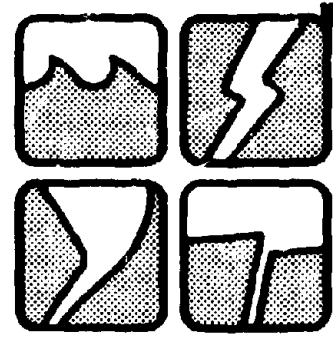


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Natural Hazards OBSERVER

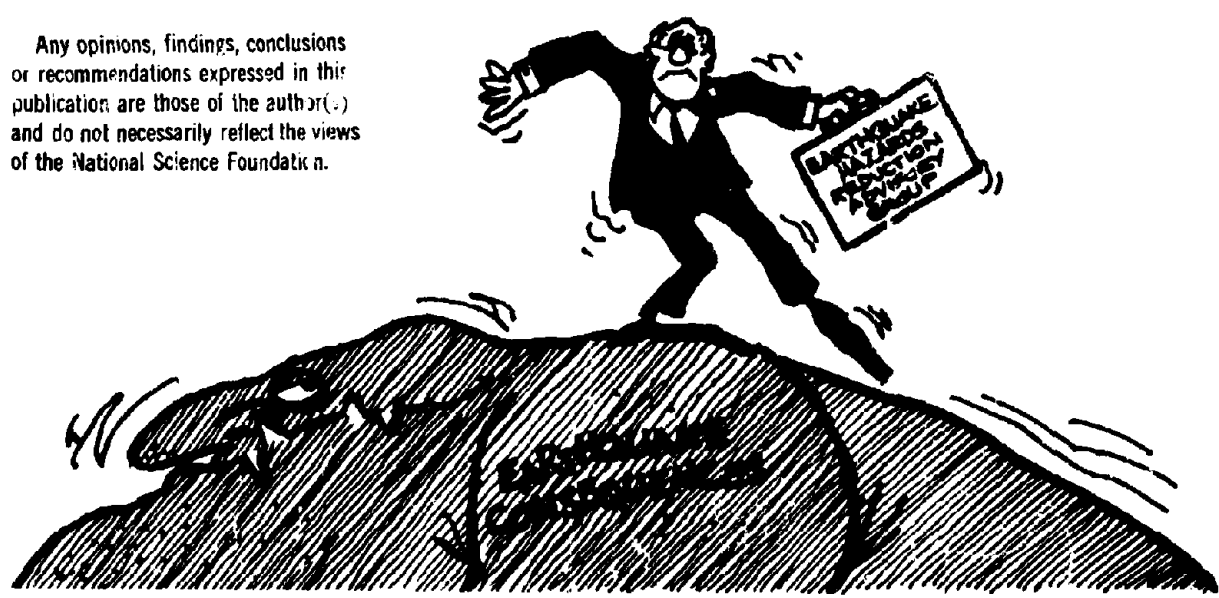


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MITIGATING EARTHQUAKE HAZARDS-- THE FEDERAL ROLE (an invited comment)

With the rapid approach of a capability to make reliable earthquake forecasts, it is essential that the federal government play a strong, positive role in formulating and implementing plans to reduce earthquake hazards. Many steps are being taken in this direction, with the President looking to the Office of Science and Technology Policy (OSTP) in his Executive Office to provide leadership in establishing and coordinating federal activities.

As one step in assuming this responsibility, OSTP has announced that it will form an Earthquake Hazards Reduction Advisory Group for the purpose of reviewing the activities and plans of federal, state and local governmental units, as well as those of the private sector, for implementing the results of earthquake mitigation research. Such research has been carried on with increasing

interest and support from the White House by agencies such as the U. S. Geological Survey (USGS) and the National Science Foundation (NSF). It is time for a concerted effort to apply their findings.

OSTP is also in the process of establishing a Working Group on Earthquake Hazard Reduction under the chairmanship of Karl V. Steinbrugge, a leading authority on civil and structural engineering in areas of high seismic risk and current Chairman of the Seismic Safety Commission of the state of California. Serving on the Working Group will be representatives of the USGS, the Federal Disaster Assistance Administration, the National Bureau of Standards, the Veterans Administration, and other agencies and departments. They will be responsive to the call of Senate Bill S. 126 to the President to submit to Congress an implementation plan for earthquake hazards reduction within 210 days after enactment of the Bill. This group will be seeking the answers to several questions essential to mitigating the ef-

CONTENTS

Safety of Dams.....	2
Climate Change.....	3
Drought Assistance.....	4

Information for Lenders.....	5
Grants.....	6
Conferences.....	7

fects of earthquakes:

- What will be the role of the federal government in dealing with the dislocation of local finances?
- To what extent will federal agencies become involved with the earthquake-resistant design and construction of buildings?
- How will early warning systems be operated?
- Who will coordinate emergency preparedness plans?
- Who will take the lead in public involvement?

