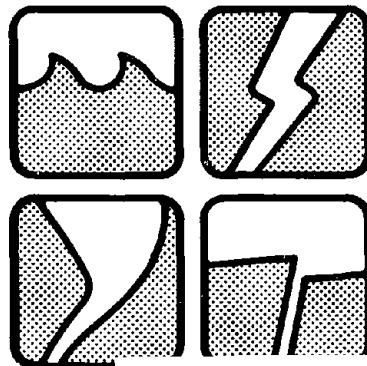


Natural Hazards OBSERVER



PB 289832

Volume I

Number 1

September, 1976

CATASTROPHE AND COMMUNICATION

The loss of more than 100 lives in the waters of Big Thompson Canyon on the night of July 31, 1976, is a chilling reminder that the United States continues to be highly vulnerable to catastrophe from natural causes. Rainfall of more than 10 inches fell in less than 24 hours in a sector of the drainage area below Estes Park. Stream flow, according to a first rough estimate by the United States Geological Survey, reached or exceeded 40,000 cfs in contrast to the highest flow previously recorded of 7,600 cfs in 1945. Highway 34 washed out in numerous places. Houses, trailers, autos, bridges, butane tanks, trees, boulders, and debris were swept along.

The National Weather Service had observed the heavy rainfall, and its warning was understandably lacking in precision as to the magnitude of the resulting flash flood. Many people received no warning. Many who listened ignored it or tried to get out in their cars rather than scrambling up the steep slopes of the canyon. The victims included vacationers new to the mountains and old-timers who thought the stream would rise no higher than the remembered maximum.

Emergency response by local, state and Federal agencies was quick and vigorous. But several longer-term lessons were clear.

The likelihood of flash floods in at least 2000 other areas is widely recognized. Improved means must be found to assist local communities in organizing to issue, disseminate, and respond to warnings.

Unless more effective action is taken to encourage land use which would be less vulnerable to extreme events, the national situation will continue to worsen.

Much of the legislation for civil emergency preparedness, response and recovery, in the words of one of the leaders in the field, "is in a mess." The current emergency activity is earnest and prompt but is handicapped by the confusion of administrative authorities and by a lack of well defined responsibility.

These and other issues were explored by the selected administrators and scientists who gathered from across the nation in the Natural Hazard Research Workshop at Boulder on June 30-July 2.

The Workshop, like this *Natural Hazards Observer*, was aimed at speeding up the flow of ideas and information among those who are on the firing line in preventing or coping with disasters and those whose research findings may assist them in doing a better job.

Many new scientific data and insight on hazard problems are not being used effectively. Thus, understanding developed by recent studies of the process of community reconstruction following a disaster is not perceived accurately by many officials who are thrown into action in the wake of events like the Big Thompson flood. At the same time, some research effort is going forward without accurate recognition of what the administrators need. The officials who are responsible under Section 201a for preparing state plans for disaster mitigation and emergency response encounter a series of problems which only recently have been brought plainly to the attention of researchers.

The Workshop, this newsletter and an information service are supported by the National Science Foundation as practical steps in the direction of closing the gap. To the extent that they advance the exchange of information among workers in the natural hazard field, they will help reduce the frequency and severity of additional Big Thompson tragedies.

--GEW

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A POSSIBLE HURRICANE CATASTROPHE?

The United States may be building toward a hurricane catastrophe, says Neil Frank of the Miami Hurricane Center in a statement of concern presented to the American Meteorological Society at the Tenth Technical Conference on Hurricanes and Tropical Meteorology, July 6-9, 1976.

One indication is the rapid increase in coastal area populations, especially in beach front subdivisions. There are now about 37 million people living in coastal counties from Texas to Maine, with more than six million of them currently exposed to storm surge hazard, the hurricane's biggest killer. Most of these people are inexperienced: 78% of them have never experienced the full thrust of a hurricane. Planned evacuation routes are not adequate for many communities in the face of increased populations or for those with limited egress roads. Contingency plans need to consider the use of well constructed high rise buildings when horizontal evacuation becomes impossible.

