93***
World Meteorological Organization. 1983. Human Response to Tropical Cyclone Warnings and Their Content. Project #12. Geneva: World Meteorological Organization, Tropical Cyclone Programme.

Timely and accurate warning messages properly disseminated to the population at risk are ineffective if that population fails to respond in a meaningful way. Compiling official directives, exerts from government surveys, and research papers on human response to cyclone warning, this study is an important contribution to the field of risk communication. Detailed discussions and guidelines are provided for writing warning messages, message hierarchy, organization of message contents, style, specific wording, familiar landmarks, forecast accuracy, message frequency, personal context, sociological factors affecting message content, experience level, knowledge of storm structure, cultural consideration, and age.

KW: Prediction/warning, review, hurricane, message content, emergency communication, dissemination, effectiveness.

94
Budnitz, Robert J. 1984. External Initiators in Probabilistic Reactor Accident Analysis--Earthquakes, Fires, Floods, Winds. Risk Analysis 4 (4): 323-335.

This article discusses the methodologies presently available for analyzing the contribution of "external initiators" to overall risks in the context of PRA (Probabilistic risk assessment) of large commercial nuclear power reactors. The external initiators examined in this report are earthquakes, fires, floods, and wind. In general, uncertainties associated with the calculated risks from external initiators are much larger than those associated with internal initiators. The principal uncertainties lie with development of hazard curves. For assessment of earthquakes, internal fires and floods, and high winds, the methodology is reasonably mature for qualitative assessment but not quantitative application. Risks from other external initiators are generally considered to be low, either because of the very long recurrence time associated with the events or because the plants are judged to be well designed to withstand them.

KW: Probabilities, earthquake, fire, flood, wind, uncertainty.

95**
Carter, T. Michael. 1983. Probability of Hurricane/Tropical Storm Conditions: a User's Guide for Local Decision Making. U.S. Department of Commerce, NOAA. 25 pp.

This manual explains how the National Weather Service intends on using landfall probabilities in predicting hurricane movements along the Atlantic coast of the United States and how these probabilities are computed, how they should be interpreted, and how they can be most effectively utilized in decision making. The author notes a number of weaknesses in the use of probabilities. It is only in the last few hours (usually less than 24) before landfall that forecasts are accurate and consistent enough to provide decision makers with a sure guide for preparatory or evacuation actions. If long lead times are required for evacuation/preparedness, relatively low probability thresholds will have to be used. Thus, there must be a trade off between probabilities and time to accomplish actions. Furthermore, probabilities are not related to hurricane intensity. The article is geared towards decision makers and therefore does not discuss the dynamics of perception and acceptance of probabilities by the general public.

KW: Probabilities, hurricane, message content.

96***
Griffith, David A. 1984. The Issuance of Hurricane Probabilities as Effectuating Local Evacuation Management: Will They Help or Hurt? Proceedings of the 15th Technical Conference of Hurricane and Tropical Meteorology, p. 535-538. Boston: American Meteorological Society.

This paper describes the potential impacts of probabilities on the local management of hurricane evacuation by examining the interpretation of the probabilities from three different perspectives: 1) the general public; 2) local elected officials; and 3) local emergency managers. Basic elements are recommended for integration into a local decision-making guidance system. Issuance of probabilities and their utilization will only be successful if strong and comprehensive efforts are taken by the National Weather Service (NWS) and local and state emergency management agencies. The NWS must inform, educate, and train potential users of probabilities as to their uses and limitations. Local and state emergency management organizations should view the probabilities as pieces of quantitative information that must be incorporated into their individual decision systems. Finally, a strong and close coordinative link between NWS educational programs and local/state emergency managers' efforts must be maintained.

KW: Probabilities, hurricane.

97
Kaplan, Stanley. 1981. On the Method of Discrete Probability Distributions in Risk and Reliability Calculations--Application to Seismic Risk Assessment. Risk Analysis 1 (3): 189-196.

The author suggests that if the point of view is adopted that in calculations of real-world phenomena we almost invariably have significant uncertainty in the numerical values of our parameters, then in these calculations, numerical quantities should be replaced by probability distributions and mathematical operations between these quantities should be replaced by analogous operations between probability distributions. Also, Practical calculations one way or another always require discretization or truncation. Combining these two thoughts leads to a numerical approach to probabilistic calculations having great simplicity, power, and elegance. The philosophy and technique of this approach is described, some pitfalls are pointed out, and an application to seismic risk assessment is outlined.

KW: Probabilities, earthquake.

98
Murphy, Allan H. 1979. Probabilistic Temperature Forecasts: the Case for an Operational Program. Bulletin of the American Meteorological Society 60 (1): 12-19.

The case for an operational program involving the formulation and dissemination of probabilistic temperature forecasts is presented. First, the need for information concerning the uncertainty in temperature forecasts is discussed, and examples of formal and informal decision-making situations in which such information would be useful are described. The results of experiments on probabilistic temperature forecasting are then reviewed, and it is concluded that experienced weather forecasters can quantify the uncertainty inherent in temperature forecasts in a reliable and skillful manner. Finally, the essential components of an operational probabilistic temperature forecasting program are outlined, and some suggestions are made regarding specific temperature events (e.g. frost) that should receive probabilistic treatment on an operational basis.

KW: Probabilities, uncertainty, effectiveness.

99
Murphy, Allan H. and Robert L. Winkler. 1971. Forecasters and Probability Forecasts: the Responses to a Questionnaire. Bulletin of the American Meteorological Society 52 (3): 158-165.

This paper summarizes the responses of Travelers Weather Service forecasters to a questionnaire concerning probability forecasting. The survey was designed to elicit information from the forecasters relative to the process of precipitation probability forecasting, the relationship between judgments and forecasts, the effect of the definition of precipitation on the forecasts, the meaning of the forecasts, the effects of feedback and experience on the forecasts, and related matters. The responses to the questionnaire and subsequent discussions with Travelers Weather Service and National Weather forecasters suggest the presence of a number of "problems" related to probability forecasting.