These are a few of the many issues that must be examined and resolved.

While there is much hard work ahead for those who will be dealing with these difficult matters, I am encouraged by the fact that we are now confronting the matter of earthquake hazards reduction as a national program, one in which our implementation plan will be developed in a timely manner to match our advances in earthquake prediction.

At the invitation of the Natural Hazards Observer, this statement was prepared by Frank Press, Director, Office of Science and Technology Policy, Executive Office of the President.

THE SAFETY OF DAMS



Concern has mounted during the past few years over the safety of dams as it affects the welfare of downstream populations, and the question of the proper responsibilities of the federal agencies involved in dam planning, construction, operation and ultimate disposal. Many agencies have initiated new reviews, or are completing those already started.

On April 23, 1977, the President issued a Memorandum to the Heads of Federal Agencies with Dam Safety Responsibilities. *Presidential Documents: Jimmy Carter, 1977, 18, #8.* The memorandum provides for broad reviews of agency dam safety, drawing special attention to the following problems: means of utilizing new technological methods to improve existing structures and procedures; the incorporation of probabilistic or risk-based analysis into the process of site selection, design, construction and operation; the effect of earthquakes or other earth movement hazards on dam safety; and the involvement of local communities in dam safety questions.

An interagency committee convened by the chairman of the Federal Coordinating Council for Science, Engineering and Technology will analyze the agency reviews and prepare proposed federal dam safety guidelines in a report due October 1, 1977. An Independent Review Panel of experts is also being established to advise the President.

One subject that seems to be generating unexpected interest is the consideration of the role of the federal government, the states and private dam owners, with respect to non-federal dams. The Corps of Engineers, in a report made under a 1972 law (P.L. 92-367) and submitted to Congress in 1976, inventoried about 49,000 dams

in the United States which are 25 feet in height or impound 50 acre feet or more of water. Only about 18% of these dams have ever been inspected. The latest public works bill included \$15 million for the Corps to update the inventory and begin inspections, but the question has not yet been resolved as to whether the federal government or the states will supervise the inspection, or whether private dams can be inspected if the owners do not submit a request. Some states such as California already have a dam inspection law and the funds and program to implement it.

After the failure of the Teton Dam on June 5, 1976 the Department of the Interior set in motion its own review of the procedures used by the Bureau of Reclamation in carrying out its dam program. As part of this review Interior has requested the National Research Council to comment on the scientific and engineering adequacy of safety aspects of the Bureau's dam program and Department of Interior's own review process, and to determine whether the steps taken are all that can reasonably be expected of the two agencies.

The NRC has established a Committee on the Safety of Dams, chaired by Earl P. Aldrich, Jr. A workshop held in Denver, CO, August 8-12, 1977, planned a detailed review and critique of the work of the Bureau, dealing with existing structures only, to assess the steps taken or planned by the Department and the Bureau to ensure the safety of existing dams. For further information: *Charles R. Malone, Executive Secretary, Committee on the Safety of Dams, Assembly of Engineering, National Research Council, 2101 Constitution Ave., Washington, DC, 20418, (202) 389-6785.*

CITY PLANNERS RESPOND TO DISASTER

On May 6, 1975, Omaha, Nebraska was hit by a major tornado which resulted in \$120 million in damage and left three people dead. In order to be "better prepared for the next catastrophe", the Mayor's Disaster Review Task Force was established in August, 1975. Their findings and specific recommendations for improvements in warnings systems, agency response, damage identification, local codes and ordinances and pre-planning for recovery are included in: Disaster Response: The 1975 Omaha Tornado. Among the specific recommendations made by the Disaster Review Task Force are reorganization of local Civil Defense into one agency, adoption of a building code requiring structures to resist wind speeds up to 90 mph, and formation of an expert group to advise during post-disaster planning.

