied by 15 private companies, government agencies and universities. It provides technical data on all earthquakes in the Southeastern United States during the six months preceding publication. Tables list such helpful information as hypocentral parameters, phase arrival times and magnitude estimates. Maps show the geographic distribution of quakes that occurred during the report period and of the cumulative seismic activity since the network began recording data.

To be added to the mailing list, or to receive back issues of the ***Bulletin of Seismicity,*** contact *G.A. Bollinger, Seismological Observatory, Virginia Polytechnic Institute and State University, Blacksburg, VA 24061, (703) 961-6729.*

THE VOLCANO DECADE FLOWS ALONG

Two new volumes in the burst of volcano literature that we've enjoyed in the '80s demonstrate that we need not be dwellers in the shadow of a great cone in order for our lives—individually and culturally—to be influenced by volcanic activity. ***The Time of Darkness: Local Legends and Volcanic Reality in Papua New Guinea,*** by R.J. Blong, recounts a geologist's investigation of legends of a "time of darkness" in conjunction with ash analysis and measurement, and resultant discovery of an eruption 300 years ago equal in magnitude to Krakatau but previously unknown to Western historians and scientists. ***Volcano Weather—The Story of 1816, The Year Without a Summer,*** by Henry and Elizabeth Stommel, describes the explosive eruption of Mount Tambora in 1815 and its effects on the weather in New England and Northern Europe.

In the highlands of Papua New Guinea there are legends among the peoples of more than 30 language groups about a time when there was no light and ash fell from the skies. Since the historical record dates back only to 1870 for coastal areas and to 1930 for the interior, the author of ***The Time of Darkness*** relied on the local legends and the stratigraphic record to determine that a volcano on Long Island off the northeast coast had indeed erupted 300 years previously, and that the legends had survived as amazingly accurate accounts over that time. This fascinating book reveals the significance of the legends as a collection of stories, as well as the indispensable pieces of evidence in the discovery of one of the great volcanic eruptions of the last millennium.

In April of 1815 on the island of Sumbawa in what is now southern Indonesia, Mount Tambora began eruptions that ejected an estimated 100 cubic kilometers of ash (compared to Krakatau's 10) into the stratosphere and altered the climate of the Northern Hemisphere. ***Volcano Weather*** chronicles the extensive impacts of this on the crops in both Europe and New England, and the subsequent famines, disease, and social dislocation. Final chapters present current scientific theories on climate change and its causes, discuss the possible impacts of the eruptions of El Chichón on the world's climate, and encourage the reader to think in global terms about all alterations to the environment.

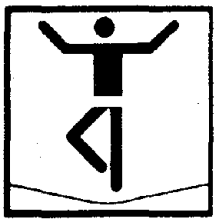
The Time of Darkness, by R.J. Blong, is 270 pages long and sells for $25.00 from the *University of Washington Press, Seattle, WA 98105.* ***Volcano Weather,*** by Henry and Elizabeth Stommel, is 175 pages long and sells for $15.00 from *Seven Seas Press, Newport, RI 02840.*

RESEARCH ON RESEARCH

The Cosmos Corporation has completed the initial stage of a project to investigate the production and use of innovative ideas (see ***Observer,*** Vol. VII, No. 1, p. 3). The first of nine projected case studies by Cosmos (formerly the Case Study Institute) analyzed the Association of Bay Area Government's (ABAG) research on local government liability for injuries or losses due to earthquakes (see ***Observer,*** Vol. V, No. 1, p. 10). The eight remaining studies, of which five will be published, will examine a wide range of research from both the social and physical sciences.

General observations are that the ABAG research was widely used because the production and utilization of the new knowledge about liability was intertwined with the conduct of the research, as evidenced by: 1) a conference attended by potential users held early in the project to identify the specific problems to be addressed, 2) an active advisory committee, 3) the administration of the project by a group whose members were already engaged in workshops and the exchange of information, and 4) a final product that included useful simulations of concrete situations relevant to the problems local government officials face.

Single copies of the report, "Innovations in Earthquake and Natural Hazards Research: Local Government Liability," by Gwendolyn B. Moore and Robert K. Yin, are available from the authors for $2.50 postage and handling at the *Cosmos Corporation, 1730 K Street, N.W., Suite 1302, Washington, DC 20006.*



ON THE LINE

COMPARING DISASTER AGENTS AND EVALUATING CRP

Rutherford Platt has commented (see May ***Observer***) that my recent book, ***The Social Psychology of Civil Defense,*** advocates crisis relocation planning (CRP) and simplistically assumes that one set of resources can structure responses to everything from thunderstorms to Armageddon. Professor Platt's remarks, though clearly not intended as a scholarly review, do fundamentally misrepresent the tone, the purpose and the conclusions of the book.

The stated purpose of the book is to conduct "a very careful examination of the question of citizens' likely response to a warning to evacuate under CRP" (p. 3). Hence, attention focuses upon warning response behavior and the management of what could be a very large-scale evacuation effort. In evaluating likely citizen warning compliance, I considered 1) social scientific theories of warning response behavior, 2) citizen performance in documented large-scale evacuations, 3) special social-psychological features of the *potential* nuclear attack setting, 4) the history of U.S. evacuation-oriented civil defense programs, and 5) the existing state of organization and planning characterizing CRP.