WARNING HEEDED--THIS TIME

Hurricane Belle, moving along the east coast, across Long Island and into New England early in August, turned into real life a casual conversation between Robert Beck of NOAA and Roy Popkin of the Red Cross. At the Natural Hazard Research Workshop in July they discussed the possibility of a hurricane preparedness drill based on the 1938 hurricane which smashed into Long Island and caused great damage in New England. There has not been a severe hurricane in this area since 1960.

Belle, fortuitously, became the "drill." Skirting the Outer Banks of North Carolina and hugging the east coast until she crossed Long Island and moved into Connecticut and eastern New England, Belle was preceded by a series of precise National Weather Service advisories and local warning statements. On the basis of this information, civil defense and local authorities were able to evacuate threatened areas, many of which were crowded with summer vacationers, and the Red Cross had plenty of lead time in which to open 377 shelters from North Carolina to Maine. The result: only one reported fatality and only a handful of people remaining on the coastal barrier islands as the storm passed.

Fortunately, Belle was not a severe hurricane, starting out as a class 3 storm and diminishing to class 1 when she crossed Long Island. But people did take the NWS forecasts seriously, with their warnings of 100 MPH winds, extremely high tides and potential flooding motivating ready response to evacuation efforts. As a "test," she provided the opportunity of a highly successful "drill." She left behind the question of how accurately people who took part in the 1976 drill will estimate a severe hurricane when next it is forecast.

Concern over the Southern California crustal uplift has led the U. S. Geological Survey to undertake an intensive study of the earthquake potential of the uplift under a \$1.3 million grant from the National Science Foundation.

The crustal uplift of up to 0.25m. (10 in.) apparently began about 1960 and has grown to cover at least 12,000km (4,713 sq. m.). It extends northwestward along the San Andreas fault from Cajon to Maricopa, eastward from Lebec across the Mojave desert, and southward into the Northern Transverse Ranges.

Objectives of the study, beginning in July, 1976, are to:

- Make observations that could indicate important changes in the region of the uplift through the installation of geophysical instruments, surveys of crustal deformation, and field studies of faults and fault activities.
- Analyze the data to determine if and when they may indicate the probability of an earthquake of damaging magnitude.
- Predict the geological effects of a large earthquake in the region of the uplift on the Los Angeles area.

The principal investigator is *Dr. Robert M. Hamilton, Chief, Office of Earthquake Studies, The Geological Survey, U. S. Department of the Interior, National Center, Stop 905, Reston, VA 22092.*

EARTHQUAKE ADVISORY GROUP

An Advisory Group on Earthquake Prediction and Hazards Mitigation met August 12-13, 1976, to review Federal Programs on these topics, advise on possibly accelerated NSF and USGS programs on earthquake research, and make recommendations on levels of funding. It is chaired by Dr. Nathan Newmark, and reports to Dr. H. Guyford Stever, Science Advisor to the President. Contact person: *Leonard Lederman, Executive Secretary to the Group, National Science Foundation, Washington, DC 20550, PH: (202) 634-4640.*

AUSTRALIAN NATURAL HAZARD RESEARCH

The first integrated effort to take the measure of all their nation's natural hazards was made by Australian scientists, engineers, insurance executives, civic leaders, and government officials at a symposium in Canberra on May 26-29, 1976. Organized by the Australian Academy of Science, papers and discussion sessions dealt with occurrence and vulnerability to the whole range of extreme events. A National Disasters Organization was set up by the Commonwealth Government in 1974. National disaster insurance is under discussion. Proceedings are being edited by Professor R. L. Heathcote and will be published by the *Academy of Science, P. O. Box 216, Civic Square, Canberra, Australia 2608.*

NEW LIGHT ON NATURAL HAZARD INSURANCE

How do people decide how much risk they will take in the face of flood or earthquake? Public policy seems to have been guided by the theory that humans rationally assess the probabilities of extreme events, assign numerical values to results of all possible courses of action and then choose the action with the highest expected utility. A study funded by NSF-RANN at the University of Pennsylvania, principal investigator Howard Kunreuther, is nearing completion, and some of the preliminary results raise questions about the validity of this traditional view. The study examined the decision to buy flood and earthquake insurance in selected vulnerable communities.