This publication is available for \$1.00 from *Susan L. Ruby, Omaha City Planning Department, 1818 Farnam, Omaha, NE 68102.*

CORRECTION

The states listed in the June issue of the Observer as having submitted final Disaster plans to FEMA have all had their plans approved, published and distributed. The following states have received their \$25,000 matching fund Improvement Grant: VA, ME, NC, SC.

CLIMATE CHANGE AND METEOROLOGICALLY INDUCED HAZARDS

by John Oliver, Department of Geography
James Cook University of North Queensland
Townsville, Queensland 4811, Australia

"Increased variability in weather is a typical phenomenon when long-term climatic changes are underway." A. B. Carr and H. R. Sherman made this point in *A Primer on Climatic Variation and Change* (see Recent Publications).

Climatologists present divergent interpretations of climatic changes and fluctuations. One group believes that, at least on a time scale of decades, climate is predominantly stable and the extreme events experienced in recent years are no more than the normal variations within the existing climatic spectrum. Conversely, other climatologists, such as Reid Bryson, Director of the Institute for Environmental Studies, University of Wisconsin, and Hubert H. Lamb, Director of the Climatic Research Unit, University of East Anglia, England, warn of a significant shift in climate, which, they consider, will have notable social and economic impacts if it continues until the end of the century.

A shift from milder conditions to a period of colder, regionally more variable, weather with more marked extremes in specific areas occurred about the 1940's especially in northern hemisphere temperate latitudes. These altered conditions replaced the unusually stable climate characterizing the years from about 1890 to 1945. Changes in the atmospheric circulation pattern accompanied this fluctuation. Reid Bryson considers the weather patterns since 1950 to have been the most abnormal in this millenium. Though the nature of the shift has varied from region to region, climates have changed at about the same time in many parts of the earth.

Natural hazard research has customarily allowed for the dynamic nature of social and economic systems, but has tended to treat the climate pattern as stable. The possibility of a shift or greater variability of climate in the future makes desirable a more searching analysis of changing patterns in the frequency, location, or extreme intensities of meteorological hazards. Analysis must allow for new patterns of experience in a particular locality. With the potential shifting of climatic zones, the possibility of related shifts in zones of hazardousness must be also considered. Some zones now ranked as high risk hazard areas may become more favorable for human occupation, while others, not previously listed, may appear in the ranking. Furthermore, there may well be complex hazard situations to which an area has been exposed previously where the magnitude of the combined hazard impact or the former mix of individual hazard components may be modified.

If climatic variability increases in the next decade or so, it will be quite possible that what appears now to be adaptive in human response and behavior may turn out, as R. M. Kates hinted, to be maladaptive in the future (*Natural Hazard Working Paper #14*, p. 2, University of Colorado).

Empirical evidence strongly suggests that past climatic experiences are not an appropriate guide for environmental planning in the future, but our inability to chart with certainty the climate of the next few decades severely limits our ability at present to plan for future hazard situations which are responsive to climatic instability. We might agree with Tom Alexander's conclusion, "In writing the equations for mankind's survival we'd better allow plenty of margin for error." (*Fortune*, February 1974.)



WHEN'S THE NEXT

100-YEAR FLOOD?

PERCENT CHANCE OF GETTING ONE OR MORE SUCH OR BIGGER FLOODS IN THE MANY YEARS					RETURN PERIOD YEARS
ONE HUNDRED YEARS	FIFTY YEARS	TWENTY FIVE YEARS	TEN YEARS	ONE YEAR	
100	50	25	10	1	100
50	25	10	5	0.5	50
25	10	5	2.5	0.25	25
10	5	2.5	1.25	0.125	10
5	2.5	1.25	0.625	0.0625	5
2.5	1.25	0.625	0.3125	0.03125	2.5
1.25	0.625	0.3125	0.15625	0.015625	1.25
0.625	0.3125	0.15625	0.078125	0.0078125	0.625
0.3125	0.15625	0.078125	0.0390625	0.00390625	0.3125
0.15625	0.078125	0.0390625	0.01953125	0.001953125	0.15625
0.078125	0.0390625	0.01953125	0.009765625	0.0009765625	0.078125
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Condominiums (cont.)

trailers and the problems of enforcing requirements through the home-owners association have led St. Lucie County authorities to no longer allow the formation of new parks of this type. Planners elsewhere may benefit from this experience. Reported in the *ASPO Journal, Planning* 43, #6, p. 6 (July, 1977).