After an exhaustive review of the above, I concluded that *any* successful civil defense program should meet four criteria: 1) it must have a defined structure that is disseminated to the public, 2) provisions must be made for role training of cadre, 3) the process of disseminating a warning to implement the plan must be clearly specified, and 4) the plan must be highly visible and perceived by the public to be an effective means of coping with the crisis. Since my concern was with evacuation compliance in the face of attack *threat* (not with the outcome of nuclear war), I went on to specify that there is no *a priori* reason to believe that citizens would not or could not respond effectively to an evacuation order under CRP. I did, however, enumerate a number of shortcomings with CRP as a program—including citizen education and training—that must be overcome before CRP could become an effective social policy.

By implication, Platt also raises a fundamental theoretical issue that transcends any disagreements that he and I may have over the empirical record regarding large-scale evacuations, namely the comparability of different types of disasters or, more specifically, the development of a taxonomy for classifying and comparing disaster agents. Platt seems to argue that all disasters are unique and that we should focus upon this uniqueness when we develop theories of citizen response and strategies for emergency management. My position on this point is indeed the opposite of Platt's.

Due to human settlement patterns and other influences, more citizens are becoming subject to natural threats. Advances in technology and increasing industrialization, in turn, increase citizen vulnerability to human-caused disasters. Until effective steps toward *mitigation* can be taken, the threat of nuclear war will plague humankind. In this hazardous environment, there is a pronounced need to develop emergency management practices that are effective for coping with a variety of hazard agents.

Some positive steps already have been taken in the direction of comprehensive emergency management. We have begun to identify "generic functions"—warning dissemination, evacuation, search and rescue, victim sheltering, communication-command-control centers, emergency medical care—that in some form must be performed across many types of natural and technological disasters, as well as for nuclear attack. By making empirical comparisons of these functions across different disaster agents, we can begin to identify commonalities in citizen response and management techniques that allow for applications across different events.

Contrary to Platt's claim, such comparisons are not simplistic and certainly do not equate thunderstorms with nuclear war. Instead, they demand careful definition of exactly what it is that constitutes a disaster (the phenomena under study), and isolation of appropriate defining dimensions to reveal which cross-agent comparisons may be made. In terms of philosophy of science, these activities lead to the development of taxonomy: a scheme for classifying and comparing phenomena under scientific study.

From both a theoretical and applied standpoint it is important to understand similarities in citizen response to warnings of earthquakes, toxic chemical spills, floods and nuclear attack. Surely there are unique aspects of each threat, but commonalities also exist. The purpose of taxonomy is to qualify and begin to quantify *along scientifically relevant* dimensions—scope of impact, magnitude of impact, speed of onset—these differences and similarities so that our theory can be translated into constructive emergency management strategy and tactics.

Only through taxonomy can social scientists begin to develop conceptual schemes for *examining* and *predicting* human response to disasters. There may be literary interest in studies that describe earthquake victims crushed under rubble, hurricane victims drowned in storm surge and nuclear war victims burned by radiation. As researchers, however, we must turn our attention away from describing the horror of the event and focus upon developing principles for mitigation, preparedness, response and recovery.

Ronald W. Perry
Arizona State University

HELP FOR A LOW E.Q.

The California Earthquake Education Project has just completed trials of ten activities in junior high schools in Alameda and Contra Costa Counties, and plans to develop models for community interaction using the results of the trials. The activities included 1) a checklist for the student to use in leading her/his family through an earthquake preparedness scavenger hunt at home; 2) a coloring book of all the rooms in the home and the hazards they might contain; and 3) lesson plans for teachers to use in presenting units on scientific facts about earthquakes, on what students know about earthquake damages and what to do about them, and on earthquake preparedness.

The California Earthquake Education Project is one of the ongoing science education activities of the University of California's Lawrence Hall of Science at Berkeley. To insure that they are up to date on all that is being done elsewhere in the country for community education on all hazards and disasters, CALEEP is very interested in communicating with other groups or individuals engaged in any such projects. To contact CALEEP, or for more information on its activities, write or call *Susan K. Jagoda, California Earthquake Education Project, Lawrence Hall of Science, University of California, Berkeley, CA 94720, (415) 642-3679.*

LOCAL GOVERNMENTS AND SEISMIC SAFETY

In planning and implementing seismic safety policies, communities encounter many difficulties that range from the impossibility of budgeting for an (as yet) unpredictable event, and the challenge of determining which policies might be most efficacious, to the troublesome lack of organized and visible public support for program expenditures and goals. The ways in which 13 California jurisdictions coped with this dilemma between 1977 and 1980 are revealed in the recently released research report, ***Seismic Safety Policy in California: Local Governments and Earthquakes,*** by Alan J. Wyner and Dean E. Mann.

Using a case study approach, the researchers first gathered information about the history, political and social structures, and economic base of the cities and counties in the study. Then a detailed search was made for documentary evidence of some sort of seismic safety policy. Finally, 238 individuals—private citizens and public officials—were interviewed about how the policies were formulated and implemented. The State of California requires every city and county to prepare a General Plan to guide land use planning, one part of which is a Seismic Safety Element, but the ways in which that is worded and dealt with in each jurisdiction differ widely.

