

use purposes established that landslide and rockfalls constituted the most severe risk, that seismic hazards were of moderate importance, and that volcanic hazards were relatively of the least importance. Work products from the study included separate zoning maps for each of the three hazards. The maps are currently being used by planners for siting new facilities and for risk management purposes.

**KEYWORDS** Earthquake, volcano, landslide, zoning, land use management, risk assessment, federal planning, regional planning, risk management, geologic hazards, mapping.

72. Society of Chartered Property and Casualty Underwriters. *Earthquake: An International Conference on Insuring and Managing the Inevitable*. Society of Chartered Property and Casualty Underwriters. Malvern, Pa. 1989. 35 pp. For availability, contact the CPCU, 720 Providence Road, CB No. 9, Malvern, PA 19355-0709.

Nearly 250 scientists, policy makers, and insurance industry leaders attended a conference held in May 1989 in Honolulu to discuss the global financial and insurance impacts of a major earthquake. Part I reports on earthquake risk assessment, loss prevention through improved structural design, and the threat of urban fire as a result of an earthquake. Part II discusses how to measure the international economic impact of a major earthquake, and how to resolve catastrophe reserve tax issues. In the final part, discussants present information and observations about implications for the insurance industry on topics such as assessing earthquake reinsurance capacity worldwide, developing earthquake risk actuarial rates in a proper manner, handling earthquake claims, creating realistic earthquake probable maximum loss estimates, and developing monetary loss estimation practices.

**KEYWORDS** Earthquake, insurance, loss estimation, risk assessment, economic impact.

73. Steinbrugge, Karl V. and S.T. Algermissen. *Earthquake Losses to Single-Family Dwellings: California Experience*. U.S. Dept. of the Interior, Geological Survey, USGS Bulletin no. 1939-A, Washington, D.C. 1990. 71 pp. Available for \$3.75 from the USGS, Books and Open-File Reports Section, Federal Center, Box 25425, Denver, CO 80225.

This investigation surveyed the effects of earthquake losses on single-family structures of varying types and ages and compared the performance of houses built on a supported wood platform with those constructed on a concrete slab. The book also contains data on insurance claims information, including whether the cost of replacement was covered by earthquake insurance. Data was drawn from the 1971 San Fernando, the 1983 Coalinga, and the 1987 Whittier Narrows earthquakes. Major attention is given to relationships among construction, geologic effects, and loss-over-deductible statistics; to loss distribution and probable maximum loss; and to the transferability of data to other earthquake occurrences. Findings suggest that 1) older dwellings did not perform as well as did newer dwellings, with the dividing date being 1940; 2) overall, the available records of quantified loss experience for dwellings remain unsatisfactory; and 3) study methods are satisfactory for approximate loss estimations at 0 percent deductible immediately after the earthquake and also for regions where no insurance-loss experience exists.

**KEYWORDS** Earthquake, loss estimation, damage assessment, state response, insurance, economic impact, data sources.

74. Sunset Magazine. "Guide to help you prepare for the next quake." *Sunset Magazine* (October 1990): 163-177; and (November 1990): 132-137. For reprints of the two-part article, contact Sunset Quake '90 Reprints, Sunset Publishing Corporation, 80 Willow Road, Menlo Park, CA 94025.

These two articles describe how to secure a house to its foundation, strengthen other weak spots such as chimneys, secure household contents, shut off gas valves, strap down a water heater, purchase earthquake insurance, choose a contractor, and understand new seismic building codes. Each construction technique is accompanied by a photo demonstrating its application. Other information presented includes family and work

preparedness measures, how to respond during and immediately after the tremor strikes, and additional sources of information about earthquakes and how to survive them.

**KEYWORDS** Earthquake, preparedness, local planning, emergency planning.

75. Thiel, Charles C., Jr., ed. *Competing Against Time*. California Governor's Board of Inquiry on the 1989 Loma Prieta Earthquake. Sacramento, Calif. 1990. 264 pp. Available from the Dept. of General Services, Publications Section, P.O. Box 1015, North Highlands, CA 95660. The cost is \$3.89 out-of-state, \$4.15 in California.

Governor George Deukmejian of California charged an Independent Board of Inquiry to report on the damage caused by the Loma Prieta earthquake and to investigate what implications these findings have on the California highway system. With no fewer than 11 damaging earthquakes having struck California since 1970, it is obvious that more damaging tremors are just around the corner and that new approaches for mitigating them must be developed. Information is provided on seismic intensities and ground motion recorded during the event, the earthquake's impact on transportation systems, the status of seismic design codes being used in California, the California bridge seismic retrofit program, and the reasons why damage was sustained by the San Francisco-Oakland Bay bridge, the Cypress Viaduct, and several other San Francisco viaducts. In many ways a technical document directed to engineering professionals and transportation planners, it basically recommends that state legislation should provide direction and funding for research, retrofitting, and design standards that will minimize future seismic impacts on transportation lifelines.

**KEYWORDS** Earthquake, structural design, retrofitting, damage assessment, state response, state planning, lifelines, transportation, seismology, building codes, civil engineering.

76. Tides Foundation. *Fifteen Seconds: The Great California Earthquake of 1989*. Covelo, Calif.: Island Press. 1989. 120 pp. Copies cost \$19.95. For availability, contact The Tides Foundation, 15 Seconds Project, 1388 Sutter Street, 10th Floor, San Francisco, CA 94109.

Photojournalism can provide insights and documentation to a disaster that words often cannot emulate. Compiled from the work of photographers from nine different publications, this collection of photos capture moments of disbelief and personal tragedy as displayed on the faces of survivors of the magnitude 7.1 earthquake. Color and black/white photos combine with captions and anecdotal accounts to convey some of the emotions which people experienced after the quake struck.

**KEYWORDS** Earthquake, recovery, emergency response, local response, disaster assistance, damage assessment.

77. Tokyo Institute of Technology. *International Symposium on Safety of Urban Life and Facilities (ISSULF): Lessons Learned from the 1989 Loma Prieta Earthquake*. Tokyo Institute of Technology, Dept. of Environmental Engineering, Graduate School at Nagatsuta. Tokyo, Japan. 1990. 257 pp. For availability, contact Tatsuo Ohmachi, Graduate School at Nagatsuta, Tokyo Institute of Technology, 4259 Nagatsuta, Midori-ku, Yokohama, Japan.

The 16 papers appearing in this volume were delivered at the ISSULF, held November 1-2, 1990 in Tokyo. The papers dealt with a variety of topics associated with the Loma Prieta earthquake and seismic mitigation measures, such as 1) seismic effects on CALTRANS facilities; 2) the response of building owners; 3) seismic regulations in Japanese building codes; 4) Japanese seismic planning measures for transportation facilities; 5) urban seismic risk assessment; 6) an analysis of newspaper accounts of the socioeconomic impacts of the earthquake; 7) the behavior of lifelines; 8) damage assessment; and 9) response and recovery efforts.

**KEYWORDS** Earthquake, emergency response, local response, transportation, lifelines, social impact, economic impact, building codes, foreign planning, legislation-regulation, media, content analysis, damage assessment, risk assessment, urban areas, recovery, geology, liquefaction, training, zoning.

**KEYWORDS** Earthquake, nuclear radiation, retrofitting, structural design, risk assessment, federal planning, DOE.

90. U.S. House of Representatives. *Earthquake Hazard Mitigation and Earthquake Insurance*. U.S. House of Representatives, Committee on Banking, Finance, and Urban Affairs, Subcommittee on Policy Research and Insurance, 101st Cong., 2nd Sess., Serial no. 101-82, February 16, 1990. Washington, D.C. 1990. 517 pp. For sale by the Superintendent of Documents, Congressional Sales Office, U.S. Government Printing Office, Washington, DC 20402.

Held in San Francisco nine days after a companion hearing was held in Washington, D.C., subcommittee members stressed an increased interest in creating or looking at a federal role in the provision of earthquake insurance. The chairman of the group remarked that "The Flood Insurance Program has shown that a pre-funded insurance program makes federal assistance more effective in post-disaster emergency assistance, both in terms of cost and preparedness." The subcommittee currently exercises jurisdiction over the National Flood Insurance Program (NFIP). Several useful documents appear as appendices.

**KEYWORDS** Earthquake, NFIP, insurance, federal planning, federal response, recovery, preparedness, damage assessment, state planning, disaster assistance.