HURRICANE AWARENESS

"Look at it this way, Frank. Look down there, south, along the beach. Look at those places. Do you really think that the county and the state and the federal government would let that construction go on, let all those hundreds of millions of dollars be spent, if they thought there was any chance of all that being washed away?"

From *Condominium* by John D. MacDonald. Copyright © 1977 by John D. MacDonald. Reprinted by permission of J.B. Lippincott Company.

This best-selling novel describes the rise --and fall--of the Golden Sands, a condominium built on an island off-shore of the Florida peninsula. It revolves around retired couples, shady real estate dealings and careless construction practices while including accurate descriptions of hurricane phenomena for this rapidly developing coastal region.



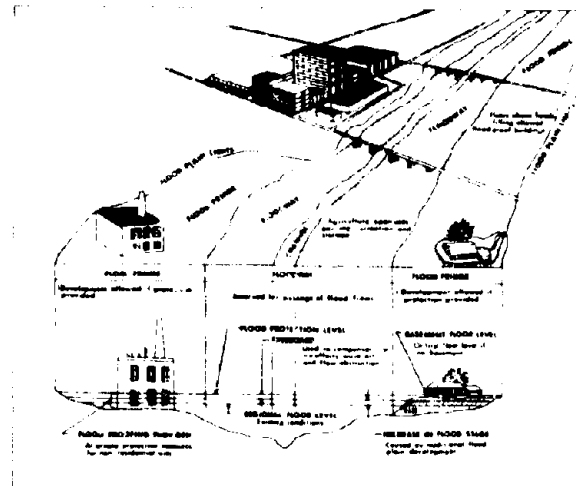
DROUGHT ASSISTANCE

There are now more than 40 drought related federal assistance programs, with at least \$800 million of drought relief measures in prospect from White House initiatives alone, and the problem of simply keeping track of possible sources of aid has grown enormously. The 21 state Western Region Drought Action Task Force commissioned a *Directory of Federal Drought Assistance, 1977*, as a tool for state and local government officials and private citizens affected by drought to better understand and take advantage of available federal government assistance programs. For a copy, and for information on other drought related activities, contact the *Institute for Policy Research, Western Governors Policy Office, 2480 West 26th Avenue, Denver, CO 80211, (303) 458-8000*.

WATER RESOURCE POLICY: NONSTRUCTURAL MEASURES

Among the problems noted in the Water Resources Council's 'Water Resources Policy Study: Issues and Options' is that "Federal water resource planning is oriented to construction projects rather than to comprehensive management of the nation's water resources by all alternative means. This orientation has precluded the use of nonstructural measures such as flood plain management and pricing policies, and has, therefore, resulted in projects that are not as effective, efficient, or environmentally sound as otherwise possible."

Four options are presented to meet this problem: equalizing federal cost sharing for structural and nonstructural measures, favoring the implementation of nonstructural measures through differential federal cost sharing policies, requiring that the nonstructural or total water management alternatives be considered whenever a structural project is recommended, and strengthening the total resource management role of river basin commissions in both water resource planning and implementation. See: *Federal Register* 42, # 136, July 15, 1977, 36790.



THREE-DIMENSIONAL VIEW OF THE STRUCTURE OF A REGULATORY FLOOD PLAIN

Source: *Flood-proofing Administrative Manual for Minnesota*, prepared by the Dept. of the Army, Corps of Engineers, and the State of Minnesota Dept. of Natural Resources for the State of Minnesota Dept. of Administration, Building Code Division, 1977.

ANNOTATED BIBLIOGRAPHIES AVAILABLE

The Natural Hazards Research and Applications Information Center has compiled several bibliographies during the past year which can be ordered from the Information Center on a pre-paid basis. Most entries include annotations with major conclusions and recommendations; all give ordering information when available:

Short Introduction to Computerized Bibliographic Information Retrieval Services for Natural Hazards, December 1976, 7pp., free.

Computer searches can provide quick, in-depth access to publications in a variety of disciplines. This assesses the applicability of various computer data bases to hazard research and gives background information on how to request these searches.

A Selected, Partially Annotated Bibliography of Recent (1975-1976) Natural Hazards Publications, March 1977, 75pp., \$2.00. *Supplement*, May 1977, 16pp., free.

The focus is on legal and social-economic aspects of natural hazard mitigation. Indexed.

Bibliography on Floodproofing, March, 1977, 6pp., \$1.00.