The "expected utility" theory, in fact, is not always used (e.g. the purchase of flight insurance even though it is more expensive than regular life insurance). Few people purchase flood insurance even though it is highly subsidized by the Federal government. Actual decision-making involves the gathering of information, often a costly procedure in time and money. People will not collect the needed data unless they perceive the hazard as a problem.

A carefully designed field survey was made of 3000 hazard-susceptible homeowners, half of whom had purchased insurance and half of whom had not. Preliminary findings, which have been supplemented and verified by separate laboratory studies, include the following: 1) Many people had very limited knowledge of the hazard. They were unable to assess the probability of occurrence or estimate potential damage. A significant proportion of uninsured expected no damage at all. 2) Of the uninsured, most could not give any estimate of the cost of insurance. Most individuals do not have enough information to be able to use the expected utility analysis. 3) Prior to a disaster, the public views insurance as an investment and expects a return. Insurance is not viewed as a means of sharing the costs of natural disasters.

There are some obvious implications for future public policy. Individuals need better information about the consequences and probabilities of hazards, and the availability of insurance. There should also be an effort to make insurance more attractive to the market, using the actual decision-making process--not a theoretical model--as a guideline. The researchers at the University of Pennsylvania are exploring the initiation of comprehensive insurance as one possible alternative.

Preliminary findings have been presented in "*Limited Knowledge and Insurance Protection*," by Kunreuther. *Public Policy*, Volume 24, #2 (Spring, 1976). For further information, contact Howard Kunreuther, The Wharton School, Department of Decision Sciences, University of Pennsylvania, Philadelphia, PA 19174.

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WHERE DO YOU GET YOUR INFORMATION?

WINDY TIMES by Lynn Ashby. Portions of this article were reprinted by permission of the Houston Post (copyright 1976).

What, specifically, is a hurricane? It is a cyclone beginning over tropical waters, with winds of at least 74 miles an hour, moving in a counter-clockwise oval, touching off small tornadoes, heavy rains and an immediate 15 per cent increase in your insurance rates.

What is the direction of a hurricane? In the lower latitudes, hurricanes usually move toward the west or northwest at 10 to 15 miles per hour. When the center of the storm approaches 25° to 30° North Latitude, the direction usually changes to northeasterly.

Where does that put the hurricane? Roughly in the 2300 block of the Southwest Freeway.

Why hasn't Houston had a hurricane in the past several years? Houston bid for Celia in 1970, but lost out at the last moment to Corpus Christi, a source of embarrassment ever since. In 1972, Houston sent a blue-ribbon delegation to make a presentation to Agnes, but was outgunned by the Eastern Establishment consortium. This year, however, civic leaders have promised an all-out program to land a decent hurricane for Houston.

If a hurricane comes into Galveston Bay, what will happen to our low-lying areas? Super-tankers will tie up at the San Jacinto Monument.

What about Baytown? I give up. What about Baytown?

Will it flood? A heavy dew will flood Baytown. A hurricane will cause some inconvenience for shrimpers snagging their nets on TV antennas.

Has an evacuation route been planned? Yes. What is it? This information is and will remain confidential. As one Civil Defense official put it: "If we make the route public, everyone will want to use it, causing no end of chaos and confusion. Our job is to prevent trouble, not cause it."

If a storm does come up, how can I tell whether it is really a hurricane? The Coast Guard will display a red pennant as a small craft advisory if the winds get between 18 and 33 knots. If you see two red pennants, it is a gale warning, with winds between 34 and 47 knots. If you see a single square red flag with a black center, it is a storm warning, with winds between 48 and 63 knots. Two square red flags with black centers on the flagpole mean a hurricane with winds of 64 knots and above. No flags on the flag-pole indicate strong winds. No flagpole indicates very strong winds. A flagpole flying through your den--with or without the pennants--indicates a hurricane.