91. U.S. House of Representatives. *Earthquakes and Earthquake Insurance*. U.S. House of Representatives, Hearing before Committee on Banking, Finance, and Urban Affairs, Subcommittee on Policy Research and Insurance, 101st Cong., 2nd Sess., Serial no. 101-74, February 7, 1990. Washington, D.C. 1990. 1412 pp. For sale by the Superintendent of Documents, Congressional Sales Office, U.S. Government Printing Office, Washington, DC 20402.

After the hearing was called to order, Chairman Ben Erdreich announced that the subcommittee "... will consider certain issues relating to earthquakes, including hazard mitigation, emergency response and preparedness, and earthquake insurance coverage ... in response to increased concern over disaster assistance and emergency preparedness capabilities in the wake of Hurricane Hugo ... and the Loma Prieta earthquake. The subcommittee is most interested in learning about the risks and liabilities associated with earthquake insurance coverage for residential and commercial structures and the insurance industry's ability to absorb claims resulting from a major earthquake disaster. Our inquiry will also include consideration of hazard mitigation research and applied technology." Testimony was taken from nearly 15 experts and numerous publications on seismic safety are reprinted as appendices.

**KEYWORDS** Earthquake, insurance, federal response, NEHRP, disaster assistance, liability, educational materials, children, building design, seismology, preparedness, federal planning, loss estimation.

92. U.S. Senate. *Preparing the Nation for Natural Disasters*. U.S. Senate, Committee on Commerce, Science, and Transportation, Subcommittee on Science, Technology, and Space, 101st Cong., 1st Sess., December 11, 1989. Washington, D.C. 1989. 108 pp.

Senator Gore, in his opening statement, mentions that the subcommittee "... oversees federal efforts to help our cities and states prepare for catastrophic earthquakes. The purpose of this hearing today is to learn what we can do to improve earthquake preparedness in our [Tennessee] part of the country ... According to a detailed study by FEMA, a repeat of the 1811 [New Madrid] earthquake would kill almost 4,000 people in the Memphis area, leave almost one half million people homeless and cause more than \$50 billion in property damage. Similar damage would take place in Paducah and in the other large cities that are near the New Madrid fault line." Testimony was taken from seismologists and high-ranking state and federal emergency managers.

**KEYWORDS** Earthquake, federal planning, preparedness, NEHRP, emergency planning, state planning.

93. United Nations Educational, Scientific and Cultural Organization. *International Coordination Group for the Tsunami Warning System in the Pacific-Twelfth Session*. United Nations Educational, Scientific and Cultural Organization (UNESCO), Intergovernmental Oceanographic Commission, Document IOC/TTSU-XII/3; or SC-90/WS 2. Paris, France, 1990. 49 pp. For availability contact the Intergovernmental Oceanographic Commission, UNESCO, Place de Fontenoy, 75700, Paris, France

Held in Novosibirsk, USSR, 7-10 August 1989, the twelfth session of this international group addressed the following topics: implementation of the resolutions and recommendations of the 11th session held in Beijing, China during 8-12 September 1987; improvement of the tsunami warning system; training assistance for the public in tsunami preparedness; participation in the IDNDR; consideration for a new earthquake magnitude scale, the Mantle Magnitude Mm; and tsunamis in the Indian Ocean.

**KEYWORDS** Earthquake, seismology, tsunami, warning systems, IDNDR, preparedness, historical survey, risk assessment, international planning.

94. University of California, Berkeley. *National Clearinghouse for Loma Prieta Earthquake Information Catalog*. University of California, Berkeley, College of Engineering, Earthquake Engineering Research Center (EERC), National Information Service-Earthquake Engineering (NISEE). Richmond, Calif. October 1990. 66 pp. For availability, contact the NISEE/Loma Prieta Clearinghouse Project, EERC, 1301 South 46th Street, Richmond, CA 94804-4698

NISEE's National Clearinghouse for Loma Prieta Earthquake Information has published the first catalog of its holdings. It provides an index of newspaper and periodical articles, monographs, papers in conference proceedings, maps, slides, videos, and technical reports, as well as a list of currently funded NSF and USGS research concerning the quake. The entries are listed under the following general categories: Selected Topics in Seismology; Engineering Seismology; Strong-Motion Seismometry; Dynamics of Soils, Rocks, and Foundations; Dynamics of Structures; Earthquake-Resistant Design and Construction; Earthquake Damage; and Earthquakes as Natural Disasters. Substantial sections list citations to building damage, disaster planning and relief, legal and governmental aspects, and socioeconomic aspects. Materials are indexed by title, author, and subject. Additional entries will be added to the catalog as research is completed.

**KEYWORDS** Earthquake, structural design, building design, damage assessment, seismology, geology, construction, disaster assistance, law, legislation-regulation, social impact, economic impact.

95. Urban Resources. *Earthquake Disaster Management: A Symposium*. *Urban Resources* 5, no. 4 (Summer 1989): 2-51. Available for \$15.00 from the City of Irvine, Emergency Management, P.O. Box 19575, Irvine, CA 92713.

This special bonus issue serves as the proceedings volume for an applied earthquake research symposium held April 27, 1989 in Irvine, California. Of the 11 articles appearing in the issue, 3 papers deal with the status of earthquake awareness and preparedness in Southern California. The remaining 8 papers discuss contingency planning and emergency response problems associated with secondary hazards resulting from earthquakes (hazardous materials emergencies and high-rise fires), medical services and hospital readiness, building safety, utility services disruption and restoration, and computerized decision making tools for disaster management. Of particular interest is Eva Garcia's report on the findings of a telephone survey designed to determine how well Irvine residents have prepared for a future earthquake. Among the findings, the survey indicates that 1) Irviners feel that freeway congestion is far and away the biggest problem with living in California, 2) nearly 62% of those queried felt that a major earthquake will strike Southern California, and 3) there was nearly 100% agreement that the individual has a responsibility to prepare for an earthquake. Also reported in the proceedings are the results of an earthquake preparedness survey conducted among residents in Long Beach, San Bernardino, and Whittier

**KEYWORDS** Earthquake, hospitals, awareness, risk perception, preparedness, emergency medical services, emergency planning, emergency management, lifelines, loss estimation, decision making, computer application, structural fire, hazardous facilities.

96. Wagner, David L. "Geologic and tectonic setting of the epicentral area of the Loma Prieta earthquake." *California Geology* 43, no. 11 (1990): 243-251.

This article discusses the regional geology and tectonic structure of the fault system which precipitated the Loma Prieta earthquake of October 17, 1989. Topics examined include the area's stratigraphy, geomorphology, geology, faulting and folding, and earthquake-generating faults other than the San Andreas fault.

**KEYWORDS** Earthquake, seismology, geomorphology, geology, regional planning.

97. Walker, George R. *Interim Report on the Newcastle Earthquake*. Australia Commonwealth Scientific and Industrial Research Organization (CSIRO), Division of Building, Construction, and Engineering, DBCE Document 90/01(s), North Ryde, New South Wales, Australia. 1990. 14 pp. For availability contact the Assistant Chief, CSIRO, Division of Building, Construction, and Engineering, P.O. Box 310, North Ryde, NSW 2113, Australia.

This publication analyzes structural damage caused by the magnitude 5.5 Newcastle earthquake and discusses the implications for building codes and regulations, building research, education, insurance, counter-disaster planning, and earthquake monitoring in Australia. Comments are offered on the wisdom of restoring buildings with historical or cultural value, on the inadequacy of Australia's existing network of earthquake recording instruments, and on the general low awareness of earthquake hazards in Australia.

**KEYWORDS** Earthquake, foreign response, foreign planning, damage assessment, risk assessment, building codes, building design.

98. Ward, Peter and Robert Page. *The Loma Prieta Earthquake of October 17, 1989: What Happened . . . What Is Expected . . . What Can Be Done*. U.S. Dept. of the Interior, Geological Survey, Washington, D.C. 1989. 16 pp. Copies are available free of charge from the USGS, Open-File Reports Section, Federal Center, Box 25425, Denver, CO 80225.

This pamphlet describes the geologic conditions that caused the Loma Prieta earthquake and identifies future implications for California. It is written for the nonscientist, and provides a concise, well-illustrated explanation of the geologic hazards in the region. In addition, it contains lists of two types of information sources: 1) government agencies and earthquake engineering organizations, and 2) publications about earthquakes in general, personal preparedness, regional planning, seismic zonation, seismic safety planning, plan implementation, effectiveness evaluation, earthquakes and structures, damage estimates, and maps.