This surveys publications on cost-benefit analysis, floodproofing techniques, land use and planning, and management considerations related to non-structural measures for mitigating the effects of natural hazards.

Flash Flood Warnings Bibliography, April 1977, 19pp., \$1.00.

This includes design of warning systems, and reactions to warnings.

Natural Hazards and Wetlands, An Annotated Bibliography, May 1977, 26pp., \$1.00.

The main emphasis is on the effects of development on wetlands areas and the resultant changes on natural hazard (storms, floods, erosion) potentialities. Legal issues of development are included.

Information Sources for Natural Hazards Research--Organizations, Periodicals, Newsletters, and Reference Sources, May 1977, 19pp., \$1.00.

It lists periodicals and newsletters in which current events are reported, and sources (organizations and reference materials) for hazard-related information.



LENDERS
APPRECIATE
INFORMATION ON
GEOLOGICAL HAZARDS

Two of the statutory charges of the Colorado Geological Survey are (1) to assist, consult with, and advise state and local governmental agencies on geologic problems and (2) to determine areas of natural geologic hazards that could affect the safety of, or cause economic loss to, citizens of Colorado. In addition to these statutory charges, subsequent legislation has dealt specifically with geologic hazards such as ground subsidence, expansive soils, unstable slopes, and avalanches. As a result of this legislation and the Colorado Geological Survey's concern for the health, safety and welfare of the citizens of Colorado, it has been involved since 1969 in studying and mapping geologic hazards which could have an adverse impact on the citizens of Colorado. Two areas of significant influence on land-use planning in Colorado have been contacts with financial institutions and the federal loan-guarantee and granting agencies.

Significant land-use controls in hazardous and potentially hazardous areas have been achieved through communication with private lending institutions. This communication has occurred through distribution of publications, formal presentations, and informal communication by phone on specific projects. The reason for the success of this effort is that lending institutions are not willing to risk capital on ventures which may suffer severe problems of unfavorable publicity or total failure as a result of hazardous geologic conditions. In one such example, a developer managed to bypass the review process and started construction of condominium units in an avalanche path. The lending institution subsequently became aware of the hazardous nature of the site and withdrew the construction loan. As a result, a still unfinished building is at the site.

Similarly, the Colorado Geological Survey has been involved in the A-95 review process which is required by the federal government on all projects in the State which are requesting money or loan guarantees from the federal government. Applications for the above items are reviewed by the CGS and evaluated for adverse geologic conditions. In these cases, a review can result in the identification of adverse geologic conditions or simply identification of potential for a condition which has not yet been evaluated. These have resulted in the federal agency either denying the application or requiring further investigations. The success of this effort is similar to the experience with the private sector in that the federal government does not wish to risk funding in areas which are unsuitable for the proposed development.

For further information: David Shelton, Colorado Geological Survey, Department of Natural Resources, 716 State Centennial Building, 1318 Sherman Street, Denver, CO 80202, (303) 847-2611.

GRANTS



Emergency planning. Emergency Planning Canada has commissioned a study of "The Coordination of Response in Emergency Planning" by the Institute for Environmental Studies, University of Toronto, to be directed by Ian Burton and Anne Whyte, and funded for \$52,000 for the first nine month phase. The study will provide an evaluation of emergency forecasting capability, and focus on the integration into emergency planning of expected social and organizational responses to early warnings. Three components of the work will be: 1) case studies of four recent emergency situations; 2) comparative analysis of Canadian capability for early forecasting of different types of emergencies and the development of indicators of high risk situations; and 3) a review and critique of the present emergency planning structure. For information: Anne V. Whyte, Institute for Environmental Studies, University of Toronto, Toronto, Ontario, Canada, M5S 2N4.

Grants (cont.)

CB's and disaster management. An "Assessment of the Social Consequences of the Adoption and Use of Citizen's Band Radio in the United States" has been funded (\$136,000) by the National Science Foundation/Research Applied to National Needs Directorate. The study, being conducted at the Denver Research Institute, will include a case study of CB influence on disaster management under the supervision of Thomas Drabek, University of Denver, to gather information about the extent of CB usage, awareness of rumors, internal policing measures, and problems or benefits of CB participation. Information: *F. Floyd Shoemaker, Principal Investigator, Denver Research Institute, University of Denver, Denver, CO 80208, (303) 753-3678.*

Hurricane response. A "Hurricane Response Model" project led by Carlton Ruch and Larry Christiansen of Texas A & M University has been funded for the first year for \$52,200. The bulk of the funds have been provided by Sea Grant, with additional matching funds including a \$5,000 contribution from the Texas Coastal and Marine Council.