The U. S. Geological Survey has predicted a possible major eruption of Mauna Loa volcano on the island of Hawaii for some time before July, 1978. Aside from precautions taken at Mount Baker in 1975, based on a substantial change in thermal activity there, this is the first time an eruption has been officially predicted.

The prediction is based upon Mauna Loa's historical record. Since 1852 small summit eruptions, similar to the July 1975 eruption, have always preceded a major flank eruption. Scientists believe that the July 1975 eruption may be a precursor. The site of the July 1975 eruption seems to indicate that the NE rift of Mauna Loa will be the location of a flank eruption. This constitutes a possible threat to the city of Hilo.

The implications of the prediction are complex. Hilo has been spared by all previous major eruptions and many residents have developed folklore about Mauna Loa. There are questions as to how the community would react to various methods, (i.e. bombing the volcano) employed by technicians to divert the lava flow and thereby mitigate the hazard. The USGS has contracted for technical expertise on monitoring and determining the location and construction of barriers. How the prediction is affecting the community, what adjustments the residents are aware of, and which they are choosing to implement are difficult to assess.

Further information on the situation is available from the *Hawaiian Volcano Observatory, U. S. Geological Survey, Hawaii National Park, HI 96718.*

DISASTERS AND MENTAL HEALTH

The Disaster Relief Act of 1974 authorized the National Institute of Mental Health to provide short-term crisis counseling to disaster victims (PL 93-288, Title IV, Section 413). Rules and regulations governing implementation have been printed in the Federal Register. They include: 1) a declaration of a disaster by the President; 2) a request for assistance no later than 60 days after such a declaration; 3) the need that crisis counseling be disaster-related; and 4) approximation of program period and financial requirements should be described. (For complete information, see Federal Register, April 16, 1976.)

In June, 1976, Dr. E. L. Quarantelli of the Ohio State University Disaster Research Center was awarded a one-year contract to develop baseline information on disaster assistance, counseling, and crisis intervention needs and resources in rural areas. Study findings will be available in a monograph which will be disseminated to target groups in both rural and urban areas.

The NIMH has contracted with the Los Angeles Suicide Prevention Center, project director Norman L. Faberow, to develop a training manual and model training program for crisis workers. This material should be completed early in 1977.

Mental Health Disaster Assistance Section, National Institute of Mental Health, 5600 Fishers Lane, Rockville, MD 20852.

As of April 15, 1976, every broadcaster in the country is required by Federal Communications Commission regulations to have a two-tone Emergency Broadcast System. This new EBS is technically better than the old system, improving its reliability and eliminating the chances of a false alarm. The FCC regulations state only that the system be available in case of a national emergency to provide the President access to the American people. There is some doubt that this need will ever be realized.

However, the system has obvious applicability for state and local emergency situations. The FCC, in conjunction with the National Weather Service and the Civil Defense Preparedness Agency, has developed a model plan for broadcasters to use in developing their own local emergency plans. For more information about this prototype, "The Parkersburg Plan," write *Ray Seddon, Chief, Emergency Communications Division, Federal Communications Commission, 1919 M Street, NW, Washington, DC 20554.*

The National Association of Broadcasters is encouraging its members to try to make this new Emergency Broadcast System useful at the local level (federal regulations do not require such an effort). Broadcasters will need the cooperation of state and local emergency planners and the National Weather Service if the new EBS is to reach its full potential as an emergency warning and information system. Anyone interested in pursuing this aspect of the system should contact *Jonathan O. Hall, National Association of Broadcasters, 1771 N Street, NW, Washington, DC 20036.*

TORNADO KNOWLEDGE AND APPLICATIONS

One hundred and fifty professionals met at Texas Tech University in June to discuss tornado technology and its human implications. Co-sponsored by the Institute for Disaster Research of Texas Tech, the U. S. Nuclear Regulatory Commission, the Wind Engineering Research Council, the American Meteorological Society, and the American Society of Civil Engineers, the symposium was organized by Kishor C. Mehta and J. R. McDonald of Texas Tech. Participants included experts in the disciplines of meteorology, engineering, physics, public health, and mathematics; representatives of the insurance industry and the nuclear industry; and governmental officials.