Among the conclusions of the report is that governmental decision making, like individual decision making, is the result of the complex process of determining what level of risk is acceptable, a process influenced by a host of economic, social, psychological and intuitive considerations. In short, comprehensive, rational decision-making models are inapplicable to matters of seismic risk. However, since some communities do make coherent progress in reducing risk, it is possible to identify conditions that facilitate adoption of local seismic safety measures: state mandates, previous earthquake experience, staff ability and awareness, attitudes of local governmental leadership, and availability of resources.

A limited number of single copies of ***Seismic Safety Policy in California,*** @350 pages, are available at no cost from *Alan J. Wyner, Department of Political Science, University of California, Santa Barbara, CA 93106, (806) 961-3115.*

ASFPM MEETS

The Association of State Floodplain Managers held its Seventh Annual Meeting in Sacramento, California, on April 26-30, 1983, with sponsorship by the California Department of Water Resources and the Washington State Department of Ecology. Those in attendance hailed from states, local and federal government agencies, and private industry.

Besides the Association business meeting, at which new officers and regional representatives were elected, the gathering included a workshop on the theme of teamwork in managing flood hazards. Technical sessions dealt with public awareness; problems of sediment, mud and landslides; special flood hazards; the coexistence of development and flood risks; and mitigation through federal/state/local cooperation.

Discussions among participants isolated some issues deserving particular attention during the coming year: the need for local governments to enforce existing flood plain regulations, the need for better involvement of the private sector, a clearer understanding of the role and consequences of public awareness, and the need for adequate data to map flood hazards. As a final prophetic conclusion to the meeting, 130 year-old rainfall records for the Sacramento area were broken while the flood plain managers were in town.

Abstracts from the workshop may be obtained from *A. Jean Brown, California Department of Water Resources, P.O. Box 388, Sacramento, CA 95802, (916) 445-6249.* Next year's meeting will be held in June in Portland, Maine. More information is available from *Fred Michaud, Maine Bureau of Civil Emergency Preparedness, State House, Augusta, ME 04330, (207) 622-6201.*

NFIP SUBSIDY EXAMINED

Because the National Flood Insurance Program was established to encourage participation in the program by providing low-cost, subsidized flood insurance, premium income has not covered the cost of providing the coverage to the 1.9 million policyholders. The Federal Emergency Management Agency has financed these losses by borrowing $854 million between 1970 and 1980 from a Treasury revolving fund set up for that purpose. However, the NFIP's enabling legislation did not require regular requests for appropriations to repay the borrowed funds. Because of this, according to a recent U.S General Accounting Office report, Congress has been hampered in its ability to oversee the flood insurance program and to ascertain why it is operating at a deficit.

A related issue, GAO notes, is that FEMA has recently undertaken to make the NFIP self-sustaining by 1988, more than two decades sooner than originally anticipated. GAO recommends that, in view of this change in policy and of the recent reauthorization of a $1 billion revolving fund, Congress reexamine the question of a continuing federal subsidy of the NFIP, how such is to be financed, and whether Congressional oversight of the program needs to be strengthened.

National Flood Insurance Program—Major Changes Needed if it is to Operate without a Federal Subsidy (#GAO/RCEDO83-53) is available free from *U.S. General Accounting Office, Document Handling and Information Services Facility, P.O. Box 6015, Gaithersburg, MD 20760.*

EARTHQUAKE HAZARDS REDUCTION

Fiscal Year 1982 achievements for the National Earthquake Hazards Reduction Program fall into four major categories: improved seismic design and construction; new contingency response planning; refinements in basic scientific knowledge and data-gathering capacities; and more extensive information dissemination. Detailed accounts of activities in those program areas are contained in a report recently released by the principal agencies involved in the implementation of the National Earthquake Hazards Reduction Act of 1977: the Federal Emergency Management Agency, U.S. Geological Survey, National Science Foundation, and the National Bureau of Standards.

The National Earthquake Hazards Reduction Program: A Report to Congress describes the FY '82 projects undertaken or funded by each of those agencies, or by others peripherally engaged, as well as their cooperative work with state and local governments and foreign countries in obtaining and exchanging information pertinent to all facets of the program. Among the projects described in the report are the following:

- A FEMA-funded analysis by the Building Seismic Safety Council of 27 buildings of varying design and construction in four cities to assess suggested improved provisions and adjust them as needed
- A FEMA and USGS-sponsored workshop in St. Louis on actions to reduce losses from earthquakes in the Mississippi Valley area
- Crustal movement and deformation studies that are part of NASA's Geodynamics Program
- The NSF-sponsored National Information Service for Earthquake Engineering that provides data and computer programs to academics and practitioners.

Single copies of ***The National Earthquake Hazards Reduction Program: A Report to Congress, FY '82*** are available free of charge from *FEMA* at *P.O. Box 8181, Washington, DC 20024.* A companion volume, ***The National Earthquake Hazards Reduction Program: Detailed Program Information, Fiscal Year 1982,*** can be obtained from the same address.

FLOOD FORECASTING AND WARNINGS

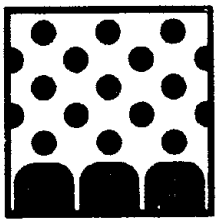
In a recent report to the President and the Congress, the National Advisory Committee on Oceans and Atmosphere (NACOA) has called for improvements in flood forecast and warning services provided by the National Weather Service. Citing the enormous success of locally funded and operated flood warning systems now in use in over 650 communities, NACOA also urged the expansion of these programs, including augmentation of rain gauge networks.