**KEYWORDS** Earthquake, zoning, preparedness, regional planning, damage assessment, seismology.

99. Western States Seismic Policy Council. *Proceedings of the XII Annual Meeting of the Western States Seismic Policy Council*. Western States Seismic Policy Council (WSSPC), Idaho Bureau of Disaster Services, Boise, Ida. 1990. 308 pp. For availability, contact Clark Meek, Idaho Disaster Services, 650 West State Street, Boise, ID 83720.

The WSSPC is a regional organization formed by 14 western states to improve understanding of earthquake preparedness measures and to formulate policy which will lessen impacts. This volume contains the proceedings of the November 6-9, 1989, conference and addresses seismic risk assessment (8 papers), loss estimation methods (10 papers), uniform building code zoning processes (4 papers), preparedness planning and disaster exercises

(6 papers), and current status reports from the member states, Canada, and British Columbia. Specific topics examined include contingency planning for business, school safety programs, and the involvement of the private sector in disaster recovery activities.

**KEYWORDS** Earthquake, loss estimation, schools, preparedness, emergency planning, state planning, building codes, private sector, business, seismology, NEHRP, risk assessment, foreign planning, disaster exercise.

100. Wolf, Bill. *San Francisco Earthquake: Assessment and Recommendation*. San Diego Office of Emergency Management. San Diego, Calif. 1989. 38 pp. For availability, contact the Office of Emergency Management, 1222 First Street-728, San Diego, CA 92101.

This report identifies areas of emergency management which earthquake-prone cities should review based upon response problems experienced by agencies following the Loma Prieta earthquake. Based upon the findings of a reconnaissance team sent to San Francisco to examine the earthquake's impacts, the report provides concise evaluations on nearly 20 emergency management concerns. Particular attention is given to emergency responses in the areas of planning, communications, damage assessment, resource management, emergency public information, and activity coordination by the emergency operations center. A "Capsule of Issues and Considerations" contains 67 recommendations which refer the reader back to the page in the text where the matter is discussed in detail. Recommendations include 1) ensure that elected officials are aware of their role and receive training; 2) evaluate the roles of non-emergency public personnel in disasters; and 3) review, develop, and/or upgrade emergency callback procedures for all city departments.

**KEYWORDS** Earthquake, local response, emergency response, emergency management, local planning, preparedness, urban areas.

## FLOODS

101. Association of State Floodplain Managers and Jon A. Kusler. *Avoiding Public Liability in Floodplain Management*. Association of State Floodplain Managers, Madison, Wis. 1989. 57 pp. Available for \$20.00 from ASFPM, P.O. Box 2051, Madison, WI 53701-2051.

In March 1987, national attention was drawn to a U.S. Supreme Court case, *First Evangelical Lutheran Church v. Los Angeles County*, in which the Court held that if floodplain regulations were involved in a "taking private property" issue, then temporary compensation would need to be paid. Ever since this landmark ruling, floodplain managers have expressed concern about potential liability issues that might arise as they perform their jobs. To assist floodplain managers in interpreting professional risks associated with *First Evangelical*, the ASFPM has prepared this document in order to explore recent judicial decisions dealing with public liability for various floodplain management activities and to discuss their possible interpretations; to discuss trends in the law and various measures that government units can take to reduce potential liability; and to update state and federal court decisions since the 1987 ruling. The report consists of two essays, "Mitigation Requirements for the NFIP and Legal Liability," by Jon Kusler, and "Turning Points in Forensic Geology," by James E. Slosson; a reprint of the *First Evangelical* ruling; and a selected list of citations to important floodplain regulatory cases during the years 1984-1989.

**KEYWORDS** Floodplain management, legislation-regulation, law, liability, NFIP, federal government, insurance.

102. Association of State Floodplain Managers. *Partnerships: Effective Flood Hazard Management*. University of Colorado, Institute of Behavioral Science, Natural Hazards Research and Applications Information Center,

Special Publication no. 22. Boulder, Colo. 1990. 295 pp. Available from the NHRAIC Publications Clerk, Campus Box 482, University of Colorado, Boulder, CO 80309.

Held in Scottsdale, Arizona, in May 1989, the 13th Annual Conference of the ASFPM focused on cooperative floodplain management efforts among federal, state, and local governments, private individuals, organizations, and public interest groups. This proceedings volume contains papers dealing with federal agency updates and initiatives, examples of effective partnerships, illustrations of computer applications, and west case studies, descriptions of ongoing mitigation efforts, and discussions of process, program, and engineering issues. The volume is comprised of six brief federal agency updates and 59 short (4-6 page) papers. Papers of interest address topics such as special needs for forecasting 100-year floods in arid regions, cooperative floodplain management on a multijurisdictional river system, use of an electronic spreadsheet to evaluate average annual flood damages, and Canadian perspectives on the effect of floodplain regulations on property values.

**KEYWORDS** Riverine flood, floodplain management, case study, flash flood, legislation-regulation, intergovernmental, property value, local funding, warning systems, insurance, mapping, local planning, risk communication, risk assessment, damage assessment, coastal flood, zoning, floodproofing, business, arid region, private sector, computer application, geographic information systems, local response, stormwater flood, federal planning.

103. Association of State Floodplain Managers. *Proceedings of the Conference on Arid West Floodplain Management Issues*. Association of State Floodplain Managers. Madison, Wis. 1989. 316 pp. Available from the ASFPM, P.O. Box 2051, Madison, WI 53707. \$15.00 to ASFPM members; \$20.00 to nonmembers.

The arid climate, geology, and political history of the western U.S. combine to create floodplain management problems which differ radically from those found elsewhere in the nation. More than 100 local, state, and federal floodplain managers, and others gathered in Las Vegas, Nevada during October 19-21, 1988 in an ongoing effort to come to grips with these special problems. This volume contains eleven papers on mapping, modeling, and hydrological data needs of western floodplain managers; seven panel discussions about management activities at the county and state levels; and a 40-page analysis of conference activities that condenses information and opinion presented at the meeting into a manageable essay. When asked to name factors in arid region floodplain management that had improved in recent years, conference participants listed public acceptance of the NFIP, mapping efforts and studies conducted by FEMA, and improved local funding for maintenance projects. Problems still causing difficulties included lack of adequate funding at the local level, the need to develop and maintain good maps, public awareness of arid region flood hazards, and inconsistent definitions and regulations for known hazardous areas.

**KEYWORDS** Arid region, floodplain management, riverine flood, alluvial fan flood, risk assessment, law, soil erosion, COE, geomorphology, mudflow, hydrology, flash flood, case study, data sources, legislation-regulation, land use planning, mapping, local planning, state planning.

104. Bialaszewski, Dennis and Bobby A. Newsome. "Adjusting comparable sales for floodplain location: The case of Homewood, Alabama." *Appraisal Journal* 58, no. 1 (1990): 114-118.

Contrary to the findings of two studies conducted in Louisiana, no support was found in this sample study for concluding that the location of a single-family residential property in a designated floodplain affected its sales price. Implications drawn from the study indicate that 1) adjustments to comparable sales to estimate the fair market value of such properties should be based upon empirical analysis of sales located within the market area of the subject property, and 2) appraisers run the risk of making serious errors if they base adjustments on research conducted outside their own market area.

**KEYWORDS** Floodplain management, riverine flood, property value, realtors, economic analysis.

105. Bollens, Scott A. "Public policy and land conversion: Lessening urban growth pressure in river corridors." *Growth and Change* 21, no. 1 (1990): 40-58.

A survey was conducted of 101 owners of vacant properties in the regulated flood-prone areas of ten cities to determine the effects on land purchase/ownership of 1) public policy, 2) community characteristics, 3) specific floodplain property characteristics, and 4) characteristics of the individual landowner. The purpose of the survey was to determine if and to what extent floodplain policy characteristics inhibit investment in river corridor properties and thus lessen development pressures in floodplains. Findings suggest that 1) the presence of a local floodplain program was found to significantly decrease property value expectations; 2) substantial public investment in structural measures (more than \$5 million in the past ten years) will significantly increase property value expectations; 3) landowner recognition of flood risk definitely dampens future property value expectations and consequently the holding of land for investment purposes; and 4) accessibility factors were most important to land investors and zoning regulations were most important to landowners wishing to live on property in the floodplain.

**KEYWORDS** Floodplain management, property value, local planning, riverine flood, risk perception.

106. Britton, Neil R. *Flooding on the Clarence River: The Experience of the Emergency Organizations, April 1988*. James Cook University of North Queensland, Centre for Disaster Studies, Disaster Investigation Report no. 8. Townsville, Queensland, Australia. 1989. 134 pp. Available for \$12.95 from The Bookshop, James Cook University, Campus Post Office, Townsville, Queensland 4811, Australia.