KW: Probabilities.

100**
Murphy, Allan H. and Robert L. Winkler. 1971. Forecasters and Probability Forecasts: Some Current Problems. Bulletin of the American Meteorological Society 52 (4): 239-247.

Using responses from a questionnaire which was administered to forecasters actively involved in probability forecasting and subsequent discussions with the forecasters, the authors document a number of problems concerning probability forecasting. The

authors identify several of the more important problems, describe their nature, indicate some approaches and results which clarify certain aspects of the problems, and make some recommendations related to research studies and operational practices in probability forecasting. In particular, topics discussed include the formulation of judgments and the assessment process, the interpretation of probability forecasts, the occurrence of "hedging" by forecasters, and the evaluation of probability forecasts and forecasters.

KW: Probabilities.

101
Murphy, Allan H. and Robert L. Winkler. 1977. Probabilistic Tornado Forecasts: Some Experimental Results. In Preprint Volume: Tenth Conference on Severe Local Storms, October 18-21, 1977, pp. 403-449. Boston: American Meteorological Society.

It is generally agreed that forecasts expressed in probabilistic terms offer two advantages vis-a-vis traditional forecasts. First, this mode of expression provides forecasters with a means of quantitatively describing forecast uncertainty. Second, probabilistic forecasts provide users with valuable data for making rational decisions in uncertain situations. This paper describes some preliminary results of an experiment in which National Weather Service (NWS) forecasters at the National Severe Storms Forecast Center (NSSFC) expressed forecasts of tornado occurrence and intensity in probabilistic terms. Results indicate that the experiment was generally successful. The authors discuss possible areas of improvement.

KW: Probabilities, tornado.

102**
Murphy, Allan H. et al. 1980. Misinterpretations of Precipitation Probability Forecasts. Bulletin of the American Meteorological Society 61 (7): 695-701.

Previous studies have suggested that the general public misinterprets probability of precipitation (PoP) forecasts leading some meteorologists to argue that probabilities should not be included in public weather forecasts. Upon closer examination, these studies prove to be ambiguous with regard to the nature of the misunderstandings. If event misinterpretation is the source of the confusion, then elimination of the probabilities would not reduce the level of misunderstanding. The present paper summarizes a study of Eugene, Oregon residents, who completed a questionnaire designed to investigate their understanding of and attitude toward precipitation probability forecasts. Results indicate that both traditional and PoP forecasts were

misunderstood and misinterpreted. On the other hand, the probabilities themselves are well understood. Moreover, most respondents revealed a preference for the use of probabilities to express the uncertainty inherent in precipitation forecasts. The results of this study support the inclusion of probabilities in public forecasting of precipitation occurrence.

KW: Probabilities, receiver perception.

103**
Sheets, Robert C. 1985. The National Weather Service Hurricane Probability Program. Bulletin of the American Meteorological Society 66 (1): 4-13.

Historically the National Weather Service (NWS) has attempted to provide a minimum of 12 hours of daylight warning for coastal communities to prepare for a hurricane. However, recent studies have shown that in some instances and communities longer lead times are desirable. Furthermore, these watches are qualitative in nature where a need has been expressed for quantitative assessments of risk. In response to these concerns and needs the NWS initiated a program using probabilities to quantitatively assess the uncertainties in the forecast tracks of hurricanes. Probabilities were used along with regular advisories during the 1983 hurricane season. Optimum use of probabilities requires users to develop plans based upon their own needs. It is hoped that the program will aid in the perceived credibility of officials.

KW: Probabilities, hurricane.

104
Simpson, R.H., B. Hayden, Michael M. Garstang, and H.L. Massie. 1985. Timing of Hurricane Emergency Actions. Environmental Management 9 (1): 61-70.

Emergency actions to prepare for hurricanes often require more time than is available from official public warnings. This means that the preparedness official must decide not only what to do but when to do it. The action decision system, described in this article, was developed for use in Florida and reformats the hurricane track forecast, a 72 hour projection prepared at the National Hurricane Center in Miami. The system specifies the probability of a strike at each of 12 vulnerable coastal communities, and then normalizes the value in terms of a composite of probabilities computed for historic hurricanes that struck the respective communities. The system is founded upon individual hurricane climatologies and decision procedures that are tailored for use at each community. The action recommendations generated by the risk analyses with a 93% level of confidence relieve the

preparedness official of the need to make meteorological decisions in timing evacuations and other critical measures, even when these must begin before official hurricane warnings are received.

KW: Probabilities, Prediction/warning, hurricane.

105
Wallace, Robert E., James F. Davis, and Karen C. McNally. 1984. Terms for Expressing Earthquake Potential, Prediction, and Probability. Bulletin of the Seismological Society of America 74 (5): 1819-1825.

The authors were designated as a committee of the Policy Advisory Board of the Southern California Earthquake Preparedness Project to consider predictive terms and their application. It is interesting to note that this paper does not focus on the communication of "probability", but instead, more easily understandable terms were developed, although indirectly they may be based on probability figures. Terms for expressing earthquake potential and prediction include two main categories, "long-term earthquake potential" and "earthquake prediction". Earthquake prediction is subdivided into three categories: "long-term prediction", "Intermediate-term prediction", and "short-term prediction". Long-term prediction is not subdivided, but two terms, "watch" and "forecast", are recognized as having similar meanings. "Short-term prediction" is subdivided into "alert" and "imminent alert". The subdivisions of earthquake prediction are based on different time frames. Earthquake potential or probability can be expressed either numerically or verbally according to a variety of schemes.

KW: Probabilities, earthquakes.

EDUCATION AND AWARENESS PROGRAMS

106
American Red Cross. 1984. Safety and Survival in an Earthquake. 2nd Edition. American Red Cross, Los Angeles Chapter. 47 pp.

