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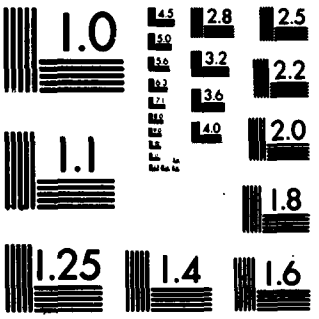

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Final Report

EVACUATION BEHAVIOR AND PROBLEMS: FINDINGS AND IMPLICATIONS FROM THE RESEARCH LITERATURE

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Disaster Research Center
The Ohio State University
Columbus, Ohio 43210

Federal Emergency Management Agency
Washington, D. C. 20472

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Final Report

EVACUATION BEHAVIOR AND PROBLEMS: FINDINGS AND IMPLICATIONS FROM THE RESEARCH LITERATURE

E. L. Quarantelli
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The Ohio State University
Columbus, Ohio 43210

for

Federal Emergency Management Agency
Washington, D. C. 20472

July, 1980

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EVACUATION BEHAVIOR AND PROBLEMS:

FINDINGS AND IMPLICATIONS FROM THE RESEARCH LITERATURE

Our task was threefold: (1) to examine what is and is not known about evacuation in peacetime disaster situations; (2) to systematically order and organize the literature and other research data; and, (3) to make recommendations from our findings and observations.

About 150 literature sources and other newly gathered as well as previously gathered research data were examined. An analytical model of evacuation behavior was developed positing a relationship between community context, threat conditions, social processes, patterns of behavior including the withdrawal movement, and consequences for community preparedness for evacuation. Policy, planning, operational and research implications were derived suggesting future actions and efforts.

Our study did find that we do currently have some research-based knowledge and understanding about evacuation phenomena in disasters. The literature and research data give us a comprehension beyond common sense notions, and in fact, at times, the evidence suggests that citizens in general and officials in particular may be working with incorrect assumptions and beliefs about the phenomena. On this topic, as is true of many other matters about disaster behavior, mythologies and misconceptions about evacuation abound.

For example, to the extent that there are research observations, they show that the withdrawal movement itself usually proceeds relatively well. The flight tends to be orderly, reasonable from the perspective of the evacuees, and generally effective in removing people from danger. The problems with evacuation occur before and after the flight behavior itself. Organizational preparations for and initiation of mass evacuation efforts tend to be poor. Planning is often unrealistic, assumes that evacuees have to be controlled and generally does not address the distinctive and special problems which can be involved in mass evacuations. Little consideration in plans or in actuality is given to the fact that evacuation involves going to some area, as well as from some locality, and almost always returning to the original place of departure.

A number of implications and recommendations follow from our analysis of the literature and research data. Thus, we argue that evacuation should be approached as a proactive policy matter important in itself rather than being treated primarily as a reaction to warning activities. In some ways, peacetime evacuation ought to be viewed as distinctive and separate phenomena parallel to the treatment of crisis relocation in the literature on wartime emergencies. Planning might visualize evacuation not as an outcome, but as a flow process with different emergent stages involving various kinds of contingencies. Evacuation does not always develop in a singular and linear path, but may involve multiple and disjunctive paths. Operational activities in connection with evacuation must consider the full range of the patterns of behavior that are involved, from the warning to the withdrawal

to the shelter and to the return stage. The heterogeneity of the population at different stages requires different organizational actions.

We also found that the research base about evacuation phenomena is not strong. Evacuation has not been a major focus of systematic study, and knowledge of the phenomena is often surface and very uneven. Theoretical treatments of evacuation are even fewer and less informative as a whole than the descriptive and case study literature which provides the bulk of the findings and impressions about the topic. Priority in the future ought to be given to in-depth research on unexplored topics (e.g., the non-movers), little systematically examined areas (e.g., the shelter stage) and selected operationally important subjects (e.g., the evacuation of institutionalized populations). At a more theoretical level, study needs to be done on understanding the meshing of individual and organizational behavior in mass emergencies.