Topics covered in the two and one-half day meetings dealt with tornado windspeeds; tornado prediction, detection and assessment of risk; engineering concerns; and opportunities for greater use of tornado technology. In addition to producing valuable technical observations and recommendations, the discussions emphasized means to achieve a reduction in deaths, injuries and damages from tornadoes. These have direct applications to building codes and emergency planning services. New findings from research indicate that windspeeds in tornadoes are not as high as has been thought; most tornadoes have ground level winds of less than 150 mph (67 m/s), with a maximum in the 250-300 mph (112-134 m/s) range. The participants urged continued and increased di-

alogue among experts, and expanded programs to educate the public on mitigation of tornado damage.

Proceedings from the symposium--an excellent summary of the current state of knowledge on tornadoes--will contain both presented papers and accounts of the open forum discussions. Copies of the proceedings will be available in late 1976, and can be ordered from the *Institute for Disaster Research, Texas Tech University, Box 4089, Lubbock, TX 79409.*

FLOOD PLAIN REGULATION: BENEFITS?

A contract to evaluate the net economic, social and environmental benefits of flood plain regulation has been awarded by HUD (FIA) to Sheaffer and Roland Company. The evaluation is to include consideration of both public and private costs and the economic, social and environmental benefits to the individual and to society. Other interrelated adjustments will be considered, but the project will focus on flood plain regulation, and will provide background for the expected Congressional review of Section 1319 of the National Flood Insurance Act of 1968, as amended (82 Stat. 581) which provides that no new contract for flood insurance shall be entered into after June 30, 1977.

At least ten communities will be studied, including those with a normal riverine situation, with flash flooding, and with coastal flooding. Two of the communities must be in the Appalachian area, and all must have had three years' experience with comprehensive regulation of their flood plains and preferably experienced recent flooding.

Contact: *John Sheaffer, Sheaffer and Roland Co., 20 North Wacker Drive, Chicago, IL 60606. Ph: (312) 236-9106.*



LONG-RANGE IMPACTS OF NATURAL DISASTERS

At the Center for Urban Affairs at Northwestern University, three researchers, Paul Friesema, Jim Caporaso and Dick McCleary are examining the long-range effects of natural disasters. The technique being used is primarily an analysis of an interrupted time series, in which the disaster is considered the interruption.

This NSF/RANN project is in its second year. The communities and disasters which are being studied are the 1965 tornado in Conway, Arkansas; the 1961 hurricane, related storm surge, and tornadoes in Galveston, Texas; the 1966 tornado in Topeka, Kansas; and the 1955 - 56 flood in Yuba City, California.

Though the preliminary findings do not indicate significant long-term economic consequences of disaster in the four communities, investigators have identified significant interruptions in the divorce and unemployment patterns.

The second phase now underway is based on the theory that variations in the impacts of disaster on the community may be related to the severity of the disaster and to the extra-community support extended to a disaster stricken community.

Paul Friesema, Center for Urban Affairs, Northwestern University, 2040 Sheridan Rd., Evanston, IL 60207.

FLOOD HAZARD REDUCTION STANDARDS

A study funded by FDAA to develop guidelines for implementation of Section 406 ("Minimum Standards for Public and Private Structures") of the "Disaster Relief Act of 1974" (PL 93-288) is nearing completion. The draft report, Flood Hazard Mitigation Through Safe Land Use and Construction Practices, is a statement concerning what is actually being done, as opposed to what can legally be done. A final report including recommendations will be presented upon conclusion of the field studies.

For information, contact *John Sheaffer, Sheaffer and Roland Company, 20 North Wacker Dr., Chicago, IL 60606.*

APPALACHIAN HAZARDS

Jack Faucett Associates has been awarded a \$225,000 contract by the Appalachian Regional Commission to evaluate natural hazards and their economic and social effects on Appalachian development. The study, to be completed in Sept. 1977, will survey existing literature and data; conduct case studies; and give a final assessment, including program recommendations and a hazard control manual. Historically, Appalachian disasters have been a burden to the states because they are small, but frequent, with few Presidentially declared disasters. Inquiries: *Robert Gidez, Senior Consultant, Jack Faucett Associates, 5454 Wisconsin Avenue, Suite 1150, Chevy Chase, MD 20015.*

The University of Massachusetts recently received funds from NSF-RANN to study aspect of recovery from disasters. Principal investigators for the project are Peter Rossi, James Wright and Sonia Wright of the University of California at Santa Barbara.