The report also noted that there is no relationship between insurance premiums or levels of federal subsidy under the National Flood Insurance Program and the presence or absence of flood forecasting and warning services in an area. It was suggested that such costs might be reduced in accord with the increasing effectiveness of local warning systems and community preparedness programs.

Copies of "The Nation's River and Flood Forecasting and Warning Service" are available from *NACOA, Page Building 1, 3300 Whitehaven Street, N.W., Washington, DC 20235.*

LAWSUITS PROCEED

A recent development in *U.S. v The Parish of St. Bernard et al.* and *U.S. v The Parish of Jefferson et al.* has kept very much alive the Federal Emergency Management Agency's lawsuit to recover funds paid in flood insurance claims to Louisiana residents, and to obtain injunctive relief against the local governments involved (see ***Observer,*** Vol. VI, No. 2, p. 5). In a 55-page opinion delivered in April, a magistrate found that the portion of the government's claim based on contract law should be dismissed, but that FEMA should be permitted to sue on its negligence and nuisance theories. Objections have been filed by both parties to the district court judge, who will issue the official ruling.



CONFERENCES

Emerging Computer Techniques in Stormwater and Flood Management. Urban Water Resources Research Council of the American Society of Civil Engineers, and the Canadian Society of Civil Engineers. Niagara-on-the-Lake, Ontario, Canada: October 30-November 4, 1983. The extensive use of micro computer technology for the control of both flooding and stormwater runoff is hampered by a lack of available designs and operational guidance in the literature. The conference will establish a state-of-the-art reference for researchers, planners, engineers and other practitioners, and identify areas where further work is needed. Conference sessions will address the following issues, among others: urban drainage and flood plain studies, computer hardware and software applications, field instrumentation and data acquisition, hydrological models, water quality models, and diversion structures and flood warning systems. Obtain further information from *Engineering Foundation Conferences, 345 East 47th Street, New York, NY 10017, (212) 705-7835.*

International Technical Conference on Mitigation of Natural Hazards Through Real-Time Data Collection Systems and Hydrological Forecasting. World Meteorological Organization of the UN, National Weather Service of NOAA, and the California Department of Water Resources. Sacramento, California: September 19-23, 1983. Recent technological developments in the use of mini and micro computer systems, as well as on-line and off-line automated data reporting systems, offer new means to mitigate the effects of natural hazards. This conference will provide opportunities to exchange experience and gather information on improving data and collection and hydrologic forecasting systems. Specific areas to be covered include operational forecasting models, integration of modelling concepts and data retrieval systems, short-term and long-term forecasting models, and use of forecasting systems and modelling techniques to define hazard potential of various hydrologic events. For further information, contact *Robert J.C. Burnash, Hydrologist-in-Charge, California-Nevada River Forecast Center, National Weather Service, 1416 Ninth Street, Sacramento, CA 95814, (916) 442-1201.*

Overcoming Institutional and Technical Constraints to Water Resources Management. Twentieth Annual American Water Resources Association Conference and Symposium. Washington, DC: August 13-16, 1984. The world's water problems cannot be solved with technological approaches that ignore political, social and legal constraints. These institutional aspects of water management are the subjects of this year's meeting. Papers are invited on such topics as coordination of water resources plans and programs, state and federal relationships and responsibilities in water management, priorities for water resources investments, decaying urban water infrastructures, managing regional water resources systems, and analyzing regional programs. A one-day symposium will be held during the conference on problems pertinent to the maintenance of water quality. The deadline for submission of abstracts is November 15, 1983. Obtain guidelines and more information about the conference from *Warren Veissman, Jr., Department of Environmental Engineering Sciences, A.P. Black Hall, University of Florida, Gainesville, FL 32611, (904) 392-0834,* and about the symposium from *Theodore M. Schad, National Academy of Science, 2101 Constitution Avenue, Washington, DC 20418, (202) 334-3083.*

Thirteenth Conference on Severe Local Storms. American Meteorological Society. Tulsa, Oklahoma: October 17-20, 1983. This conference will emphasize the physical understanding of severe local storms and their environment, and the application of this better understanding to improved forecasts and warnings of severe weather. Papers will be presented on the following topics: storm dynamics, tornadoes, forecasting and warning systems, storm-scale and meso-scale numerical models, electrical activity, and the application of remote sensors. There will also be poster displays, slides and movies of severe weather phenomenon, and at least two joint sessions with the Fifth Conference on Hydrometeorology, sponsored by AMS in Tulsa at the same time. For more information, contact *Rodger A. Brown, Program Chairman, National Severe Storms Laboratory/NOAA, 1313 Halley Circle, Norman OK 73069, (405) 360-3620.*

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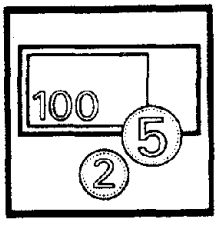

Emergency planning. "Contingent Conditions for Research-Based Local Emergency Planning," National Science Foundation, $164,994, 24 months. Principal Investigator: *Jack D. Kartez, Environmental Research Center, Washington State University, Pullman, WA 99164, (509) 335-8536.*

This study seeks to determine what conditions or influences have a bearing on whether local governments are willing, or even able, to use insights from previous research in planning for their community's response to natural hazards, specifically earthquakes. Three central objectives are 1) to develop a model of relationships between management decisions on response planning and the governmental and community organization in the jurisdiction, 2) to develop and test methods of better transferring research knowledge to users with particular needs and constraints, and 3) to advance the prevalent theories on organizational response to disaster. The model will be based on findings from interviews and a mail survey of managers in the Seattle area, and tested in a survey of both the Washington management personnel and a comparable group in California.