This study chronicles the meteorological and hydrological events that occurred from March 28 to April 14, 1988, when four of Australia's eight states and territories were subjected to severe rainfall. It recounts state and local government organizational response to the ensuing floods and concludes with a general overview of community disaster planning and preparedness. The report lists numerous response weaknesses and provides recommendations for correcting them, including 1) police switchboard centres needed to install extra telephone lines to alleviate switchboard jamming caused by the continuous and large number of incoming inquiries; 2) for various reasons, many helicopters are not appropriate for medical evacuations; 3) many motorists failed to heed emergency workers at "road closed" barriers, resulting in their having to be rescued later; 4) personnel in some state headquarters were not familiar with locales where emergency conditions existed; and 5) a high turnover rate of emergency personnel definitely can undermine the effectiveness and efficiency of emergency response efforts.

**KEYWORDS** Riverine flood, emergency response, foreign response, hydrology, intergovernmental, foreign planning, public safety, emergency planning, interorganizational, social impact, meteorology.

107. Children's Television Workshop. *Big Bird GET READY for FLOODS*. Children's Television Workshop. New York, N.Y. 1990. 12 pp. and tape. For availability, contact the Children's Television Workshop, Department NH, One Lincoln Plaza, New York, NY 10025.

Games, songs, and stories are used to teach children about floods and how to safely respond to them. The kit contains an informational booklet for children and their parents, a cassette tape with songs and stories presented by Sesame Street regulars, and a "You're All Wet!" match-the-message card game. The game messages—"If a flood is coming, I have to get away from the water to a place that's safe and high" and "Playing in storm drains is not safe, so I stay away from them"—provide a fun way for parents and kids to learn flood safety and preparedness tips.

**KEYWORDS** Riverine flood, educational materials, children, preparedness.

108. Cudworth, Arthur G., Jr. *Flood Hydrology Manual*. U.S. Dept. of the Interior, Bureau of Reclamation, Earth Sciences Division, Surface Water Branch. Denver, Colo. 1989. 243 pp. Available for \$8.00 from the



Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. Sales number is 024-003-00170-8.

The primary purpose of this manual is to provide the necessary background, relationships, criteria, and procedures to allow engineers to conduct flood hydrology studies which will result in greater consistency and reliability of results for most drainage basins encountered in Bureau projects. Information contained in the manual is based on the detailed analysis of accumulated hydrologic and meteorologic data and of studies of observed flood and severe rainfall events. Separate chapters address the following topics: basic hydrological and meteorologic data; hydrometeorology; flood hydrograph determinations; flood routing through reservoirs and river channels; envelope curves of recorded flood discharges; statistics and probability determination methods; flood study and field reconnaissance reports; and a historical perspective on the discipline of flood hydrology. The manual provides a concise and inexpensive introduction to the field of flood hydrology and related subjects.

**KEYWORDS** Riverine flood, hydrology, meteorology, federal planning, mathematics, civil engineering.

109. Davis, Darryl W. and Michael W. Burnham, eds. *Proceedings of a Seminar of Flood Damage Reduction Reconnaissance Phase Studies*. U.S. Dept. of Defense, Army Corps of Engineers, Hydrologic Engineering Center, HEC Seminar Proceedings no. 18. Davis, Calif. 1988. 184 pp. For availability, contact the Publications Clerk, Hydrologic Engineering Center, 609 Second Street, Davis, CA 95616.

The 13 papers and 7 group discussions included in this proceedings volume focused on three objectives: to identify approaches for the conduct of such studies; to discuss the scope and reliability requirements for the necessary technical analyses; and to determine specific guidance and assistance needs for Corps district offices. Guidelines for an "ideal" flood control reconnaissance phase study are listed as follows. 1) identify the flood problem, 2) determine whether it is likely that upon further study a feasible solution to the problem will result, 3) determine whether there is federal interest in the likely solution, 4) identify a local cost-sharing sponsor, and 5) should the findings be positive, determine the scope of and define the tasks for completing the feasibility phase investigations. The volume features contributions dealing with the level of detail needed in the reports, study perspectives from the standpoint of the hydrological engineer, case studies of flood damage analyses, environmental considerations, roadblocks to a feasibility study, and analytical methods and tools needed for a reconnaissance study.

**KEYWORDS** Riverine flood, COE, loss estimation, hydrology, case study, floodplain management, federal planning, risk assessment.

110. Davison, A. Todd, Tim Keptner and Mike Borengasser. *A Report on the Results of a Questionnaire on Substantial Improvement*. Association of State Floodplain Managers, Topical Paper no. 1. Madison, Wis. 1990. 29 pp. Copies are available from the ASFP, P.O. Box 2051, Madison, WI 53701-2051. Cost is \$3.00 to ASFP members; \$4.00 to nonmembers.

This report offers a summary of the findings of a survey distributed at the ASFP's 1988 annual meeting concerning the NFIP definition of substantial improvement and its administration at the local level. Substantial improvement regulations apply to any repair, reconstruction, or improvement of a building located within a special flood hazard area. The study found, among other things, that: substantial improvement is being enforced with some success in most of the responding communities; most respondents felt the substantial improvement threshold of 50% should not be changed; straightforward guidance on how to administer substantial improvement should be developed and disseminated to local officials; there is widespread misunderstanding of the term "market value" as it applies to substantial improvement; and consistency should be established across national building code groups and in the enforcement practices of local officials.

**KEYWORDS** Riverine flood, floodplain management, NFIP, insurance, enforcement, legislation-regulation, local planning, reconstruction, property value.

111. Dietz, Vance J., et al. "Health assessment of the 1985 flood disaster in Puerto Rico." *Disasters* 14, no. 2 (1990): 164-170.

During October 4-7, 1985, tropical storm Isabel triggered the second heaviest series of rainstorms in Puerto Rico's recorded history. Approximately 180 persons died (127 in a massive landslide) and 4,400 people were temporarily displaced into 44 shelters. This study reports on an epidemiologic surveillance system that was initiated to monitor communicable and chronic diseases. It summarizes the impact of the disaster and compares the results with similar disasters in the past. In general, the analysis supports epidemiologic findings from previous disasters in the U.S. No acute communicable disease outbreaks were identified either in the shelters or during the post-disaster period. Suggestions are made for conducting post-flood surveillance systems, such as the system should be implemented immediately after the disaster, it should be representative of the entire impacted area and not just the region most seriously affected, and efforts should be made to filter out as many duplicative records as possible.

**KEYWORDS** Epidemiology, riverine flood, emergency medical services, morbidity, landslide, mortality, public health, local response.

112. Donnelly, William A. "Hedonic price analysis of the effect of a floodplain on property values." *Water Resources Bulletin* 25, no. 3 (1989): 581-586.

According to the author, previous statistical tests have proven inconclusive in deciding whether property values are affected by siting in the floodplain. The study reported in this article demonstrates the use of the hedonic price index technique as a method for ascertaining the level of disutility imposed upon a residential property because of its location in a floodplain. Findings indicate that 1) home buyers adjust the purchase price within a floodplain, amounting, on average, to just over 12 percent, and 2) the loss in market value attributable to the floodplain is approximately \$6,050 for a \$50,000 home.

**KEYWORDS** Riverine flood, property value, insurance, economic impact.

113. Eveready Flood Control and French & Associates. *Federal Assistance Programs for Sewer Flooding*. Association of State Floodplain Managers, Topical Paper no. 2, Madison, Wis. 1990. 22 pp. Available for \$3.00 to ASFPM members and \$4.00 to nonmembers, plus \$1.50 shipping, from the Association of State Floodplain Managers, P. O. Box 2051, Madison, WI 53701-2051.

Local decision makers faced with the many difficulties caused by sewer flooding will benefit from this brief guide to federal assistance available to correct such problems. The authors reviewed 1,100 federal flood control programs and compiled a list of funding sources for community systems and individual buildings. These resources are further refined into lists of programs that are available in most communities; those available only after a disaster, only in rural areas, and only in certain areas of the U.S.; those targeted for economic development projects; and those available for unique or special projects, such as private housing and rental housing improvements, business development, and the protection of special types of buildings. In addition, the authors offer practical tips for working with federal funding sources.

**KEYWORDS** Disaster assistance, federal funding, stormwater flood, local planning, rural areas, urban areas.

114. Ferguson, Bruce. *Urban Stormwater Management Bibliography*. Vance Bibliographies, Public Administration Bibliography no. P-2795. Monticello, Ill. 1989. 15 pp. Available for \$3.75 from Vance Bibliographies, P.O. Box 229, Monticello, IL 61856.