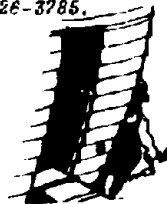
The model will attempt to describe how people interpret various types of hurricane information. The project includes an assessment of the effectiveness of the "Hurricane Awareness Project" in Texas, and of three "town meetings" addressed by Dr. Neil Frank of the National Hurricane Center.

Results will include a publication and a 13 minute film aimed at encouraging a maximum safety response from the public to a hurricane threat. Project leader: *Carlton E. Ruch, Industrial Economics Research Division, Texas A & M University, College Station, TX 77843, (713) 846-5711.*

Drought. The National Science Foundation has funded an invitational "Conference on Drought Research Needs", to be held December 12-16, 1977, at Colorado State University under the direction of Vujica Yevjevich. The aim is to carry out an improved assessment of research needs related to general policy for drought control. The interrelation between urban and agricultural drought problems will be considered. For information: *Vujica Yevjevich, Department of Civil Engineering, Hydrology and Water Resources Program, Colorado State University, Fort Collins, CO 80523, (303) 491-8651.*

Drought. A study of "Consumer Response to Urban Droughts in Central California", by William Bruvold of the University of California, Berkeley, has been funded by the National Science Foundation/Research Applied to National Needs Directorate (\$37,500). It will assess consumer attitudes toward residential water conservation programs adopted by selected water districts in nine Bay Area counties of California and compare effectiveness of various water district conservation programs. For further information: *William H. Bruvold, School of Public Health, Department of Social and Administrative Health Sciences, University of California, Berkeley, CA 94720.*

Floodplain acquisition: any examples? R. M. Field, Associates, Inc. and Abeles and Schwartz of New York City have been awarded a contract by HUD to study the feasibility of implementing Section 1362 of the National Flood Insurance Act. That section allows HUD to negotiate the purchase of floodplain property which has been damaged substantially beyond repair while covered by flood insurance. Communities which have used acquisition and relocation as a floodplain management tool--whether through local, state or other federal programs--or individuals knowing of such communities are urged to contact: *Ann C. Yahner, Ralph M. Field Associates, Inc., 121 Post Road East, Westport, CT 06880, (203) 226-3785.*



Floodplain management. A study by Rutherford H. Platt, University of Massachusetts, will review the state of the art of intergovernmental coordination of floodplain management. Funded by the U. S. Army Corps of Engineers and the Office of Water Research and Technology for \$23,840, it will examine the fragmentation of public authority over a common floodplain, the legal/institutional mechanisms for reconciling and coordinating intergovernmental floodplain management, and the question of how existing regional or intergovernmental arrangements could be used more effectively for such coordination. Contact: *Rutherford H. Platt, Department of Geology/Geography, University of Massachusetts, Amherst, MA 01003, (413) 545-2296.*

Seismic safety: A new project, "The Response of Local Governments in California to Seismic Safety Events", has been funded (\$110,000) by the National Science Foundation/Research Applied to National Needs Directorate. Local governments in California currently are required to address seismic safety issues, but there are often serious economic, social and political pressures working against enactment and enforcement of these measures. Major earthquakes create an immediate crisis with quick response requirements. An inadequate response plan coupled with previously lax enforcement of buildings codes, zoning laws and subdivision requirements can exacerbate the crisis.

Dean E. Mann and Alan J. Wyner, both of the University of California, Santa Barbara, will examine the ways in which selected California cities plan and implement seismic safety programs. The demography of the community, effectiveness of its "normal" planning process, the recency and magnitude of an earthquake and other variables will be examined. Two pairs of cities, two cities which have had earthquakes within recent times, and two similar cities which have not will be studied. A report will be issued at the end of this one year project. Contact: *Dean E. Mann, Department of Political Science, University of California, Santa Barbara, CA 93106, (817) 961-3623.*