This handbook is part of an earthquake preparedness course entitled: Safety and Survival in an Earthquake. The booklet is comprehensive, examines individual preparedness and emergency response to an earthquake. The handbook is somewhat unique in two aspects: 1) there is a brief, easy to understand scientific explanation of what happens when an earthquake occurs; and 2) the booklet uses "visual keys" in association with preparedness and response suggestions.

KW: Education and awareness programs, earthquake.

107**
Battisti, Francesco. 1982. The Organization of a Mass Education Program in Order to Mitigate Earthquake Hazards in Calabria. In Barclay Jones and Miha Tomazevic (eds.), Proceedings of the 3rd International Conference: the Social and Economic Aspects of Earthquakes and Planning to Mitigate Their Impacts, pp. 341-362. Institute for Testing and Research in Materials, Ljubljana, and Program in Urban and Regional Studies, Cornell University, Ithaca, New York.

This paper is an account of one of the first experiences in mass education undertaken by a local government in Italy. Mass education about earthquakes must not be independent from other measures for increasing the general preparedness of the community against unscheduled events. Mass education is most effective if it is achieved one or two years before the earthquake; its utility decreases as time passes before such an event happens again. It is also necessary to discriminate between information which is subject to obsolescence and that which may continue to be effective through time. Items not subject to obsolescence include: 1) elementary notions of what is an earthquake; 2) patterns of earthquake recognition; 3) personal safety behavior; 4) patterns of family organization and response; 5) evacuation procedures; 6) home safety; and 7) structural building improvements. Items most likely to become obsolete are: 1) evacuation sites; 2) evacuation roads; 3) location of health services; 4) location of administrative offices and emergency personnel; 5) channels of public communication; and 6) other channels of communication. To protect against obsolescence a hazard education program should undergo revision every four or five years.

KW: Education and awareness programs, earthquake, education.

108**
California Earthquake Education Project. 1986. CALEEP--California Earthquake Education Project--Sampler. Berkeley, California: Lawrence Hall of Science, University of California. 62 pp.

This publication provides a description and sample materials of the California Earthquake Education Project (CALEEP). The CALEEP program works with and provides materials to the state Office of Emergency Services, Department of Education, county and school disaster preparedness agencies, and local curriculum development and teacher training programs. Beyond increasing students' understanding of earthquakes, CALEEP activities attempt to motivate students and their families to take pre-event actions which would minimize injury, loss of property, and psychological upset. Risk communicators will find this sampler a useful introduction to one of the better earthquake education projects in the United States.

KW: Education and awareness programs, earthquake, education.

109
California Office of Emergency Services. 1983. California Earthquake Response Plan, Southern San Andreas Fault (draft). California Office of Emergency Services.

This plan describes the organization, agencies, tasks, and responsibilities which comprise the emergency response system following a catastrophic earthquake on the southern San Andreas Fault. While directed mostly at the state's response, the plan also addresses incorporation of private sector, federal, and local government resources that are available on a statewide basis. The plan discusses the likely impacts of a major earthquake on public and private communication systems. An earthquake poses a matrix of events that would reduce the effectiveness of communication systems, rather than destroy them. However, the failure of one line in the chain can effectively disable a large portion of the system. Risk communicators may be interested in the "communication chain" discussed in this plan. In providing emergency communication to the public, five categories of information are needed: transportation, utilities, medical/health, mass care, and volunteer services.

KW: Education and awareness programs, earthquake, liquefaction, emergency communication, dissemination.

110**
Chess, Caron. April 1986. Recommendations for the New Jersey Department of Environmental Protection's Radon Communications Program: a Working Document. Unpublished paper. 7 pp.

Representing the New Jersey Department of Environmental Protection (DEP), the author summarizes recommendations from a symposium convened in October 1985 to deal with communication aspects of the radon contamination issue. Government efforts can greatly influence the public's perceptions of the problem and ways in which the DEP is perceived. These perceptions can, in turn, lead to action or inaction on the part of the public that could seriously affect public health in the state. Symposium participants suggested that the state should take the initiative in explaining the problem and mitigation plans to the press, health personnel, elected officials, and others. They also believed that an information campaign should be delayed for a few months to allow for planning and verification of preliminary data. Factors that were key in determining that an active public information campaign was necessary include: 1) fill the information vacuum; 2) maintain trust and credibility; 3) provide information; and 4) the need to emphasize planning. Special importance should be given to: 1) increasing feelings of individual efficacy; 2) responding to the public's concerns; 3) maintaining the state's credibility; and 4) defining audiences and channels of communication.

KW: Education and awareness programs, radon.

111***
Christensen, Larry and Carlton E. Ruch. 1978. Assessment of Brochures and Radio and Television Presentations on Hurricane Awareness. Mass Emergencies 3 (4): 209-216.

This article assesses the effectiveness of a Hurricane Awareness Program to alert Texas coastal residents of hurricane dangers and preparedness measures. The program included radio and television spots and the distribution of 750,000 brochures. The assessment took the form of a survey of 1,350 Texas coastal residents. The survey revealed that radio presentations had virtually no effect on hurricane awareness or preparedness. Television spots did enhance the respondents' belief about the destructiveness of hurricanes. The brochure increased the accuracy of subjects' information. To be effective, specific responses must be identified, and material and information presented to the public must directly bear on these responses. Terms must be defined and residents told explicitly what they should know. Likewise, to generate desirable behavior, residents must be informed about what they are to do during a hurricane watch and warning.

KW: Education and awareness studies, media studies, hurricane, message channel, effectiveness.

112**
Colorado Division of Disaster Emergency Services. Undated. Citizen Emergency Preparedness Guide. Colorado Division of Disaster Emergency Services.

This attention catching brochure is meant for general dissemination. Topics covered include: emergency telephone numbers, warnings, major natural disasters, floods, tornadoes, lightning, winter storms, earthquakes, fire, fallout shelters, national emergency evacuation, and emergency care. The pamphlet uses color indexing of the topics to catch the readers attention and provide quick referencing. Diagrams and drawings are used to illustrate major points.