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Evacuation planning. "Transportation Actions to Reduce Highway Evacuation Time Under Natural Disasters," National Science Foundation, $181,133, 30 months. Principal Investigator: *Antoine G. Hobeika, Department of Civil Engineering, Virginia Polytechnic Institute and State University, Blacksburg, VA 24061, (703) 961-7407.*

The main objective of this research is to develop, test, and evaluate various measures that would reduce the highway network clearance time in communities threatened by a natural disaster, as in the case of floods or hurricanes, or in communities just stricken by disaster, as in the case of earthquakes. The measures to be considered are related to highway facilities, vehicles, and driver education programs. The results of the effort will be a report on the state of the art in network evacuation planning under emergency conditions, and a model with which to evaluate actions to reduce network evacuation time for use by public and private agencies concerned with evacuation. The social, economic, and political feasibility of recommended schemes will be assessed, as will the implementation requirements of each.

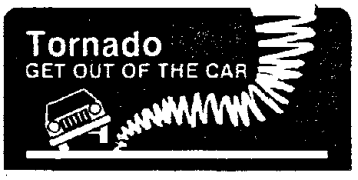
Multiple hazard mitigation. "National Hazard Vulnerability and Hazard Mitigation," Federal Emergency Management Agency, $62,445, 6 months. Coordinator: *Abram B. Bernstein, Advisory Board on the Built Environment, Commission on Engineering and Technical Systems, National Research Council, 2101 Constitution Avenue, Washington, DC 20418, (202) 334-3377.*

A workshop on present capabilities relevant to the development of mitigation strategies for communities prone to multiple natural hazards will be convened in July, and involve geophysicists, engineers, economists, and specialists in community planning and government. They will be asked to provide guidance to FEMA in connection with its mandate to develop a comprehensive hazard mitigation policy, and to provide hazard mitigation and disaster planning assistance to state and local agencies. Conducted under the auspices of the National Research Council, the workshop is being planned by a steering committee chaired by J. Kenneth Mitchell of Rutgers University; preparation of the workshop report is also the responsibility of the steering committee. The workshop will address three major questions: whether our current ability to assess hazard risk and community vulnerability is adequate for multiple hazards; whether our understanding of the economics of natural disasters can provide a rational basis for the selection of strategies; and the degree to which our institutional mechanisms are conducive or inimical to adoption of multi-hazard mitigation techniques.

GET READY FOR TORNADOES

Helping state or community officials improve tornado preparedness and safety is the goal of new awareness materials just released by the Federal Emergency Management Agency and the National Oceanic and Atmospheric Administration. The ***Tornado Safety Resource Workbook*** provides step-by-step guidelines for a public education campaign, examples of effective programs, and an abundance of practical information about coping with tornado threat.

The workbook is divided into five sections, each useful alone or in combination with materials from the others. The first is a planner's packet containing advice about organizing town meetings, establishing and maintaining a tornado spotters' network, the usefulness of a local tornado preparedness committee composed of representatives of businesses, volunteer groups, churches and schools, and the use of communication facilities throughout the region to disseminate information about tornado safety. The second section is directed at families with children, and provides safety information using the Owlie Skywarn instructional materials. Section three is a collection



A car is the least safe place to be during a tornado. When a warning is issued, do not try to leave the area by car. If you are in a car, leave it and find shelter in a building. If a tornado approaches and there are no safe structures nearby, lie flat in a ditch or other ground depression with your arms over your head.

of camera-ready graphics, checklists, and photographs suitable for inexpensive reproduction and use in local newsletters, flyers, or posters. Another section is devoted to press releases and radio spots on various aspects of tornado awareness, preparedness, and response, and the final portion of the workbook lists audio-visual materials, publications, and sources for more information.

The ***Workbook*** can be obtained free by writing to *Office of Public Affairs, Federal Emergency Management Agency, 500 C Street, S.W., Washington, DC 20472.*

NEW GROUND MOTION MAPS

Extensive data recently acquired on Holocene and Quaternary faulting in the western United States, and new interpretations of geologic structures controlling the seismicity pattern in the central and eastern United States have made possible significant improvements in the U.S. Geological Survey's 1976 map of maximum ground motion expected from earthquakes (see ***Observer,*** Vol. 1, No. 1, p. 7). New maps have just been published.

The seismic source zones used in the development of the new maps are more clearly defined and generally smaller than those relied upon for the original probabilistic acceleration map. Because of this, many areas of high seismic hazard have been delineated in more detail, although for large areas of the nation accurate geologic information is still lacking. The compilation of maps is useful in building code applications, land use planning, insurance analysis and disaster mitigation planning. As fault slip and related geologic data become available, further refinement of the probabilistic estimates of ground motion will be possible.