Warnings. The first year of a three year study of the "Dissemination of and Response to Natural Hazard Warnings" has just been funded (\$260,750) by the National Science Foundation/Research Applied to National Needs Directorate. Principal investigators are Robert K. Leik, Minnesota Family Study Center, and John P. Clark and T. Michael Carter, Department of Sociology, University of Minnesota. There are three interrelated components of the study: dissemination and response in the network of community organizations, response and response diffusion among community households, and laboratory experiments on the factors influencing response. Field work is quasi-experimental in that communities will be studied prior to experiencing a disaster, with follow-up, post-disaster restudy for all communities subsequently struck. A total of 25 communities will be pre-studied, approximately evenly divided according to exposure to hurricane, flash flood and tornado, with a small parallel study of earthquake risk communities. Procedures for sufficient post-disaster data have been established if too few of the pre-studied sites are struck. Results of the study should shed light on the very practical problems of how to disseminate information about imminent hazards most effectively and how to generate appropriate responses to warnings. Information: *John P. Clark, Natural Hazard Warning Systems, 2001 Riverside Ave., Minneapolis, MN 55454, (612) 378-1865.*

CONFERENCES



International Symposium on Risk and Reliability in Water Resources, June 26-28, 1978, University of Waterloo, Ontario, Canada. The conference will explore the general topic of risk and reliability in water resources with emphasis on the following: a) distribution and analysis of extreme events, b) use of various models in risk and reliability analyses, c) socio-economic and political considerations, and d) decision theory techniques. Information: *International Symposium on Risk and Reliability in Water Resources, Department of Civil Engineering, University of Waterloo, Waterloo, Ontario, Canada, N2L 3G1.*

A general concern over the increasing catastrophe potential from natural hazards is evidenced by the American Meteorological Society's decisions to include several sessions devoted to cross-disciplinary topics in two upcoming conferences.

The Tenth AMS Severe Local Storms Conference on October 18-21, 1977, in Omaha, NB, will have two sessions dealing with forecast, dissemination, preparedness, and public response aspects of the warning system. For information, please contact: *H. Michael Mogil, Public Services Branch, National Weather Service Headquarters, W112, 2080 13th Street, Silver Spring, MD 20910, (301) 427-7677.*

Conferences (cont.)

The Eleventh AMS Technical Conference on Hurricanes and Tropical Meteorology on December 13-16, 1977, Miami, FL, in addition to technical sessions, will explore such topics as coastal planning, psychology of human warning responses and social impact of hurricane disasters. For information: *Dr. Joseph M. Pelissier, National Hurricane Center, P. O. Box 9286, Coral Gables, FL 33124.*



RECENT PUBLICATIONS

A Primer on Climatic Variation and Change. Prepared for the Subcommittee on the Environment and the Atmosphere of the Committee on Science and Technology, U. S. House of Representatives, 94th Congress, 2nd session, by the Congressional Research Service. Serial 00 (Committee Print). 1976. 403p.

In a non-"doomsday" approach this report stresses the importance of climatic variation at varying time scales for national and international planning. Man's activities as a cause of climatic variation; effects of climate on food, water and energy supplies; and natural causes of climate variation are the major topics covered in this report. A chapter on the needs and deficiencies of the current climatic research summarizes federal, non-federal, and international studies on research needs.

"Community Response to External Demands: An Analysis of Participation in the National Flood Insurance Program." Dan E. Moore and Randolph L. Cottrell. *Rural Sociology* 41 (1976), #4:484-508.

This study develops a model to predict community participation in the National Flood Insurance Program. Recent experience with flooding and the existence of formal planning procedures were found to influence community action regarding the program. Other factors such as population change, condition of housing, and family income were not important predictors of response. The findings can be useful in formulating special legislative provisions for the communities which are likely to be slow to react.

Coastal Zone Report Series

Three technical report series prepared under the auspices of the Coastal Engineering Research Center which relate to the study and management of the coastal zone are the **Miscellaneous Report Series**, the **Technical Paper Series**, and the **Technical Report Series**. Some of the topics covered by these series are: fauna and fish characteristics; effects of the environment on fish and fauna; climate; effects of storm hazard; coastal engineering innovations and erosion in the coastal zone. A limited number of these reports are distributed free of charge and can be ordered from: *U.S. Army, Corps of Engineers, Coastal Engineering Research Center, Kingman Building, Fort Belvoir, VA 22080.*

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 grant No. ENV 76-05682 from the National Science Foundation/Research Applied to National Needs Directorate. Any opinions, findings, conclusions or recommendations expressed in this newsletter are those of the authors and do not necessarily reflect the views of NSF.

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