KW: Education and awareness programs, brochures, education.

113
Comerio, Mary et al. 1982. An Earthquake Advisor's Handbook for Wood Frame Houses. Publication #CP26. Berkely, California: Center for Planning and Development Research, College of Environmental Design, University of California. 90 pp.

The purpose of this publication is twofold: 1) to document the Center for Planning and Development Research's Earthquake Assistance Service (EAS) program; and 2) to illustrate to those organizations and agencies interested in setting up their own EAS what the process entails. The intent of an EAS project is to develop a service that will inform residents of seismic hazards and assist them to voluntarily, effectively, and economically make modifications that will improve the safety of their homes. This type of program could be broadly applicable to other natural and technological hazards. The report contains sample news releases, publicity flyers, client contact sheets, liability release forms, maps, and other "tools" important in the risk communication process.

KW: Education and awareness programs, earthquake, preparedness.

114
Comerio, Mary et al. 1982. Earthquake Hazards and Wood Frame Houses: What You Should Know and Can Do. Publication #CP15. Berkeley, California: Center for Planning and Development Research, College of Environmental Design, University of California. 46 pp.

This manual is intended to help homeowners improve the seismic resistance of their homes. As part of the Earthquake Advisory Service (EAS), this manual includes detailed discussions of identifying structural weaknesses in wood frame houses. Earthquake safety and inspection checklists are included. The booklet provides good examples of how somewhat technical diagrams and photographs can be effectively incorporated for educational material.

KW: Education and awareness programs, earthquake, education, maps.

115**
Davenport, Sally S. and Penny Waterstone. 1980. Hazard Awareness Guidebook: Planning For What Comes Naturally. Austin, Texas: Texas Coastal and Marine Council. 41 pp.

This publication, an outgrowth of a National Hazard Awareness Workshop held in Corpus Christi, Texas, was compiled in order to help those who are currently involved in planning programs to improve the public awareness of threats stemming from hazards, together with results of recent research; these are utilized to produce an outline of elements which need to be considered when putting together a hazard information program. A discussion of the ability of various forms of communication, both written and electronic, to reach certain audiences, plus suggestions for dealing with the mass media, provides a practical foundation for maximizing the distribution of relevant information. The material discussed in the text is presented in convenient "do's" and "don'ts" lists. A sampling of these guidelines include: 1) make your message specific and let it indicate what constructive action can be taken; 2) repeat and reinforce your message regularly; 3) don't assume that distributing information will by itself change people's actions; 4) avoid duplication and obtain ideas for useful materials and approaches by knowing what others have done; 5) don't attempt to use information which cannot be transferred into a clearly understandable form; 6) structure your message to your chosen audience and relate it to experiences with which they can identify; and 7) use newspapers for long term education.

KW: Education and awareness programs, effectiveness.

116
Emergency Planning Department, City of Littleton, Colorado. 1981. To Save a Life, Yours!--Disaster Handbook for Citizens. Littleton, Colorado. 20 pp.

This booklet is meant for general circulation and provides basic information on disaster and emergency preparedness. Topics of discussion include: where to call for help, types of disaster, how the city is prepared, individual preplanning preparedness, and how

to react during different disasters. The brochure is a good example of local efforts to educate the public.

KW: Education and awareness programs, brochures.

117
EQE Incorporated. 1987. The EQE Earthquake Home Preparedness Guide. 4th Edition. San Francisco: EQE Incorporated. 25 pp.

A brief description of basic structural measures that can be taken to reduce earthquake damage (e.g. hanging pictures, securing bookcases, etc.) is provided in this brochure. There are three noteworthy aspects of this booklet that risk communicators might find useful. First, black and white photographs used in the pamphlet are clear and easy to view. Second, diagrams are well drawn, precise and appropriately labeled. Finally, the booklet is an example of how black and white printing can be effectively and tastefully used to produce an attractive product.

KW: Education and awareness materials, earthquake.

118
Fisher, Anne. 1987. Risk Communication: Getting Out the Message About Radon. EPA Journal 13 (9): 27-28.

The author describes the Environmental Protection Agency's (EPA) involvement in the communication of radon risk. The EPA's program has been based primarily on a strategy that encourages voluntary mitigation methods, since EPA lacks regulatory authority in this area. This along with the difficulty of residents to perceive the risk as real has made risk communication difficult. EPA and others are currently testing the effectiveness of various educational materials and programs. It is hoped that results will help EPA to improve its radon information programs.

KW: Education and awareness programs, radon.

119**
Geer, Ira W. 1978. Increasing Weather Awareness--Hurricanes: an Assessment Study of School-Based Hurricane Education in the Gulf and Atlantic Coastal States. Final Report. Brockport, New York: National Weather Service Project, State University of New York. 110 pp.

During the 1976-77 school year, this study found that there were 18.5 million students enrolled in 31,000 schools in the coastal states extending from Texas to Maine. Few of these schools offered hurricane instruction beyond that found in conventional curricular materials. Some of the guidelines and recommendations

suggested include: 1) schools and school personnel are more likely to be receptive to curricular innovations that focus on broad educational goals and include opportunities for student activities; 2) education programs should consist of both long- and short-term preparedness considerations; 3) hazard preparedness education should be coupled with instruction on more normal weather patterns; 4) education materials should be general enough to assure wide distribution, yet specific enough to be based on local environmental and social conditions; and 5) successful programs require teacher training.

KW: Education and awareness programs, hurricane, education.

120
Heider, Claret M. (ed.). 1986. Improving Seismic Safety of New Buildings: a Community Handbook of Societal Implications. Earthquake Hazards Reduction Series #13. Washington, DC: Prepared for the Federal Emergency Management Agency by the Building Seismic Safety Council. 99 pp.