Compiled by an author active in research, teaching, and consulting about stormwater management matters, this bibliography combines citations to "classic" older books with references to recent articles that represent the most advanced thinking on hydrologic science, technical implementation, and public administration. The bibliography

is weighted toward newer, more experimental, and controversial management techniques, since detailed debates in such areas are more useful than repeating older conventional wisdoms, some of which are being replaced by newer ideas. Approximately 165 citations are organized under three categories: "Background" references; "Hydrologic Modeling of Storm Water", and "Hydrologic Alternatives for Planning and Design."

**KEYWORDS** Stormwater management, hydrology, local planning.

115. Filippone, Ella F and Joseph W. Walsh. "The flood control saga in the Passaic River Basin." *Population and Environment: A Journal of Interdisciplinary Studies* 11, no. 4 (1990): 285-298.

Hydrologists have recognized that the Passaic River Basin is one of the most floodprone river systems in the U.S. For over 100 years various levels of government have attempted to prepare plans which would alleviate the problems caused by recurrent flooding. This article chronicles the history of development in the Basin, recounts the status of current flood mitigation measures, and describes mitigation plans that have been proposed to solve the problem. These plans include Corps of Engineers recommendation for a 13.5 mile diversion tunnel that would cost a minimum of \$1 billion, and a proposal in the state legislature to authorize a bond issue which would finance the relocation of at-risk structures. The authors present calculations that estimate relocation costs for structures in the 10-year and 50-year floodplains.

**KEYWORDS** Riverine flood, floodplain management, urban areas, local planning, federal planning, COE, relocation, floodproofing, historical survey.

116. Green, C.H. *The Relationships between the Magnitude of Flooding, Stress, and Health*. Middlesex Polytechnic, Flood Hazard Research Centre, Publication no. 141. Enfield, United Kingdom. 1988. 23 pp. Available for 0.50 English pounds from the Flood Hazard Research Centre, Middlesex Polytechnic, Queensway, Enfield, Middlesex, EN3 4SF, U.K.

This publication contends that stress and anxiety caused by flooding is not limited to the first few days after the event occurs; the months spent trying to return a residence to normal conditions are also stressful, while the risk of a recurring flood can also contribute to acute episodic periods of anxiety. The research reported in the document was performed in the belief that stress and some of the other non-monetary impacts of flooding on households could be included in the overall cost-benefit analyses of flood alleviation schemes.

**KEYWORDS** Riverine flood, psychological impact, public health.

117. Green, C.H., S.M. Tunstall and M. Fordham. *Perceptions of the Risks of Flooding*. Middlesex Polytechnic, Flood Hazard Research Centre, Publication no. 165, Enfield, Middlesex, United Kingdom. 1990. 27 pp. Available for one English pound from the Flood Hazard Research Centre, Middlesex Polytechnic, Queensway, Enfield, Middlesex, EN3 4SF, U.K.

This paper discusses how engineers, emergency planners, the general public, and hazard researchers define the perceived risks of flooding, particularly regarding design of mitigation procedures and research instruments. The authors suggest that risk communication is more appropriately defined as the communication of problem definitions and choices rather than numbers derived from quantitative methods.

**KEYWORDS** Riverine flood, risk perception, risk communication, emergency planning, psychology, foreign planning.

118. Gruntfest, Eve and Carole Huber. "Status report on flood warning systems in the United States." *Environmental Management* 13, no. 3 (1989): 279-286.

In 1987 the authors surveyed 18 community or regional early-warning systems as part of a U.S. Bureau of Reclamation investigation into the utility of such systems for warning people about dam failure floods. Problems identified from the survey included the need for redundancy in all parts of the warning system, the need for backup power supplies to forestall problems created by extended power outages, the lack of consistent maintenance funding, and damage to equipment caused by weather extremes or vandalism. On the positive side, the study revealed a number of pleasant surprises, such as intergovernmental and interjurisdictional cooperation often was stimulated during the design and operation of an integrated warning system; most communities that experienced a flood following installation of the warning system expressed satisfaction with its operation; and useful hydrological data was obtained for small watersheds whose drainage is a critical factor in producing localized flooding.

**KEYWORDS** Dam failure flood, flash flood, warning systems, local planning, local response, emergency management.

119. Handmer, John W. *Flood Insurance and Relief in the U.S. and Britain*. University of Colorado, Institute of Behavioral Science, Natural Hazards Research and Applications Information Center, Working Paper no. 68. Boulder, Colo. 1990. 32 pp. Available from the Publications Clerk, Natural Hazards Center, IBS Bldg. 6, Campus Box 482, University of Colorado, Boulder, CO 80309. Cost is \$4.50 in U.S., \$5.50 beyond the U.S.

This paper surveys the different roles government can adopt in flood hazard reduction. Within this broad range of strategies, insurance and relief, which focus on loss redistribution rather than loss reduction, are examined in greater depth using the U.S. and Great Britain as contrasting examples. At the federal level, the U.S. relies on an integrated strategy, the NFIP, which is administered by one central agency and is tied to land use regulation. The British approach, in contrast, appears uncoordinated and ad hoc. There are no explicit national flood-related policies or standard procedures for disaster relief; however, flood insurance is generally included in normal commercial and household coverage. Relief relies heavily on public appeals for donations, and the success of these appeals varies dramatically with the disaster. The use of these measures, the author points out, affects every part of the flood hazard management process, and successful implementation requires that they not be treated in isolation from other mitigation measure and their social context. All approaches raise serious questions for industrialized countries about the proper role of government, about equity, and about the desirability of special disaster provision.

**KEYWORDS** Riverine flood, insurance, NFIP, foreign planning, federal planning, comparative study, disaster assistance.

120. Kaniasty, Krzysztof Z., Fran H. Norris and Stanley A. Murrell. "Received and perceived social support following natural disaster." *Journal of Applied Social Psychology* 20, no. 2 (1990): 85-114.

Although victims of natural disasters typically expect, as well as receive, support from others, not all victims may be recipients of such expectations. This study examines 1) how expectations of help in a hypothetical life crisis fare during an actual emergency, and 2) whether the help actually received influences subsequent expectations of assistance. The study focuses on two severe flood events that struck an impoverished area of Kentucky in 1981 and 1984. Findings include 1) the sample of victims received little help—much less than they had expected to receive in a hypothetical emergency prior to the floods; 2) the extent of personal losses experienced by flood victims did affect social support perception; and 3) the results do not correspond to those of studies which have reported widespread local altruism or the establishment of "therapeutic communities."

**KEYWORDS** Riverine flood, social impact, disaster assistance, local response, perception, psychological impact.

121. Laska, Shirley B. "Homeowner adaptation to flooding: An application of the general hazards coping theory." *Environment and Behavior* 22, no. 3 (1990): 320-357.

This research examines the question of whether long-term adjustments to repeated flooding by individual homeowners can be explained by the application of a model developed by Burton, Kates, & White (1978) to describe societal coping with natural hazards. The location surveyed during the study was a New Orleans suburb that suffered major flooding three times in five years, and which is exposed to all types of flood hazard: coastal, riverine, and flash floods. Social phenomena investigated included thresholds of action, an assessment of flood/victim characteristics as predictors of adjustments, and homeowners' adjustments as a function of an industrial versus a post-industrial model. Findings suggest that the Burton, et al. theory of hazard adjustment is supported by this study. The theory should be successful in explaining much flood adjustment behavior if refined to state that a series of actions will be taken from the least to the greatest effort, but that the nature of the effort required also be taken into consideration.

**KEYWORDS** Riverine flood, coastal flood, sociology, local response, group behavior, social impact, local planning, disaster studies, modeling.

122. Lindsey, Greg. "Charges for urban runoff: Issues in implementation." *Water Resources Bulletin* 26, no. 1 (1990): 117-125.

In an effort to control nutrients flowing into Chesapeake Bay, officials in Maryland have considered levying charges on stormwater utilities. These utilities are local government enterprises that provide services related to flood control, drainage, and stormwater management. Utility users are owners of properties that discharge stormwater to publicly maintained systems. This study discusses the Maryland Nutrient Reduction Plan (which calls for a 40% reduction in nitrogen and phosphorus loadings from all sources of pollution), reviews equity and efficiency issues related to user charge schemes, and attempts to evaluate whether a user charge system will become politically acceptable to communities with stormwater utilities.