Project A, Census Post--Audits of Recovery Processes, is designed to indicate how long it takes for a community to recover from disasters of different types, of varying severity, and within communities having different characteristics. Project B, State and Local Variation in Response to Disaster Risk, is intended to specify the conditions under which state and local jurisdictions adopt public policies to mitigate disaster.

Additional information from the *Social and Demographic Research Institute, University of Massachusetts, Amherst, MA 10020*.

LEGISLATION-- CIVIL DEFENSE AMENDMENTS

Amendments to the Federal Civil Defense Act of 1950 passed both the Senate and the House of Representatives July 14, 1976 (PL 94-361). The new law is, essentially, a sanction of the common practice of using local civil defense personnel, equipment, and facilities to provide emergency assistance in natural disaster situations.

While emphasizing that the primary purpose of the Defense Civil Preparedness Agency is still preparation for an enemy attack, the amendments recognize that the organizational structure of the DCPA can be utilized in many different emergency situations efficiently and without detriment to the structure itself. Federal grant funds from the DCPA may be used by state and local agencies for disasters other than disasters caused by an enemy attack.

There was concern in both houses that the authority of the FDAA not be duplicated or undermined, and the bill reflects this concern. The bill authorizes use of DCPA resources only in the emergency phases of a natural disaster. The DCPA does not have authority to undertake planning and preparation activities for natural disasters.

FLOOD INSURANCE AMENDMENTS

On August 3, 1976, President Ford signed into law S. 3295, The Housing Authorization Act of 1976 (PL 94-375). The new law amends the National Flood Insurance Act of 1968 (PL 90-448) and the Flood Disaster Protection Act of 1973 (PL 93-234) by extending the authority for emergency implementation of the National Flood Insurance Program until Sept. 30, 1977, and by authorizing \$100 million in 1977 for flood insurance studies. Amendments to Section 202(b) of the Flood Disaster Protection Act of 1973 will permit Federally-related loans to be made in flood hazard communities which are not participating in the national flood insurance program. The loans could be made only for homes occupied prior to March 1, 1976, or one year following an area's identification as a flood hazard community.

Proposed requirements for a Mobile Home Consumer Manual developed by the Department of Housing and Urban Development would state under "wind safety" that the mobile home should be anchored to secure it against high winds, but that no mobile home, anchored or otherwise, is safe in extremely high wind conditions that occur during hurricanes and tornadoes. For the proposed rule, see Federal Register 41, No. 136, p. 29072.

RECENT GRANTS

Social Implications of Volcano Hazards; a NSF/RANN Grant recently awarded to *Dr. Marion E. Marts, 303 Lewis Hall DW-40, University of Washington, Seattle, WA 98195, for \$45,000*.

A program of case studies in the Connecticut Basin of non-structural flood plain management alternatives has been funded by the Office of Water Research Technology in a cooperative effort with the Water Resources Council and the New England River Basins Commission. Budget for 1977: \$75,000 for the case studies and \$100,000 for Corps of Engineers' Level C studies.

CONFERENCES AND MEETINGS

The 23rd National Watershed Congress was held June 27-30, 1976, in Biloxi, Miss. The theme this year was "Alternatives in Watershed Management." Some critical areas of concern were "Accelerated Runoff and Flood Hazards" and "Reducing Runoff and Preventing Floods." Proceedings are available from the *23rd National Watershed Congress, 1025 Vermont Avenue, NW, Washington, DC 20005*.

A workshop on earthquakes and related disasters (landslides, dam failure, fire, liquefaction) will be sponsored by the American Institute of Planners, Nov. 7-11, 1976, at the Islandia Hyatt House on Mission Bay in San Diego. Disaster mitigation through land use planning will be emphasized through a combination of presentations and discussions. For further information please contact: *Ron Davis, Project Director, American Institute of Planners, 1776 Massachusetts Avenue, NW, Washington, D.C. 20036, (202) 872-0677*.