This handbook was developed to provide community decision-makers with information they can use in assessing the extent to which these effects will be felt in their community and in making more reasoned decisions. The handbook is geared to a broad audience and is structured in a way risk communicators may wish to emulate. For example, chapter headings are in the form of common questions such as: How do I determine my community's seismic hazard?; What does an earthquake do to buildings?; What does a seismic building code do?; Will design and construction costs increase in my community?; How do I get my community to act?; Where do I go for information?; and What do those technical terms mean?.

KW: Education and awareness programs, earthquake, education.

121
INTERTECT and Peace Corps. 1984. Disasters and Development: a Peace Corps Pre-Service Training Module. Washington, DC: Peace Corps Information Collection and Exchange. 221 pp.

Materials in this module have been developed to introduce Peace Corps trainees to natural hazards and how natural disasters can affect development. Information is intended to prepare trainees to make decisions on appropriate actions to take during an emergency and how to integrate into their primary development assignments activities that can mitigate the effects of future disasters. The module contains everything from samples of hazard maps to questionnaires. The value of this training module to risk communicators is not so much its hints on risk communication, but instead as an example of how one might develop their own training module for hazard managers.

KW: Education and awareness programs, education.

122
Judson, Arthur. 1976. Colorado's Avalanche Warning Program. Weatherwise 29 (6): 268-277.

This article discusses the principal components of Colorado's avalanche warning system. These include a network of reporting stations in the mountains, high country weather forecasts, the Avalanche Warning Center (AWC) in Fort Collins, and a communications system for dissemination of warnings to the public. Warnings prepared by the AWC are disseminated through the National Weather Service's communication network by national teletype lines, local VHF radio, and recorded phone messages at special numbers. Approximately 50 radio and television stations, major newspapers, and wire services simultaneously receive the warnings. Each warning states the area covered, duration of the warning, reason for the warning, and instructions to minimize risk. Improvements in the system could be made by installing more reporting stations in western Colorado, where station density is low, and implementation of an efficient communications system to link field stations with the AWC.

KW: Education and awareness programs, avalanche, message channel, message content.

123
Kockelman, William J. 1978. Communicating Research Products Developed by the San Francisco Bay Region Environment and Resources Planning Study. In Walter W. Hays (ed). Proceedings of Conference V, Communicating Earthquake Hazard Reduction Information, pp. 307-334. United States Dept. of Interior, Geological Survey Open File Report 78-933.

The six year (1970-1976) San Francisco Bay Region Environmental and Resources Planning Study (SFBRS) is the topic of this paper. The goal of SFBRS was to identify and provide earth-science information needed for regional land-use decisions, provide a wide range of data at a regional scale, and test and evaluate how this data is being used for planning and decision making. The author makes several suggestions that would improve the effective use of earth-science data. Some of these include: 1) making a greater effort to provide engineering interpretations and land and water use capability rating; 2) make available earth-science information at scales and levels of detail commonly used by local and regional governments; 3) releasing data on critical issues early through verbal briefings, seminars, maps, open-file reports, and publications and reports of cooperating agencies; and 4) provide educational, advisory, and review services along with any data collection and analysis program.

KW: Education and awareness programs, earthquake, maps.

124
Leslie, Jolyon. 1986. A Building Education Programme in North Yemen. Disasters 10 (3): 163-171.

In 1982 the central highlands of the Yemen Arab Republic suffered an earthquake that caused extensive damage to traditional buildings. In the aftermath of the relief effort for victims of the disaster, a project was set up to provide local builders with simple information about the means of strengthening homes. This report describes the activities of the project, and assesses some of the issues that emerge from this kind of education work, and the methods that have been used. Since most communities had one or more men considered as builders, who would be employed to plan and set out a building, organize materials and supervise construction, it was felt that these people would represent a key target group to communicate the risk of traditional structures. Builders also generally maintained a high level of respect within the villages. Persuasion was the only realistic tool in North Yemen, where building legislation was nearly non-existent. Builders that had been through a two day training course were found to had persuaded a substantial number of their clients to incur the extra expense of earthquake resistent building techniques.

KW: Education and awareness programs, earthquake, education.

125
M & M Protection Consultants. 1983. Natural Hazards Information System: Purpose and Application Bulletin. Marsh & McLennan, Inc. 7 pp.

This report describes the authors' Natural Hazards Information System which is a computerized data base using modeling techniques combined with raw data available from government and other sources providing natural hazard frequency and intensity information for almost any location in the world. Both area and site specific impact reports are available. Data from the computerized database can be used for such things as property damage loss estimates, risk assessments, insurance premium determination and allocation, engineering design considerations, site selection and expansion decisions, business interruption/interdependency studies, pre-loss funding calculations, and contingency planning. Examples of the database are provided.

KW: Education and awareness programs.

126
McNamara, E.F., T. Kurth, and D. Hansen. 1981. Communication Efforts to Prevent Wildfires. In R.E. Rice and W.J. Paisley (eds), Public Communication Campaigns, pp. 143-160. Beverly Hills: Sage Publications.

This paper is divided into three sections: 1) description of the nature and scope of the wildfire problem; 2) basic agency organization, role of each administrative level in a successful fire prevention program, and local approaches to prevent wildfires; and 3) the history development, extent, and impacts of the national forestry community's Smokey Bear Campaign. The campaign is considered highly successful.

KW: Education and Awareness Programs, fire, education.

127
Mogil, H. Michael, John C. Monro, and Herbert S. Groper. 1978. NWS's Flash Flood Warning and Disaster Preparedness Programs. Bulletin of the American Meteorological Society 59 (6): 690-699.