**KEYWORDS** Stormwater management, water pollution, local planning, economic analysis.

123. Moore, Jamie W. and Dorothy P. Moore. *The Army Corps of Engineers and the Evolution of Federal Floodplain Management Policy*. University of Colorado, Institute of Behavioral Science, Program on Environment and Behavior, Special Publication no. 20. Boulder, Colo. 1989. 184 pp. Available from the Publications Clerk, Natural Hazards Center, IBS Bldg. no. 6, Campus Box 482, University of Colorado, Boulder, CO 80309. Cost is \$15.00 in U.S., or \$16.00 non-U.S.

In the U.S., flood control efforts have moved away from the construction of impressive structures that keep flood waters away from people and toward nonstructural management programs that keep people away from flood waters. This book chronicles the Corps' role in implementing federal flood control policies during the twentieth century. The book examines, among other things, the 1932 and 1936 Flood Control Acts, federal cost-sharing requirements and other economic considerations, the National Flood Insurance Program, the influences of various individuals and philosophies on policy formation, implementation difficulties among and between federal agencies, and the effects of the environmental movement. It is illustrated with 31 photos, and includes a substantial bibliography, detailed notes, and an index. The volume is particularly useful for its lengthy historical and political perspective of a major national environmental program that is still evolving. It should be a useful resource to any student of federal policy, floodplain management, public administration or public policy.

**KEYWORDS** Floodplain management, riverine flood, federal planning, legislation-regulation, historical survey, insurance, NFIP, COE, intergovernmental, structural measures, nonstructural measures, politics, public administration

124. Pace, C.E. *Tests of Materials and Systems for Floodproofing Structures*. U.S. Dept. of Defense, Army Corps of Engineers, Army Engineer Waterways Experiment Station, Vicksburg, Miss. 1988. 93 pp. Available from NTIS, 5285 Port Royal Road, Springfield, VA 22161 as AD-A209 380/5/GAR. Paper copy: \$17.00; microfiche: \$8.00.

This report presents test results which describe materials and systems that can be used to protect buildings from floodwaters. High flood damage costs to property have produced an awareness that nonstructural methods should be developed to augment flood protection provided by dams, levees, and similar structures. Because of the frequency and extent of flooding, strong initiatives to protect buildings from repetitive flood damage losses will provide a quick return on investments. The structural integrity of a building must be known or the building may be floodproofed to an extent that it will be excessively loaded and suffer damage, or in extreme situations, collapse. If a building is loaded to excessive depths, it can fail instantaneously and possibly result in injury or death to the occupants. Closures, materials, and systems were tested to determine the effectiveness in protecting homes or buildings from floodwaters.

**KEYWORDS** Riverine flood, floodproofing, structural materials, structural design, damage assessment, hydraulics.

125. Phifer, James F. "Psychological distress and somatic symptoms after natural disaster: Differential vulnerability among older adults." *Psychology and Aging* 5, no. 3 (1990): 412-420.

More than 200 older adults were interviewed before and after a disastrous flood struck southeastern Kentucky in May 1984. The co-occurrence of the flood with an ongoing panel study enabled the researchers to examine the differential vulnerability problem within the context of a prospective research design. Analysis of the data revealed that 1) the findings confirm those of other studies dealing with the physical and psychological impacts of disasters on the elderly; 2) adverse psychological effects of the flood on older adults increased inversely with occupational status (earning power); 3) men generally experienced greater declines in well-being after the flood than did women; 4) the lack of a joint effect of flood exposure with prior symptom levels was an unexpected finding. The study area has experienced repeated flooding over a number of years; and 5) men and respondents aged 55-64 were significantly more susceptible to adverse psychological symptoms.

**KEYWORDS** Riverine flood, psychological impact, elderly, gender, public health.

126. Singer, Saul Jay. "Flooding the Fifth Amendment: The National Flood Insurance Program and the 'takings' clause." *Environmental Affairs* 17, no. 2 (1990): 323-370.

A judicial finding that NFIP floodplain regulations constitute "takings," thereby invoking the fifth amendment requirement that the government tender "just compensation," would effectively kill the program. Since early 1987, the U.S. Supreme Court has decided three cases which involve the question of just what constitutes a taking of real property under the Constitution. This article assesses the potential impact of the Court's rulings on the constitutionality of the NFIP; discusses the nature of the flood hazard, the need for governmental underwriting of flood insurance, and the scope of the NFIP; outlines the decisions defining when regulations might limit the use of private property under takings considerations; and analyzes the effect of recent developments in takings law on the constitutionality of land use regulations enacted pursuant to the NFIP. As a result of the three cases, the article concludes that the NFIP will continue in much the same advantageous position in held prior to the Court decisions, and that it should not experience serious constitutional challenges in the immediate future.

**KEYWORDS** Floodplain management, insurance, NFIP, law, legislation-regulation, litigation, federal planning, land use management.

127. Smith, D.I. and J.W. Handmer, eds. *Flood Insurance and Relief in Australia*. Australian National University, Centre for Resource and Environmental Studies (CRES). Canberra, Australia 1989. 234 pp. Available for \$19.95 plus \$5.00 (Australian) for postage and handling from the Publications Dept., CRES, Australian National University, GPO Box 4, Canberra, ACT 2601, Australia.

Victims of flood in Australia frequently receive financial aid either from insurance or commonwealth and state disaster payments. Flood insurance is rarely available for homes, although commercial enterprises are usually insured. This book presents the proceedings of a workshop held at the CRES in February 1988. The participants

were actively involved with flood insurance and relief: officers from federal, state, and local government; academics; representatives from the insurance industry and engineering firms; with additional contributors from New Zealand. The book—the first national review of such matters—provides an overview of insurance and relief in Australia (and compares this approach to that in the U.S. and Britain), describes flood insurance options, outlines past and future disaster relief policies, discusses the problems posed by dam failure, and charts the possible integration of insurance and relief into urban floodplain management in Australia and elsewhere. Other topics addressed include dam failure and warning systems for such failure, the unification of floodplain management, and the Victorian experience in managing disaster recovery.

**KEYWORDS** Riverine flood, floodplain management, dam failure flood, insurance, foreign planning, disaster assistance, historical survey, warning systems, damage assessment, foreign response, risk assessment, recovery, comparative study.

128. Trieste, Douglas J. *Downstream Hazard Classification Guidelines*. U.S. Dept. of the Interior, Bureau of Reclamation, ACER Technical Memorandum no. 11. Denver, Colo. 1988. 50 pp.

The purpose of this document is: 1) to define the Safety Evaluation of Existing Dams (SEED) method for assigning a dam's hazard classification; 2) to provide guidance and present methods for the purpose of downstream hazard classification and for estimating the downstream area susceptible to flooding due to a dam failure; 3) to provide guidance and criteria for identification of downstream hazards; and 4) to bring objectivity and consistency into downstream hazard classification. Following a set of definitions involving items such as lives-in-jeopardy and downstream hazards, the report presents guidelines for estimating inundation zones caused by dam break floods and identifies specific hazards in these zones. The hazards identified include mobile homes, roadways, pedestrian routes, campgrounds and recreational areas, areas possessing a combination of at-risk facilities, and permanent structures, such as residences and commercial buildings. Although it is remarked that dam-break/inundation studies are not an exact science, the author provides an appendix that discusses methods for performing such studies.

**KEYWORDS** Dam failure flood, taxonomy, loss estimation, life value, federal planning, scenario, risk assessment.

129. U.S. Dept. of Defense. *Procedures for Compliance with Floodway Regulations—2nd Edition*. U.S. Dept. of Defense, Army Corps of Engineers, Water Resources Support Center, Floodplain Management Information Series: A Special Report. Davis, Calif. 1990. 25 pp. Copies are available free of charge from the Pennsylvania Dept. of Community Affairs, Floodplain Management Division, P.O. Box 155, Harrisburg, PA 17120.

This report is intended to aid municipal officials in administering local regulations based on requirements of the National Flood Insurance Program (NFIP). It includes guidelines for reviewing development proposals to ensure compliance, as well as information concerning the revision of floodplain and floodway maps. The guide is also directed toward builders, developers, and property owners who are considering developing within designated floodplain and floodway areas. It summarizes the NFIP, describes general floodplain development procedures, and explains floodplain maps and basic flood elevation data.

**KEYWORDS** Riverine flood, floodplain management, insurance, local planning, legislation-regulation.

130. U.S. Dept. of Defense. *Raising and Moving the Slab-on-Grade House with Slab Attached*. U.S. Dept. of Defense, Army Corps of Engineers, Galveston District, National Floodproofing Committee. Washington, D.C. 1990. 28 pp. For availability, contact the U.S. Army Corps of Engineers, Lower Mississippi Division Office, P.O. Box 80, Vicksburg, MS 39181. Attn: Publications Department.