Probabilistic Estimates of Maximum Acceleration and Velocity in Rock in the Contiguous United States, by S. T. Algermissen, D. M. Perkins, P. C. Thenhaus, S. L. Hanson, and B. L. Bender, Open File Report #82-1033, can be purchased ($24.50 for paper and $6.50 for microfiche) from the *Open-File Services Section, Branch of Distribution, U.S. Geological Survey, Box 25425, Federal Center, Denver, CO 80225.*

GET PUBLISHED FAST

Small Town magazine is devoting a special issue in late 1983 to all aspects of small community and rural disaster planning, response, and recovery. The issue is an outgrowth of the American Planning Association National Conference held in Seattle in April, and its session on "Small Towns and Disaster Planning." ***Small Town*** is seeking short articles (six to 14 double-spaced pages), accompanied by photos, graphics and illustrations if possible. Also welcome are brief reviews of books or reports on smaller community disaster planning. Accounts of small town emergency planning for the Shoreham, Long Island nuclear generating plant, and of emergency response to Mount St. Helens' eruptions will lead off the issue.

Send materials *by October 1, 1983,* to *Ken Munsell, Director, Small Towns Institute, P.O. Box 517, Ellensburg, WA 98926, (509) 925-1830.*

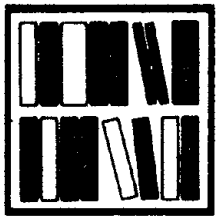
READINGS READIED

A new working paper, a special publication, and the 1981-1982 annual bibliography have just rolled off the Information Center's hyperactive press.

The Niño as a Natural Hazard: Its Role in the Cultural Complexity of The Peruvian Coast, Working Paper #48, argues that large populations along the Peruvian coast from 2500 to 1750 B.C. subsisted on marine resources during normal climate periods, and shifted to agriculture during disturbances to the marine ecosystem caused by Niños—incursions of warm surface water southward along the coast that alter the ocean's ecosystem. Because of these periodic alternative means of subsistence, centralized authority developed in the culture and is evidenced today by remnants of preceramic monumental architecture in the area. Elaborating the thesis, the author discusses the responses of cultural systems to temporal environmental variation, specifically natural hazards. ***The Niño as a Natural Hazard,*** by Joseph J. Lischka, 65 pages @$4.50, is available from the Information Center.

Special Publication #6 is the text of a lecture delivered at the University of Colorado by Robert Kates entitled, "The Human Environment: Penultimate Problems of Survival." Using natural and technological hazards as examples, the author thoughtfully explores the Malthusian dilemma, the growing global separation of wealth and poverty, and the disparity between technological capability for change and the primitive character of human behaviors and institutions. "The Human Environment" is 48 pages long, costs $3.50, and can be obtained from the Information Center.

A Selected, Partially Annotated Bibliography of Recent (1981-1982) Natural Hazards Publications, compiled by David R. Morton, lists 250 citations and is indexed by subject and principal author. The bibliography sells for $5.00, from the Information Center.



RECENT PUBLICATIONS

Surficial Geology: Building with the Earth. *John E. Costa and Victor R. Baker. New York: John Wiley & Sons. 1981. 498 pp. Text edition: $24.95.*

The book is designed for use by upper-division undergraduates in courses on geologic hazards, urban geology, and environmental studies. The coverage is based not only on the study of surficial processes, but also on the author's practical experiences in applying knowledge of these processes to societal problems. Land use in hazardous areas is examined with respect to earthquakes, volcanoes, erosion, landslides, subsidence, floods, and coastal processes. Numerous illustrations and references amplify the textual material.

Urban Snow and the Potential Value of PROFS (Prototype Regional Observing and Forecasting Service). *Harold C. Cochrane et al. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Environmental Research Laboratories, PROFS, 325 Broadway, Boulder, CO 80303. 1982. 62 pp.*

Retail sales and urban snow removal are often cited as areas that could benefit from more accurate 0-12 hour weather forecasts. Two investigations were conducted to test this belief. First, retail sales and sales tax data were obtained from three U.S. cities (Buffalo, Chicago, Denver) hit with crippling blizzards in recent years. Business losses in the wake of unusually large snowstorms do not appear to disrupt the community's economic life. The second part of the study involved contacting 40 public works managers responsible for directing snow removal operations in their cities. They were asked a set of questions about operational strategies, use of forecasts, and their willingness to pay for improved forecasts. Among other findings, it was noted that the managers were most concerned with being caught unprepared. Almost without exception, they ranked a storm not forecast as the error most troubling to them.

Land Management Guidelines in Tsunami Hazard Zones. *1982. 258 pp. $20.00. Order from Urban Regional Research, 1426 5th Avenue, Suite 308, Seattle, WA 98101.*

Continued development of the coastal zone increases the risk to life and property from tsunamis. Prepared for the National Science Foundation, these guidelines present a variety of primarily nonstructural solutions that address the complicated problem of managing land uses in the tsunami hazard zone. The document is organized into two sections: Part I is a regional planning and regulatory analysis that attempts to define the hazard zone in terms of locational susceptibility. Three case studies—Hilo, Hawaii; the north shore of Kauai, Hawaii; and Kodiak, Alaska—examine the planning experience of American locations at risk from tsunamis. Part II offers a site planning process and site planning guidelines to maximize coastal development while minimizing exposure to the hazard. Local ordinances, zoning codes, and flood insurance are a few of the topics discussed within the context of nonstructural mitigation measures.