In the 1970s flash floods became the nation's number one stormy weather killer. To combat escalating losses the National Weather Service (NWS) expanded its efforts to improve forecasting and warning of flash floods and to improve the public's response to flash flood threats. This paper summarizes current (1978) and planned NWS operational flash flood warning and disaster preparedness programs. The authors recommend initiatives that the NWS and other agencies could take to improve warning dissemination and increase public awareness/response. Some of these include: 1) place more emphasis on predisaster efforts; 2) encourage the private sector to develop inexpensive automated precipitation and river alarms; 3) increase public understanding of and response to hazardous weather; and 4) provide additional NOAA Weather Radio transmission capability, especially for high use recreational areas.

KW: Education and awareness programs, severe storm, flood.

128
National Association for Search and Rescue. 1980. School Emergency Response Plan: a Model Plan for Emergency Response in the Schools. La Jolla, CA. 33 pp.

This is a suggested emergency plan for individual schools or school districts. The plan is a straightforward and relatively simple description of what school employees should do in case of an emergency. The project includes not only emergency communication information but also discussion of communication with parents and the setting up of a "communications team". At

the beginning of each academic year parents should be advised of the school's emergency plans including communication channels that the school will use during an emergency.

KW: Education and awareness programs, education.

129**
National Oceanic and Atmospheric Administration, National Weather Service. 1983. Watch Out...Storms Ahead! Owlie Skywarn's Weather Book. Washington, DC: Government Printing Office. 27 pp.

This pamphlet is intended for school age children and provides a relatively comprehensive discussion of characteristics and adjustive strategies for hurricanes, tornadoes, lightning, flash floods, and winter storm hazards. Four communication techniques stand out in the pamphlet. The booklet is well illustrated. Personal experiences are used to portray the possible destructiveness of hazards. Attention getting facts are used (although this may result in undo fear of a hazard). In some instances, comparisons to common objects (eg. hail the size of marbles, golf balls, or baseballs) are incorporated into the discussion of the hazard. A series of quizzes are available at the end of the brochure.

KW: Education and Awareness programs, education.

130
National Weather Service, National Oceanic and Atmospheric Administration. Undated. When a Hurricane Threatens: Safety Precautions During the Greatest Storm on Earth. Washington, DC: Government Printing Office. 15 pp.

This pamphlet is designed to tell the reader what to do to protect himself and family when a hurricane threatens. A general discussion of hurricanes is provided along with sections on the storm surge, floods and winds. Each of the sections has an "action checklist" of what the reader should do and when to evacuate. The study suggests that during a hurricane that the reader evacuate if his/her residence can be reached by the storm surge or flood from associated rainfall. However, little information is provided for the reader on how to determine if their residence is subject to flooding or where that information can be obtained.

KW: Education and awareness programs, hurricane, flood, brochure.

131
Owen, H. James. 1977. Guide for Flood and Flash Flood Preparedness Planning. National Oceanic and Atmospheric Administration, National Weather Service. 47 pp.

The purpose of this guide is to assist local officials in: 1) assessing the present state of a community's existing flood warning and preparedness plan; 2) deciding what is needed to write a preparedness plan; and 3) actually developing an adequate flood preparedness plan. General guidelines are provided for such topics as warning dissemination, community information, emergency communication, and mapping.

KW: Education and awareness programs, flood, brochure, maps.

132
Pulley, H. Roger. 1980. California's Earthquake Prediction Response Plan. In Walter W. Hays (ed), Proceedings of Conference XII, Earthquake Prediction Information, pp. 180-232. United States Department of the Interior, Geological Survey Open File Report 80-843.

This paper, for the most part, duplicates the California Earthquake Prediction Response Plan. A detailed discussion and diagram on the information flow process are provided for the reader. The plan allows for several forms of earthquake warning information: 1) area of intensified geophysical research; 2) earthquake advisory; 3) earthquake watch; 4) earthquake warning; and 5) cancellation. The plan describes model public information and education goals at three time levels of an earthquake prediction: short, intermediate, and long term.

KW: Education and awareness programs, earthquake, prediction/warning, dissemination.

133
Rold, John W. 1978. The Communication of Information for Geologic Hazard Mitigation --The Colorado Example. In Walter W. Hays (ed), Proceedings of Conference V, Communicating Earthquake Hazard Reduction Information, pp. 120-133. United States Dept. of Interior, Geological Survey Open File Report 78-933.

The author, director of the Colorado Geological Survey, traces the historical and legislative development of the State's policies dealing with geological hazards. Education was the major strategy used by geologists to convince opponents about the importance of hazard information dissemination and legislation. Education often had to be approached with missionary zeal and geologists had to demonstrate that geological information would save money, lessen development time, and provide a better end product to the

consumer. Communication was most successfully achieved through one-on-one situations. The state utilized the talents of others such as oil or mining company geologists in locating hazardous area and conveying information. Maintaining communications is a continuing effort. Agencies must be prepared to respond quickly to information and aid requests. It is vital to acquire and utilize "converts". Agencies must provide a local government with strong support when they have made a decision on your advice. Legislation itself is a communication method because it can legally require that information be used.

KW: Education and Awareness Programs, landslide, legislation/regulation.

134**
Saarinen, Thomas F. 1982. The Relation of Hazard Awareness to Adoption of Mitigation Measures. In T.F. Saarinen (ed), Perspectives on Increasing Hazard Awareness, pp. 1-34. Program on Environment & Behavior Monograph #35. Boulder, Colorado: Institute of Behavioral Science, University of Colorado.

Through the use of examples, this study explores the relationship of hazard perception to the adoption of mitigation methods. In trying to understand the link, Saarinen suggests that the communication process (especially education) is important. Some of the issues and topics discussed in this article include: the role of experience, hurricane evacuation and awareness programs, attitude and behavior discrepancies, flood hazard brochures, earthquake awareness and information, forced awareness, availability bias, and public service advertising. The author accepts that hazard awareness based on experience is associated with greater adoption of mitigation measures, but questions whether people can always substitute information for experience. Public education on natural hazards is necessary but questions remain to be answered about the most effective format for presenting information in each communication medium, including sequence, timing, and duration of presentation.