Raising existing structures above expected flood levels, or relocating them to flood free areas is one solution to the problem of halting damages caused by repeated flooding. The relocation methods used are relatively simple for structures originally constructed on piers; however, they are not as well recognized as economically viable

practices for structures built on concrete slab foundations. There are two practical solutions to relocating slab-on-grade houses: detaching the structure from the floor slab, or moving the entire structure with the slab attached. This report discusses the procedures for raising or relocating structures with the slab attached, to point out some of the advantages and disadvantages of the procedure, and to indicate the possible costs involved. A step-by-step procedure is presented, and numerous photographs provide a visual aid to those contemplating a move out of the floodplain.

**KEYWORDS** Floodplain management, floodproofing, building design, relocation, local planning, construction.

131. U.S. Federal Emergency Management Agency. *A Report on Structures Substantially Damaged by Floods in the United States (1978-1988)*. U.S. Federal Emergency Management Agency, Federal Insurance Administration, Office of Loss Reduction, Program Policy and Compliance Division. Washington, D.C. 1990. 30 pp

Statistics compiled from the NFIP claims file on insured structures substantially damaged by floods in the U.S. over a ten-year period revealed that 18,558 insured structures had been damaged for a total loss of nearly \$440 million. Of this, the NFIP paid \$332,305,065 in claims, with the average substantial damage amounting to 72.5%. A substantially damaged structure is one which incurred flood damage in excess of 50% of its value. The study drew from the following data: owner name, address, dollar amount of damage, loss data, structure value, damage as a percent of structure value, dollar amount of claim paid, and risk zone designation. Other statistics from the report included: average coverage of substantially damaged structures was \$29,174; and the average NFIP loss to substantially damaged structures was \$17,906. The report also revealed several interesting geographical and risk zone trends that exist between FEMA regions, states, and within certain communities. Another report prepared by FEMA/FIA is the "Summary and Assessment of National Flood Insurance (NFIP) Repetitive Loss Data," released June 26, 1990, 15 pp.

**KEYWORDS** Riverine flood, coastal flood, insurance, economic impact, NFIP, economic analysis, disaster statistics, federal funding, recovery, data analysis, risk assessment, damage assessment.

132. U.S. Federal Emergency Management Agency. *Mandatory Purchase of Flood Insurance Guidelines*. U.S. Federal Emergency Management Agency, FEMA-186. Washington, D.C. 1989. 48 pp. Available free of charge from FEMA, Publications Dept., P.O. Box 70274, Washington, DC 20024.

FEMA's Federal Insurance Administration has released a booklet that presents essential information about the purchase of flood insurance as mandated by the National Flood Insurance Program. The booklet offers guidelines pertaining to many of the questions most often asked about the NFIP by administrators and purchasers alike. The guidelines cover such diverse subjects as the current status of the NFIP, interpretations on nine topical issues of interest to lenders, and an explanation of condominium coverage under the NFIP. Of use to lenders, insurance agents, borrowers, the general public, and administrators at all levels of government, the document features a detailed index that allows readers to access NFIP complexities with ease and precision.

**KEYWORDS** Riverine flood, coastal flood, insurance, lenders, NFIP, federal planning.

133. Vance, Mary. *Flood Damage Prevention: Recent References*. Vance Bibliographies, Public Administration Series no. P-2820. Monticello, Ill. 1990. 14 pp. Available for \$3.75 from Vance Bibliographies, P.O. Box 229, Monticello, IL 61856.

This bibliography contains 181 references, including numerous references to non-U.S. publications, on a wide range of flood-related mitigation topics. The citations have been taken from a variety of sources, including civil engineering and public administration journals, federal and state government publications, and water resources and geographic journals. Almost all the citations are drawn from the years 1980 to 1989.



**KEYWORDS** Floodplain management, COE, water resources management, federal planning, state planning, local planning, foreign planning.

134. Vance, Mary. *Flood Insurance: A Bibliography*. Vance Bibliographies, Public Administration Series no. P-2821. Monticello, Ill. 1990. 13 pp. Available for \$3.75 from Vance Bibliographies, P.O. Box 229, Monticello, IL 61856.

This bibliography contains 140 citations to materials on the provisions, marketing, and overall effectiveness of the National Flood Insurance Program. The references, dating back to 1973, have been culled primarily from professional insurance and underwriting journals. There are also 27 citations to U.S. Congressional reports and hearings and U.S. General Accounting Office critiques of the NFIP.

**KEYWORDS** Floodplain management, insurance, federal planning, federal funding, NFIP.

135. Wilson, Wallace A. *Issues to Floodproof Retrofitting*. Association of State Floodplain Managers, Topical Paper no. 3. Madison, Wis. 1990. 12 pp. Available for \$3.00 to ASFPM members and \$4.00 to nonmembers, plus \$1.50 shipping, from the Association of State Floodplain Managers, P.O. Box 2051, Madison, WI 53701-2051.

Recent estimates from the Federal Insurance Administration indicate that, since 1978, approximately 2% of all properties ever insured against flood damage account for 40% of all claims paid from the National Flood Insurance Program. These numbers have sharpened interest in reducing repetitive losses through floodproof retrofitting. This paper discusses issues related to funding sources, reduction of flood insurance premiums through floodproof retrofitting, improved local record maintenance, repetitive loss structures, proactive approaches to floodproof retrofitting, testing of retrofitting measures, information dissemination, retrofitting public properties, and assessing the benefits and adverse impacts of retrofitting.

**KEYWORDS** Riverine flood, insurance, floodproofing, local planning.

136. Wollongong City Council (of Australia). *Thirtieth (30th) Annual Flood Mitigation Conference Business Papers*. Wollongong City Council, Wollongong, New South Wales, Australia. 1990. 320 pp. Available for Australian \$35.00 from the 30th Annual Flood Mitigation Conference, General Manager & Town Clerk, Wollongong City Council, P.O. Box 21, Wollongong East, New South Wales 2520, Australia.

Australia's 30th Annual Flood Mitigation Conference was held May 15-18, 1990 in Wollongong, New South Wales, Australia. Sixteen papers appear in this proceedings volume that deal with a variety of flood-related subjects, such as recent developments in the legal aspects of flood mitigation, residential floor level design, warning systems, risk communication, emergency management, flood insurance, potential dam failure, Commonwealth perspectives on floodplain management, and the potential effects of anticipated climate change. Although some papers are specific to Australia, most of the information is applicable to other areas of the globe.

**KEYWORDS** Coastal flood, riverine flood, insurance, law, liability, emergency management, risk communication, warning systems, dam safety, climate impact assessment, greenhouse effect, flash flood, foreign planning, hydrology, foreign response.

## HURRICANES, CYCLONES, TORNADOES, AND SEVERE STORMS

137. All-Industry Research Advisory Council. *Surviving the Storm: Building Codes, Compliance, and the Mitigation of Hurricane Damage*. All-Industry Research Advisory Council and the National Committee on Property

Insurance. Oak Brook, IL. 1989. 71 pp. Available from the AIRAC, 1200 Harger Road, Suite 310, Oak Brook, IL 60521. Within the U.S., single copies are available free of charge; additional copies cost \$4.00 each. Copies mailed to non-U.S. nations cost \$5.00.

This report examines current policies that address building construction techniques that lessen damage and injuries caused by hurricanes. Among its key findings, the report notes that the value of Atlantic and Gulf Coast properties exposed to potential hurricane losses increased 64% between 1980 and 1988. In addition, past studies of hurricanes have shown that when strong building codes are properly enforced, they can greatly reduce the amount of property damage caused by high winds. Homes built to withstand hurricane-force winds also provide life safety for the occupants, particularly in densely populated areas away from the direct storm surge, where evacuation may not be feasible. Yet, the cost of such construction is not restrictive, because homes can be made much more hurricane-resistant at a cost of between 1.8% and 3.7% of a coastal property's total sale price, including land. The study also found that a number of coastal areas already have adequate building codes in place, yet other communities are facing difficulties in implementing such provisions because of perceived threats to economic development and perceived increases in building and housing costs.

**KEYWORDS** Hurricane, building codes, insurance, building design, enforcement, damage assessment, loss estimation, economic analysis, local planning, construction.

138. Badolato, Edward V., et al. *Hurricane Hugo: Lessons Learned in Emergency Preparedness*. Clemson University, Strom Thurmond Institute of Government and Public Affairs. Clemson, South Carolina. 1990. 37 pp. Available from the Strom Thurmond Institute, Clemson University, Clemson, South Carolina 29634-5130. Cost is \$8.50 per copy.