Five NSF regional conferences on environmental design research were held in June, 1976, to determine research needs in environmental design and related fields, and included experts from the design professions, social sciences, economics, developers, research centers, and Federal, state and local governments. The results will be synthesized into a final publication at the Rice Center for Community Design and Research at Houston, Texas, with Dr. Donald Williams as principal investigator. Information: *Henry J. Lagorio, Division of Advanced Environmental Research and Technology, National Science Foundation, Washington, DC 20550*.

RECENT PUBLICATIONS

The Water's Edge: The National Forum on the Future of the Floodplain, with Emphasis on Open Space and Outdoor Recreation, Supplemental Report. Sponsored by U. S. Department of the Interior, Bureau of Outdoor Recreation; the League of Women Voters of the United States; and National Association of Counties. Minneapolis: The National Forum, October 1975. 52 pp.

Recommendations from five workshops-- covering public and private policies, open space and outdoor recreation in urban/suburban communities, conservation of undeveloped flood plains, economic policies, and developing and implementing legislation--are designed to help Federal, state and local governments design more rational economic programs for flood plain use.

Special Section on "Disaster at Buffalo Creek," American Journal of Psychiatry. Vol. 133, No. 3, March 1976, pp. 295-316.

What are the personality, family and community effects of a flood caused by a dam break?

"Family and Character Change at Buffalo Creek" James L. Tithcener and Frederic T. Kapp

"From Chaos to Responsibility." Gerald M. Stern (about the litigation to recover damages for mental impairment following the disaster)

"Loss of Communitality at Buffalo Creek." Kai T. Erickson

"Children of Disaster: Clinical Observations at Buffalo Creek." C. Janet Newman

"Discussion of the Buffalo Creek Disaster: The Course of Psychic Trauma." Leo Rangell

Earth-Science Information in Land-Use Planning: Guidelines for Earth Scientists and Planners. Spangle & Associates, et al. Geological Survey Circular 721. Arlington, VA: Branch of Distribution, U. S. Geological Survey, 1976. 28 pp.

A nationwide sample of applications of earth-science information to urban land-use planning, prepared for the San Francisco Bay Region Environment and Resources Planning Study. A general but helpful study which covers sources, types and interpretation of information; planning for natural resources; planning for natural hazards; and integration of information in the planning process.

The Port Alice Slide. Joseph Scanlon, Jim Jefferson and Debbie Sproat. EPC field Report 76/1. Ottawa, Canada: Emergency Planning Canada, Pearson Building, April 1976. 63 pp.

A community's reaction to a landslide: the initial reactions; how the decision to evacuate was made; reactions to the evacuation order; and the decision to return. Recommendations to Provincial authorities for improved disaster response.

A new handbook, Comprehensive Emergency Preparedness Planning in State Government. Hirst Sutton, Project Director, Council of State Governments, is due off the press in September. Available from: Council of State Governments, Iron Works Pike, Lexington, Kentucky, 40511 (Attention: Mr. Albright).

Flood Warning Systems: Can we apply what we know? Lyle S. Raymond, Jr. File #76-50. Cornell University Water Resources and Marine Sciences Center. (468 Hollister Hall, Ithaca, NY 14853).

Discussion of application problems of flood warning technology summarizing a report of the NYS Senate Select Committee on Interstate Cooperation and a roundtable discussion of the Natural Hazards Workshop in Boulder. One of the Synopsis series by Raymond which condenses information on water resources research and applications and covers the Cornell University research funded by the Office of Water Research and Technology.

Earthquake Prediction Studies in Southern California--Research in Progress June 1976. Peter L. Ward, Editor. Menlo Park, CA: U. S. Geological Survey. U. S. Dept of the Interior, Geological Survey, Open File Report #76-456 (preliminary). 1976. 152 pp.