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evacuation behavior was developed positing a relationship between community context, threat conditions, social processes, patterns of behavior including the withdrawal movement, and consequences for community preparedness for evacuation. Policy, planning, operational and research implications were derived suggesting future actions and efforts.

Included as part of the report is an extensive annotated bibliography of 71 empirical studies and 19 theoretical works in the peacetime disaster evacuation literature.

ACKNOWLEDGEMENTS

Many minds and bodies have contributed in different ways to this report. Foremost have been the four staff members of the Disaster Research Center, (DRC), who worked directly on the project. Barbara Baisden as Project Supervisor had day-to-day responsibility for the work and the general activities undertaken. Tim Bourdess as a graduate research associate assisted in all phases of the work, including the field operations. Lori Minutilli and Teresa Lewis helped primarily with the literature analysis and coding. Yasumasa Yamamoto helped in the early stages of developing the analytical model. They are all thanked for their efforts and particular individual contributions.

However, as is true of much of the work at DRC, many of the staff members not formally associated with the project also contributed in varying degrees to the work done. Elizabeth Wilson, the DRC Executive Director did her usual good job in trying to edit into readable English the original manuscript of this report; she also capably handled a number of the administrative details of the project including stretching an inadequate budget. Shari Carres did a fine job in typing under deadline pressure the final copy of the report. Charlsa Norman helped out in some of the early bibliographic search and abstracting.

Last, but not least, persons and organizations outside of DRC must be thanked. A variety of individuals and organizations, too numerous to mention, cooperated in providing data in our field work. Most importantly, officials in DCPA and its successor agency, FEMA, especially James Kerr, played a major role in the initiation of the project and the carrying out of the work to its completion. In the instance of Kerr, this was the continuation of the very positive and helpful stance he has taken for over fifteen years now with respect to the possible contributions of social and behavioral science research generally and DRC studies in particular to operational, planning and policy issues in the disaster area.

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PREFACE

In this report we describe and analyze what is known, as the result of research by social and behavioral scientists, about the phenomena of mass evacuation in disasters. For a variety of reasons, this is a topic of interest to many people and groups. The following anecdotal account may serve to illustrate how this report can possibly meet the needs of concerned parties.

While in the process of writing the first draft of this report, the principal investigator was contacted via phone by a reporter for one of the national television news services. The reporter was in the process of putting together a story about the problems which might arise if evacuation were to occur in one of the larger metropolitan areas of the country in the event there was a major radioactive leak in a nearby nuclear reactor plant. In the course of asking a series of questions, she repeatedly pressed the principal investigator to make a statement about the probable impossibility of evacuating the metropolitan area. In light of the presentation in the following pages, the reporter made two assumptions which are of particular interest. First, she assumed that clear-cut answers based on some kind of data about evacuation could be given. Taken from her perspective, the issue was not whether research information was available, but rather what the information showed. Second, she also had preconceived ideas as to the kind of answers she would be given, namely, that there was likely to be wild flight if not panic in case an evacuation was suggested or ordered in the metropolitan area as a result of a nuclear mishap. That is, she took it for granted that disorderly evacuation was likely to be a problem and a key question, therefore, was how such flight could be prevented.

As we try to indicate in the pages that follow, our base of research-rooted knowledge about evacuation is uneven and limited; there are many things

about it where we lack even the most basic information. On the other hand, there is enough study-based understanding about some aspects of evacuation so that even now we can ascertain that certain common sense and popular conceptions about what occurs are almost certainly wrong. This is the state of knowledge about most of the social and behavioral aspects of disaster phenomena. We have uneven, scientifically derived knowledge about many disaster issues and questions, but we do know on the basis of research studies, that many widely held public and official beliefs are "myths."

