

SPECIAL ISSUE

EVACUATION RESEARCH: THEORY AND APPLICATIONS

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**UNDERSTANDING EVACUATION BEHAVIOR:
AN EDITORIAL INTRODUCTION***

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Evacuation behavior has long been an important issue for disaster research. Its importance stems from both its applied role in emergency management and its focus as a phenomenon for social scientific investigation. For emergency managers, evacuation may be seen as a **generic** protective mechanism. It is effective across a variety of disaster agents: floods, hurricanes, volcanic eruptions, hazardous materials incidents, and nuclear power plant accidents, to name only a few. Furthermore, there is a second dimension to the utility of evacuation in disaster management. When the state of technology permits accurate prediction or detection of the threat, evacuation is an effective **pre-impact** tool for reducing danger to human life. At the same time, when predictions are not feasible as in the case of earthquakes—evacuation still may serve a variety of emergency functions when used as a **post-impact** measure. This flexibility, combined with its wide applicability and relatively uncomplicated logistical nature, makes evacuation a powerful tool for managing the uncertain environment.

From a social scientific perspective, evacuation behavior has been the target of much research and theorizing. Some of this work has been driven

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by the applied needs of the emergency management community and some has been undertaken as more basic or academic study. Descriptive accounts of evacuations, usually journalistic in nature, date from the Greek historian Herodotus in the fifth century B.C. More systematic accounts, though still largely descriptive, began to appear after World War II; notably in the strategic bombing studies conducted by the U.S. armed forces and the account of the evacuations of London by Richard Titmuss. Social scientific analyses of evacuation behavior began to appear in the studies conducted by the Disaster Research Group at the National Academy of Sciences in the 1950s and in the work of the Disaster Research Center formed by Russell R. Dynes and Enrico L. Quarantelli in 1963.

In the late 1960s, Thomas E. Drabek and his colleagues began the process of moving from largely descriptive accounts to a concern with explanation and with integrating the empirical studies into theoretical edifices. This initial theoretical impetus was built upon by a variety of researchers who began creating formal models of citizen response to evacuation warnings. Many of these efforts grew out of the authors' experiences at the University of Colorado (Boulder) Natural Hazards Research and Applications Information Center or the Ohio State University Disaster Research Center. Such modeling efforts include Dennis Mileti's work on the Rapid City flood, Earl Baker's hurricane response research, and the flood studies at Battelle Institute conducted by Marjorie Greene, Michael Lindell and Ronald Perry. Throughout the 1970s, more models appeared, some were refined, and aspects of evacuation behavior other than warning response were modeled. Much of this research involved applications to current management problems and events. Among many studies, this work included Joseph Scanlon's study of the Darwin (Australia) cyclone, Anne Whyte on the Missassagua evacuations, Robert Stallings' applications for the President's Commission on the Reactor Accident at Three Mile Island, and the work by Michael Lindell, Susan Cutter, John Sorenson and others on evacuation in nuclear reactor emergency evacuation planning.

The tone of the work on evacuation behavior in the 1980s was set by Enrico Quarantelli's massive theoretical and empirical of evacuation research conducted in the first year of the decade. This piece addressed the full range of evacuation phenomena, including individual response to warnings, post-warning behavior, and issues at the organizational level of analysis. During this period, case studies continued to be generated and modeling and theoretical efforts grew. Previously unresearched aspects of evacuation also began to be addressed. The understanding of transportation issues advanced considerably with the development of conceptual and

computer models by a variety of scholars including Thomas Urbanik at the Texas Transportation Institute and Antoine Hobeika at Virginia Polytechnic Institute and State University. Larry Christensen and Carl Ruch began their research on the conduct and feasibility of vertical evacuation in response to hurricane threats. Late in the decade, awareness of the area of evacuation research was also enhanced by various efforts to summarize and synthesize the literature, notably the work of Barbara Vogt, John Sorenson and their colleagues at Oak Ridge National Laboratory. It is clearly impossible to adequately summarize even the recent history of evacuation research and theory in a few paragraphs. Our purpose here was simply to mention major milestones as a way of providing context for the articles that appear in this issue. We believe that these collected papers both capture the spirit of growth of evacuation research and significantly extend the conceptual organization of the field.

We have organized the papers into two general sections: one dealing with broader issues that apply across the general phenomenon of evacuation, and one addressing special issues or aspects of evacuation behavior. Colleen Fitzpatrick and Dennis Mileti lead the first section with their paper on motivational issues in evacuation conduct. This piece considerably extends the issue of motivation from the more simple psychological views of warning message content to integrate social structural aspects of the warning setting. John Sorenson focuses upon the very little studied issue of timing in citizen compliance with evacuation warnings. He conceptualizes departure timing within a social psychological framework of personal mobilization and draws conclusions about the implications for applied issues in warning response and broader issues in cross hazard generalization. Calvin Streeter explores the implications of redundancy in social systems for evacuation planning. Redundancy is conceptualized as heightened capacity and responsiveness in organizations that can be marshalled during times of threat. Robert Stallings closes the first section with his paper on ending evacuations. This paper reviews the very critical—and little examined—issue of how the decision to terminate an evacuation is made by authorities, and how families, upon hearing an all clear signal, decide to return to their homes.

David Gillespie and Susan Murty open the second section of the journal with their paper on organizations' boundary setting criteria and evacuation capacity. These scholars develop and test a theoretical model and delineate guidelines for implementing boundary setting criteria. Continuing to focus on the organizational unit of analysis, Thomas E. Drabek breaks new ground in his examination of evacuation planning in the private sector. Through a multi-community study of tourist-oriented firms, Drabek reviews the chal-

ges of evacuation planning, the extent of planning activity and possible means to improve the planning process. Barbara Vogt also examines evacuation planning, concentrating on the issue of nursing homes and aged health care facilities. She elucidates the relationship between organizational characteristics and evacuation management and planning outcomes, and discusses ways of integrating plans for "special facilities" into the comprehensive evacuation plan.

The two closing papers each examine evacuations in connection with a particular class of disaster agent. Susan Cutter presents a comprehensive overview of international trends in evacuations conducted in response to chemical accidents. Covering the period from 1900 through 1989, she examines patterns in event frequency and evacuation management as well as trends in fatalities and injuries. Earl J. Baker closes the volume with his piece on evacuation behavior in response to hurricanes. His data base includes information on twelve events between 1961 and 1989, the largest survey data base on any single hazard event. Trends on evacuation compliance are evaluated, including the effect of warning source, type of dwelling, hazard knowledge, length of residence, and perceived personal risk.

Collectively, the papers in this volume cover a range of issues from theoretical models to analytical summaries of knowledge regarding particular threats. It is our editorial hope that these papers not only summarize the state of evacuation research at the beginning of this decade, but also anticipate the kinds of questions that will form the focus of future study.