KW: Education and awareness programs, review, hurricane, earthquake, flood, message content, education, evacuation, legislation/ regulation, receiver perception, effectiveness

135
Sanders, John. 1985. An Analysis of the North Carolina Coastal Weather Awareness Program. Marina, CA: Sanders Scientific Enterprises. Prepared for Severe Weather Branch, National Weather Service, NOAA. 23 pp.

This report provides a perspective on hurricane awareness and education programs and illustrates some of the relationships

between hazard awareness, disaster preparedness, and emergency response. Data suggest that perception of flood risk is based primarily on a person's prior notion of threat rather than on information supplied in hurricane warnings. Younger adults show poorer recall of information. People who have had "fringe" hurricane experience are more attentive to awareness material. Those with prior or "fringe" experience are more positive about the reliability of hurricane forecasts.

KW: Education and awareness programs, case studies, hurricane, flood, receiver perception.

136
Shearer, C.F. 1980. U.S. Geological Survey Hazard Warning Program Procedures and Problems. In Walter W. Hays (ed), Proceedings of Conference XII, Earthquake Prediction Information, pp. 156-164. United States Department of the Interior, Geological Survey Open File Report 80-843.

The Geologic Hazard Warning and Preparedness Program, which was developed in response to the Disaster Relief Act of 1974, is the topic of this paper. The program's procedures define three levels of geologic hazard information: 1) notice of potential hazard; 2) hazard watch; and 3) hazard warning. Lack of precise definitions for these terms have resulted in confusion in their communication and comprehension. USGS experience in sending information to state and federal governments has been generally positive. Local government reaction, however, has been less enthusiastic. Two reasons are cited for this. First, local governments lack the technical ability to assess the risk and funding to develop solutions. Second, local governments are faced with the possibility that once given the information, they may be liable for any failure to reduce the hazard. An appendix of hazard warning procedures is also provided.

KW: Education and awareness programs, earthquake.

137
Slosson, James E. 1980. Technical Consideration in Personal Preparedness. In Walter W. Hays (ed), Proceedings of Conference XII, Earthquake Prediction Information, pp. 279-288. United States Department of the Interior, Geological Survey Open File Report 80-843.

The author reviews and discusses: 1) common methods and message suggestions for communicating pre-earthquake building mitigation measures; and 2) how structures might be categorized for earthquake vulnerability purposes. Pacific Telephone in California was approached in the hope that they would print an eight page section on earthquake information and survival in their

telephone books. The company agreed and the project has been deemed a success. Other information is proposed to be added, including earthquake information and tips for homeowners, apartment dwellers and those working in office buildings.

KW: Education and awareness programs, earthquake, preparedness.

138
Smith, Shirley M. 1980. Earthquake Predictions and Their Effects on Preparedness: A Public Education Perspective. In Walter W. Hays (ed), Proceedings of Conference XII, Earthquake Prediction Information, pp. 307-328. United States Dept. of Interior, Geological Survey Open File Report 80-843.

This paper is divided into four sections: 1) educational programs for earthquakes, other natural hazards, and successful mass education campaigns outside of natural hazards; 2) history of public education in Southern California which illustrates promising techniques for home-centered preparedness training; 3) implications and recommendations for personal preparedness education; and 4) future issues. A few of the recommendations made by the author for improving public education programs include: 1) update public information periodically; 2) encourage local units to direct the program with help from state and federal governments; 3) design a flexible program; 4) the program should include mass media and live training components; 5) form alliances with adult education facilities; 6) consider long term viability of any awareness program; 7) orient messages to families; 8) training information should be based on realistic scenarios; and 9) workshops should consist of two versions -- one for the public and one to train the trainers.

KW: Education and awareness programs, earthquake, education.

139**
Southern California Earthquake Preparedness Project (SCEPP). 1983. Earthquake Public Information and Education Program Design. Van Nuys, California: SCEPP. 58 pp.

A cooperative agreement between FEMA, the California Seismic Safety Commission, and SCEPP, recognized the importance of public education and information in earthquake preparedness. Task 10 of that agreement asks SCEPP to survey available earthquake safety materials and develop a long-term program design and strategies. This report presents the findings of the SCEPP education staff, together with appropriate discussion and recommendations. Some of the recommendations include: 1) maintain a resource list, such as SCEPP developed, and keep it current; 2) maintain a network of information-providing groups by holding regular meetings and workshops or by newsletters and telephone; 3) follow the Japanese

earthquake model. SCEPP's research team was impressed with the quality of Japan's information materials and the aggressive manner in which the materials were disseminated; 4) combine awareness information with preparedness steps in an integrated awareness campaign; 5) identify and establish links with information providers and furnish training and assistance to support their efforts; 6) identify accessible, informed sources for use by the media; 7) maintain awareness of scientific processes and advances in earthquake prediction to promote credibility of scientists in the public mind; and 8) earthquake information and education programs should convey certain basic messages to the public.

KW: Education and awareness programs, earthquake, review.

140
Speigel, Wayne P. 1982. Tornado Awareness. Topeka, Kansas: Kansas Division of Emergency Preparedness, Natural Resources Planning Section. 19 pp.

This booklet is a concise review of emergency information about tornado hazard. Written in a simple, straight-forward style, it acquaints the reader with the general characteristics of tornadoes, the weather terminology associated with severe storms, and what precautions should be taken to protect oneself in the event of a tornado watch or warning. Additional material deals with emergency supplies, mobile home safety, and how to protect life and property following a tornado strike. Victims of a tornado are offered general advice on what to expect from federal and state disaster assistance programs and frequencies are listed of eight Kansas radio stations serviced by NOAA's F.M. weather radio.

KW: Education and awareness programs, tornado, brochures.

141
Sullivan, Raymond. 1981. Earthquake Games and Curriculum Development Information. Washington, DC: Office of U.S. Foreign Disaster Assistance, Agency for International Development. 93 pp.