When Hurricane Hugo knocked out electrical power in widespread areas for extended periods of time, the prolonged disruption had adverse effects on community health, safety, commerce, and industry and impeded recovery efforts. This report reveals many details about the emergency response effort to restore power or to provide improvised power supplies and also recommends improved emergency planning measures. Among its recommendations, the report suggests that emergency planners prepare for the worst; coordinate their responses with federal, state, and industry responders; establish and sustain pre-emergency planning activities; create an emergency preparedness group to work at the state and local levels; familiarize themselves with the role of the military; and better utilize communications systems.

**KEYWORDS** Hurricane, emergency response, local response, emergency planning, lifelines, recovery, utility failure.

139. BCD Council of Governments. *Disaster Analysis & Recovery Tracking System (DARTS) Project Management Report: Dorchester County & the Region*. Berkeley, Charleston, Dorchester (BCD) Council of Governments. Charleston, S.C. 1990. 38 pp. For availability, contact the BCD Council of Governments, Suite 1-548, 701 East Bay Street, Charleston, SC 29403.

Communities struck by Hurricane Hugo needed rapid assessments of the extent of damage and numbers of people affected in order to plan their recovery programs. The DARTS project was developed by the BCD regional planning organization to provide local policy makers with maps and data to guide their restoration decisions. The DARTS project was created with four primary objectives: 1) to provide a quick-response, low-cost instrument for analyzing hurricane damage by neighborhood; 2) to create a regional tracking system for recovery and reconstruction projects involving community facilities; 3) to develop related planning information systems for economic development, transportation, EMS, etc.; and 4) to establish a planning-oriented microcomputer land use and mapping system for the region. As part of the DARTS project, more than 20 community studies and reporting systems are currently under development that make use of records from the American Red Cross, FEMA, state and local governments, and historical societies. Regional projects described include storm damaged housing, aid to storm victims, and hurricane-related planning for the elderly.

**KEYWORDS** Hurricane, recovery, reconstruction, regional response, local response, computer application, mapping, damage assessment, local planning, geographic information systems, land use management.

140. Coastal Hazards Advisory and Mitigation Project. *Recommendations for Rebuilding after Hurricane Hugo*. Clemson University, Dept. of Civil Engineering, Coastal Hazards Advisory and Mitigation Project. Clemson, S.C. 1989. 5 pp. Available free of charge from the Coastal Hazards Advisory and Mitigation Project, 110 Lowry Hall, Clemson University, Dept. of Civil Engineering, Clemson, SC 29634-0911.

Damage due to Hurricane Hugo has been estimated to exceed \$6 billion. Relatively new buildings were demolished by Hugo's strong winds, indicating that community building codes are not adequate to deal with events of this severity. This short publication provides recommendations to legislators, building owners, architects, engineers, and building officials on ways to correct past mistakes and ensure that future South Carolina structures are better able to withstand storms like Hugo. It is recommended that ANSI A58.1 be used as a guide to better structural design.

**KEYWORDS** Hurricane, building design, architecture, building codes, local planning.

141. Cross, John A. "Longitudinal changes in hurricane hazard perception." *International Journal of Mass Emergencies and Disasters* 8, no. 1 (1990): 31-47.

This paper reports the results of a longitudinal study of hurricane hazard perceptions conducted over a twelve year time period among the same survey population. Residents of the Lower Florida Keys were questioned about hurricane risk perception in 1976, resurveyed in 1982, and those still remaining in the area were last surveyed in 1988. Observed changes in the residents' hazard perception include 1) awareness of hurricane-generated winds, waves, and flooding as being problems has steadily increased over the 12-year period; 2) residents have become more knowledgeable about flood zone location; 3) greater confidence is expressed by residents about the hurricane-resistance capability of their homes; 4) hurricane hazard awareness basically remains high, and if anything, has slightly increased; and 5) while awareness of hurricane threat remains high, many residents increasingly are underestimating the vulnerability of their homes to wind and wave damage.

**KEYWORDS** Hurricane, awareness, risk perception, longitudinal study.

142. Friedman, D.G. *Is Hugo a Forerunner of Future Great Hurricanes? National Committee on Property Insurance—Annual Forum*. Philadelphia, Pa. 1989. 81 pp.

There is speculation among climate scientists that adverse impacts from anticipated global warming could encourage the formation of powerful "super hurricanes." It is also claimed that the appearance of these storms could begin during a transitional climate phase (1990-2010), as global warming starts to accelerate. This paper attempts to quantify these shorter-term effects, utilizing presently available information that is consistent with the current state of knowledge about regional storm characteristics (frequency, severity, location); their natural disaster production characteristics during the present climatic regime; and likely effects of a global atmospheric warming on these storms and their catastrophe-producing potentials. Results of the analysis suggest that the overall damage-producing potential of winter storms could decrease during the period of climatic transition. For severe local storms, it would increase slightly. For hurricanes, the increase in damage potential could be substantial.

**KEYWORDS** Hurricane, meteorological hazards, loss estimation, forecasting, risk assessment, scenario, climate impact assessment, greenhouse effect.

143. Ho, Francis P. *Extreme Hurricanes in the Nineteenth Century*. U.S. Dept. of Commerce, National Oceanic and Atmospheric Administration, National Weather Service, NOAA Technical Memorandum NWS HYDRO 43. Silver Spring, Md. 1989. 134 pp.

This report provides available meteorological information pertinent to coastal flooding risk assessment of severe hurricanes in the 19th century. Hurricane parameters included are: the central pressure, the radius of maximum winds, and the direction and speed of the storm's forward motion. The report also gives brief discussions of available data and informative newspaper accounts of individual hurricanes which helped in determining the hurricane track and the point of landfall. It is observed that the intensities of severe hurricanes of the 19th century are comparable to extreme hurricanes of the 20th century. Damage to property and crops has increased in value as the population increases in hazards areas, but fatalities have dramatically decreased, due in part to better warning systems and preparedness measures.

**KEYWORDS** Hurricane, meteorology, social impact, risk assessment, data sources.

144. News and Courier/Evening Post-Charleston, South Carolina. *And Hugo Was His Name: Hurricane Hugo, A Diary of Destruction*. C.F. Boone Publishers. Sun City West, Ariz. 1989. 68 pp. Available for \$6.45 from C.F. Boone Publishers, 12433 Fieldstone Drive, Sun City West, AZ 85375.

Collated from journalistic sources, this publication contains numerous anecdotal accounts from storm survivors, presents many eye-opening photographs of the destruction wrought by Hugo, and describes the emergency response efforts of agencies and individuals who were involved in recovery operations following the storm's passage. Damage assessments are given by state and by county.

**KEYWORDS** Hurricane, emergency response, local response, damage assessment, disaster assistance, recovery.

145. Obermeyer, Raphael. *Planning for High-Wind Disasters: Tornadoes, Hurricanes, and Severe Storms—A Partially Annotated Bibliography*. American Planning Association, Council of Planning Librarians, Bibliography no. CPL-236. Chicago, Ill. 1989. 10 pp. Available from the APA, 1313 East 60th Street, Chicago, IL 60637. Price is \$10.00.

This bibliography addresses local-level recovery following severe storms, hurricanes, and tornadoes. Some citations address immediate relief, while others focus on longer-term recovery. Mitigation through insurance, construction requirements, emergency warning systems, and land use planning are also covered, while other sections address general works on disasters that are applicable to severe weather as well as individual reactions to severe storms.

**KEYWORDS** Disaster assistance, hurricane, tornado, local planning, recovery, social impact, wind, meteorological hazards.

146. Oliver, John. *Tropical Cyclone Warning System: A Survey of Public Interpretation and Opinions in Queensland on the Present Tropical Cyclone Warning System*. Cumberland College of Health Sciences, Disaster Management Studies Centre, Occasional Paper no. 2. Sydney, Australia. 1989. 77 pp. Available for \$10.00 from the Disaster Management Studies Centre, Cumberland College of Health Sciences, P.O. Box 170, Lidcombe, NSW, Australia 2141.

This report presents case studies of tropical cyclones Winifred and Charlie, evaluating the warning systems and responses to each event. In the case of Winifred, 146 respondents replied to a questionnaire that was handed out at shopping centers and distributed to selected weather observers. Among the findings it was noted that detailed final precautionary advice should be included in broadcast warnings, and that some respondents suggested a dual warning format be used, a shortened message in simple terms for the general public, and a