A listing of research with sections on strain, electro-magnetic, geochemical, seismic, geological, and sociological studies, and studies on the effects of earthquake prediction. Includes names of researchers, objectives and plans, area, portable instruments used, summaries, references, and subject and researcher indices.

A Probabilistic Estimate of Maximum Acceleration in Rock in the Contiguous United States. S. T. Algermissen and David M. Perkins. U. S. Dept. of the Interior, Geological Survey, Open File Report #76-416. 1976. 45 pp.

A probabilistic estimate of the maximum ground motion to be expected from earthquakes occurring in the contiguous United States, based primarily upon the historic seismic record. Provides a method for evaluating the relative importance of the many parameters and assumptions in hazard analysis. The "Preliminary Map of Horizontal Acceleration" shows relative earthquake hazard in the U.S.

These most recent Natural Hazard Research Working Papers, Institute of Behavioral Science, Boulder, Colorado, are available at a subscription price of \$2.00 per copy or individually for \$3.00 per copy from the Institute of Behavioral Science, University of Colorado, Boulder, CO, 80309.

The Consequences of Large-Scale Evacuation Following Disaster: The Darwin, Australia Cyclone Disaster of December 25, 1974. J. Eugene Haas. Natural Hazard Working Paper #27. July 1976. 67 pp.

Flood Insurance and Community Planning. Adoption of the Federal Flood Insurance Program in Two Texas Communities. Nancy Baumann. The Problems and Issues of Implementing the National Flood Insurance Act in Oregon. Rod Emmer. Natural Hazard Working Paper #29. June 1976. 89 pp.

The NATURAL HAZARDS RESEARCH AND APPLICATIONS INFORMATION CENTER is intended to disseminate recent information on natural hazards and its application to urgent problems relating to national, state and local policy on 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 a grant from the National Science Foundation/Research Applied to National Needs Directorate.

STAFF

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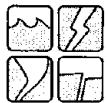
NATURAL HAZARDS OBSERVER
IBS #6
UNIVERSITY OF COLORADO
BOULDER, COLORADO 80309
(303) 492-6818

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Natural Hazards Research and Applications
Information Center
Institute of Behavioral Science #6
University of Colorado
Boulder, Colorado 80309

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or recommendations expressed in this
publication are those of the author(s)
and do not necessarily reflect the views
of the National Science Foundation.

REPORT DOCUMENTATION PAGE		1. REPORT NO. NSF/RA-761638	2.	3. Recipient's Accession No. 00289832
4. Title and Subtitle Natural Hazards Observer Volume I, Number I, September 1976			5. Report Date September 1976	
7. Author(s)			6.	
9. Performing Organization Name and Address University of Colorado Natural Hazards Research and Applications Information Center Institute of Behavioral Science #6 Boulder, Colorado 80309			8. Performing Organization Rept. No.	
12. Sponsoring Organization Name and Address Applied Science and Research Applications (ASRA) National Science Foundation 1800 G Street, N.W. Washington, DC 20550			10. Project/Task/Work Unit No.	
15. Supplementary Notes			11. Contract(C) or Grant(G) No. (C) (G)	
16. Abstract (Limit: 200 words) The Natural Hazards Research and Applications Information Center is intended to disseminate recent information on natural hazards and its application to urgent problems relating to national, state, and local policy on natural hazards. This newsletter advances the exchange of information among workers in the natural hazard field. Some of the topics discussed in this issue include: heeding warnings; the Palmdale Bulge Study; Australian natural hazard research; natural hazard insurance; a predicted volcano eruption; disasters and mental health; a new emergency broadcast system; tornado knowledge; flood plain regulation; long-range impacts of natural disasters; flood hazard reduction standards; Appalachian hazards; and recovery processes in natural disasters.			13. Type of Report & Period Covered	
17. Document Analysis a. Descriptors Hazards Warning systems			14.	
b. Identifiers/Open-Ended Terms Natural hazards Palmdale Bulge Study			13. Type of Report & Period Covered	
c. COSATI Field/Group			14.	
18. Availability Statement NTIS		19. Security Class (This Report)		21. No. of Pages 70
		20. Security Class (This Page)		22. Price PC F01MFB01