"Tornado Technology and Professional Practice." *Joseph E. Minor.* ***Journal of the Structural Division, Proceedings of the American Society of Civil Engineers*** *108 (November, 1982): 2411-2422.*

Although advances in tornado technology have been recognized in some areas of engineering practice, professionals who work with conventional buildings, housing, and community planning have not been as quick to utilize these new design considerations. This paper summarizes tornado-related literature that can be used by the practicing engineer and outlines areas of current and potential use of tornado technology. The author also contends that practicing professionals will have a difficult time incorporating the new technology into their work if they must deal with a public that retains preconceived notions of tornado phenomena. Aggressive education programs in the schools, modification of basic reference literature, and updating of information used in colleges and universities will be necessary if some of these erroneous concepts are to be overturned.

Impact of Science on Society *32 (January-March, 1982): entire issue on the violent forces of nature. Published quarterly by the United Nations Educational, Scientific and Cultural Organization, 7 place de Fontenoy, 75700 Paris, France. 124 pp. 62F/yearly subscription; 18F/single copy. English and French versions.*

Twelve articles by international hazards experts cover the following topics: fire, the social and economic impact of tropical cyclones, earthquakes and plate tectonics, earthquake prediction and public response, the five components of volcanic risk, avalanche triggering, the effects of tsunami on society, mapping of mountain hazards, seismic and volcanic hazards, the consequences of disasters for developing nations, and the need for an international rescue organization. Each article carries a reference list representative of other work in its area of concern. A final section describes the activities of the UN Disaster Relief Co-ordinator's Office.

Handbook for Arizona Communities on Floodplain Management and the National Flood Insurance Program. *Leslie A. Bond. 1982. 166 pp. plus appendices. $6.00, plus $2.00 domestic or $4.00 foreign postage. Order from Arizona Department of Water Resources, 99 East Virginia, Phoenix, AZ 85004.*

The handbook is designed as an introductory text to the National Flood Insurance Program and flood plain management, with references to both federal rules and the Arizona Revised Statutes dealing with flood plain management and flood control. Intended primarily for persons working with Arizona's problems, it can also serve as a model for other states. The looseleaf format facilitates updates and additions that will be sent from time to time to all purchasers.

Status of Volcanic Prediction and Emergency Response Capabilities in Volcanic Hazard Zones of California. *Roger C. Martin and James F. Davis, editors. California Department of Conservation, Division of Mines and Geology. Special Publication #63. 1982. 275 pp. $7.00. Order from the California Division of Mines and Geology, P.O. Box 20980, Sacramento, CA 95812.*

In December of 1981, 200 people met in Sacramento to discuss and evaluate the hazards California's volcanoes pose to state residents. Eleven of the 22 papers presented at the workshop address problems dealing with California's volcanic hazards and the current physical means for predicting future eruptions. The remaining papers consider topics pertinent to planning and preparedness operations in anticipation of an eruption: emergency planning for rare events; experiences of local governments during the Mount St. Helens eruptions; federal government involvement; and a legislative perspective on the role of the California state government in natural hazard emergencies.

Earthquake Hazards Information Dissemination: A Study of Charleston, South Carolina. *Marjorie R. Greene and Paula L. Gori. Department of the Interior, U.S. Geological Survey. Open-File Report #82-233. 1982. 57 pp. Paper copy: $7.75; microfiche: $3.50. Order from the Open-File Services Section, Western Distribution Branch, U.S. Geological Survey, Box 25425, Federal Center, Denver, CO 80225, (303) 234-5888.*

The study identified ways in which public officials and representatives of the private sector in Charleston learn about hazards, and ascertained whether such information gets incorporated into their activities. Interviews were conducted with representatives of agencies and professions to determine the degree of earthquake awareness in the Charleston area. Some findings from the study are that 1) although awareness of earthquake hazard for many of the respondents was only at the level of curiosity, no one who was interviewed was unaware that earthquakes have occurred in South Carolina; 2) officials generally approach hazard mitigation and disaster response from a multi-hazard perspective; 3) accurate and timely information before and during a disaster appears to have greatest importance; and 4) workshops appear to be a particularly effective catalyst for stimulating thinking and activities.

Handbook for Emergencies, Part I: Field Operations. *United Nations High Commissioner for Refugees (UNHCR). 1982. 194 pp. For availability, contact The Emergency Unit, United Nations High Commissioner for Refugees, Palais des Nations, CH 1211 Geneva 10, Switzerland.*

Part I of the handbook is a managerial guide to setting up emergency operations for large-scale influxes of refugees. The result of a lengthy review process, it reflects the growing attention being given within UNHCR and similar agencies to improving the management of emergencies involving refugees. Major themes stressed are improving the techniques of relief assistance, developing strategies to increase refugee self-reliance, and finding ways to permit refugees to assume responsibility for their own welfare. Most of the material is relevant to emergencies precipitated by natural disasters. Topics such as the provision of food and water, site selection of the camp, health and medical problems, and sanitation measures are treated in detail. A chapter on social services and educational facilities is of special interest. The handbook is available in French and English, and a Spanish version also will be published.