The author has collected a variety of educational materials on earthquake awareness, preparedness, and response. Risk communicators may find this collections useful in developing similar educational materials for other hazards. Especially valuable are the numerous games (K-12) found in the handbook.

KW: Education and awareness materials, earthquake, education.

142
U.S. Department of Commerce, National Oceanic and Atmospheric Administration. 1985. Heat Wave: A Major Summer Killer. Washington, D.C.: Government Printing Office. 2 pp.

This brochure for dissemination to the general public provides an explanation of NWS's heat index program, summary of NWS's alert procedures, how heat affects the body, and heat disorder symptoms and their prevention.

KW: Education and awareness programs, pollution, individual response, brochures.

143**
U.S. Environmental Protection Agency (EPA). 1986. A Citizen's Guide to Radon: What It Is and What To Do About It. EPA, Office of Air and Radiation. 13 pp.

This brochure does a fairly good job of describing radon hazards, testing techniques, and mitigation measures. The booklet subheadings are questions that the general public might be interested in, such as: What is radon?; Where does radon come from?; How does radon affect me?; How certain are scientists of the risks?; How does radon cause lung cancer?; When did radon become a problem?; Does every home have a problem?; How does radon get into a home?; How is radon detected?; How can I get a radon detector?; How should radon detectors be used?; What do my test results mean?; How quickly should I take action?; Are there other factors I should consider?; and How can I reduce my risk from radon? Risk communicators may find this format of setting up booklets and other awareness materials an effective method for communicating information about hazards that are especially difficult for people to comprehend. The pamphlet also contains a radon risk evaluation chart (or ladder) that depicts measured levels of radon exposure and compares these with other more easily understood hazards (x-rays and smoking).

KW: Education and awareness programs, radon.

144**
U.S. Federal Emergency Management Agency (FEMA). 1982. Survive Winter Through Self Help and Helping Others: a Resource Workbook. FEMA-29. Washington, DC: FEMA. 175 pp.

This workbook provides planners, hazard managers, and private citizens with a comprehensive and easily accessible body of materials dealing with winter safety and survival. A variety of publicly and privately provided literature is reprinted which discusses safety precautions to be taken during severe winter weather conditions. The workbook is broken into five sections.

The first section is a "Planners Packet" which includes information on how to identify and reach your target audience, how to utilize the media and other resources, and planning and evaluating techniques. In Part 2, Parents/Teachers/Families, the reader can find samples of education materials for children, the elderly and homeowners. Part 3, Camera Ready Materials, contains brochures, pamphlets, and other information to alert consumers to the hazards of winter and how to cope with them. Media materials are provided in Part 4, including radio scripts, public service announcements, and newspaper articles. Finally, in Part 5, Resources, FEMA has compiled a resource directory of organizations offering publications and other materials at little or no cost.

KW: Education and awareness programs, winter storm, brochures, preparedness.

145
U.S. Federal Emergency Management Agency (FEMA). 1983. Flash Flood Awareness Packet. No. FEMA-35. Washington, DC: FEMA, Office of Public Affairs. 47 pp.

In conjunction with the National Oceanic and Atmospheric Administration and the American Red Cross, FEMA has prepared a packet of awareness materials designed to reinforce safety programs developed by local officials. It emphasizes the correct actions people should take, particularly the importance of heeding flood warnings and pre-planning safe evacuation routes. Also included is information on FEMA's National Flood Insurance Program, radio spots, and directions for obtaining free brochures suitable for mass distribution.

KW: Education and awareness programs, flood, brochures.

146**
U.S. Federal Emergency Management Agency (FEMA). 1985. Hurricane Awareness Workbook. Washington, DC: FEMA, Office of Public Affairs. 217 pp.

Designed to aid emergency planners in conducting public awareness campaigns, the workbook is divided into three sections: Resources, Media, and Sample Information for the Public. The resources section includes a list of people and organizations that can provide technical assistance in developing a hurricane awareness program, a bibliography, a monograph that includes papers on various aspects of hurricane awareness, and an awareness guidebook that summarizes the do's and don't's in developing awareness programs. The Media chapter contains a fact sheet on hurricane devastation, sample radio scripts, newspaper articles, and information cartoons. The final section includes copies of many fact sheets, posters, information brochures, and descriptions of

audio-visual products, all of which can be ordered or directly adapted for local use.

KW: Education and awareness programs, hurricane, message content, message channel, brochures.

147
Ward, Delbert B. 1978. Communicating Seismic Safety Information for Public Policy Development. In Walter W. Hays (ed), Proceedings of Conference V, Communicating Earthquake Hazard Reduction Information, pp. 380-394. United States Department of the Interior, Geological Survey Open File Report 78-933.

This paper discusses issues dealing with the transfer of technical information on earthquake hazards reduction to user groups in Utah from the perspective of a state seismic safety policy development program. Purposes of such communications, characteristics of the various user groups having interest in seismic safety policy, functions and goals of the Utah Seismic Safety Advisory Council, and particular information transfer situations are described. Also included are the author's views regarding preferred methods and media for communicating different types of technical and general seismic data to groups of different interests and technical competencies.

KW: Education and awareness programs, earthquake, public policy.

148**
Yuhnke, Robert E., Ellen K. Silbergeld, and Janice E. Caswell. 1987. Radon: the Citizens Guide. New York: Environmental Defense Fund. 24 pp.

This booklet provides an interesting comparison to a similar brochure published by the U.S. Environmental Protection Agency (1986) that is also annotated in this section of the bibliography. Like the EPA guide, this brochure is set up in a question/answer format. It differs in three aspects. First, the Environmental Defense Fund (EDF) pamphlet is much more forceful in its assertion that radon exposure is harmful, thus decreasing the element of uncertainty to the reader but possibly arousing greater fear. Second, a listing of both federal and state agencies that deal with the radon issue is provided. Finally, the EDF booklet contains short author biographies which may help to personalize and increase the credibility of a publication.

KW: Education and awareness programs, radon.