Stormwater Management *and* ***Stormwater Management Model Ordinance.*** *Illinois Department of Transportation, Division of Water Resources. Local Assistance Series #s 4A and 4B. 1982. 39 pp. each. A limited number of single copies are available free from the Illinois Department of Transportation, Division of Water Resources, 300 North State Street, Room 1010, Chicago, IL 60610, (312) 793-3123. Attention: Vicky Wong.*

Prepared principally by the Southwestern Illinois Metropolitan and Regional Planning Commission, these two reports deal with the effects of urban development on precipitation runoff. ***Stormwater Management*** 1) provides a brief background to human-caused intervention in the hydrologic cycle, 2) examines possible stormwater management measures and the considerations needed to select appropriate measures, 3) discusses the operation and maintenance of these measures, and 4) considers stormwater regulations and the legal ramifications of such regulations. ***Stormwater Management Model Ordinance*** gives detailed information about how new subdivisions can be regulated to ensure that they will properly manage their stormwater runoff. Included in this report are an examination of Illinois law, a discussion of the engineering and planning aspects underlying the ordinance, and an overview of local government authority to adopt and enforce regulations.

Geologic Hazards, Resources, and Environmental Planning. *Gary Griggs and John Gilchrist. Belmont, CA: Wadsworth Publishing Company, 10 Davis Drive, Belmont, CA 94022, (415) 595-2350. 1983 (Second Edition). 512 pp. $27.95.*

Co-authored by a geologist and an environmental planner, this college-level text offers an understanding of the interaction between geologic processes and environmental concerns. Separate chapters deal with earthquakes and faulting, volcanic activity, the hazards associated with soil conditions, landslides and other mass earth movements, subsidence, coastal processes, and surface hydrology and flooding. Each chapter includes discussions of processes and how they operate, recognition of hazards and resource limitations, and specific approaches to planning solutions. Overviews are given of hazard perception, land use control, new approaches to environmental planning, and legislation at federal, state and local levels.

"Earthquake Prediction: Testing the Ground." Berel Lang. ***Environmental Ethics*** *5 (Spring, 1983): 3-20.*

Earthquakes and the personal and institutional responses they evoke raise significant questions about public policy and the application of moral values. Some of the questions are the standard ones of policy analysis and cost/benefit predictions that have been applied to most social hazards, for instance, pollution and nuclear waste. Other questions, however, are specific to earthquakes because of the implications they have for the concept and practice of earthquake *prediction*, both for scientists and for the public that depends on science. This article discusses the extensive impacts of earthquake prediction on land use controls, building codes, the economy, and human behavior. It calls for increased attention to the effect of certain public and social values on the practice of prediction, and to the need for more questioning about the social character of "normal" science and the deprofessionalization of scientific institutions.

Examples of the Use of Geologic and Seismologic Information for Earthquake-Hazard Reduction in Southern California. *William J. Kockelman. Department of the Interior, U.S. Geological Survey. Open-File Report #83-82. 1983. 58 pp. Paper copy: $7.50; microfiche: $3.50. Order from the Open-File Services Section, Western Distribution Branch, U.S. Geological Survey, Box 25425, Federal Center, Denver, CO 80225, (303) 234-5888.*

The report illustrates some of the geologic and seismologic information used by planners to reduce earthquake hazards in Southern California. The five examples include anticipating damage to critical facilities; preparing, adopting, and implementing seismic safety programs; retrofitting highway bridges; regulating development in areas subject to fault rupture; and strengthening or removing unreinforced masonry buildings. For each example, a summary is given of the problems or needs faced by users, the available earth-science information, the methods and procedures used, and the impact of each decision on earthquake-hazard reduction by other users.

The NATURAL HAZARDS RESEARACH AND APPLICATIONS INFORMATION CENTER is intended to strengthen communication between research workers and the individuals, organizations, and agencies concerned with public action relating to natural hazards. Please let us know of any research or research needs or other information which should be brought to the attention of the Center. The Center is funded by the National Science Foundation, Federal Emergency Management Agency, National Oceanic and Atmospheric Administration, U.S. Geological Survey, Tennessee Valley Authority, and the Corps of Engineers.

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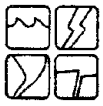

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15. Supplementary Notes

16. Abstract (Limit: 200 words)

This issue reports on the role of the National Oceanic and Atmospheric Administration (NOAA) in providing assistance in coastal hazards. NOAA's new Office of Ocean and Coastal Resource Management is involved in activities including: (1) assessing the future direction of coastal hazards in NOAA and making recommendations to NOAA's management; and (2) coordinating the National Weather Service storm surge modeling with state coastal zone management programs. Documents reviewed concern: (1) proceedings of a workshop on the California wetlands; (2) investigations of the 1886 Charleston, South Carolina earthquake; (3) improvements in flood forecast and warning services provided by the National Weather Service; and (4) ways in which 13 California jurisdictions planned and implemented seismic safety policies. Lists of recent publications, grants, and conferences are provided.

17. Document Analysis a. Descriptors

Hazards
Local government
State government
Documents
Safety
Meetings
California
Floods
Management
Planning
Earthquakes
South Carolina
Grants

b. Identifiers/Open-Ended Terms

National Oceanic and Atmospheric Administration
National Weather Service
Wetlands
Charleston (South Carolina)
G.F. White, /PI

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report)	21. No. of Pages
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