To set forth what is known on the basis of evidence about evacuation and to point to some fallacies about evacuation phenomena are some of the underlying purposes for this study. As such, it is a "stock-taking" effort, and continues one tradition that is reflected in the Center's publications program. Through the years, the Disaster Research Center (DRC) has produced a series of reports summarizing what was known at the time of the writing about a particular disaster question or topic, along with implications of the findings for further and future work on the subject matter. Thus, apart from the specifics of this report, this study should be seen in the larger content of one of the traditional missions of DRC--to periodically evaluate the research community's stance in regard to certain important disaster-related topics, whether that be the delivery of emergency medical services (Taylor, 1977), the functioning of local civil defense offices (Anderson, 1969b; Dynes and Quarantelli, 1977), the handling of the dead (Blanshan and Quarantelli, 1980), the use of EOCs in mass emergencies (Quarantelli, 1978b), the problems of warning systems (McLuckie, 1970), or the military-civilian relations during disasters (Anderson, 1968).

The stock-taking about evacuation in this particular report results from a contract between DRC and the Defense Civil Preparedness Agency (DCPA)

which, during the course of the study, was absorbed into the Federal Emergency Management Agency (FEMA). Many of the earlier DRC efforts were possible due to the funding provided by DCPA and its predecessor organizations which go back to the Office of Civil Defense in 1963. Apart from the value of such reports for researchers, support for this study was also provided because it was felt the publication could be helpful to policy makers, planners and operational personnel involved in disaster preparedness, response and recovery activities. In accordance with DRC's tradition, this report is aimed at the same kinds of multiple audiences as in the past. It is intended to be informative for a wide range of disaster interested students and research users. The report could even be of some use to those people, such as the reporter mentioned earlier, who might have some general questions about evacuation in disasters.

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Chapter I

OBJECTIVES AND STUDY PROCEDURES

In this chapter we indicate our objectives, the procedure we followed, and the format of the rest of the report.

Objectives

Our task in this study was threefold. First, we wanted to systematically look at what is and is not known about the phenomena[1] of evacuations in disaster situations. Our focus was primarily on works with an empirical basis, instead of speculative or hypothetical material. We sought to examine what has been found and said about the characteristics of evacuation, the factors affecting its existence, and the problems associated with it manifestation. Thus, one of our goals was to summarize the existing state of knowledge about disaster-related evacuation.

Second, we had to organize in some fashion the observations and findings on evacuation by ourselves and others. Among other things, this involved considering how to define and conceptualize the phenomena, and what kind of theory or model of evacuation we might use. As it turned out, because of the weaknesses of the literature on these matters, we had to develop our own definition and our own model. The latter not only served to organize the research findings and conclusions, but also provided an explanatory scheme for the behavior. Thus, another goal was the development of analytical tools which we could bring to bear on our descriptive summaries of evacuation phenomena.

Third, we needed to draw relevant implications from what we found. Given what we currently know from what has been done in the past, where should future efforts be directed? In part, this involved making an assessment of

the literature and research data. The intent was to derive possibilities for activities and work which could be undertaken with respect to evacuation in disasters. Thus, our third and final goal was to use our analysis to make recommendations regarding disaster-related evacuations.

In summary, our objectives were to look at and assess the literature and research data on evacuation, to systematically organize and analyze what we found, and to indicate what our analysis suggested for those with policy, planning, operational and research interests in this area.

Procedures

To fulfill our objectives, we did three things. One, we collected and examined the existing disaster literature which specifically talked about evacuation. A master bibliography was compiled from the resources of the Disaster Research Center (DRC) library. This work was facilitated by the fact that DRC in the past had attempted to develop a list of empirical studies on evacuation. This list was updated, and cross-checked against the only three known prior listings of evacuation studies (i.e., Committee on Disaster Studies, 1954; Hans and Sell, 1974; Strope, et al, 1977). Besides relevant empirical studies, we added to the bibliography unpublished reports particularly of related ongoing work in the area (e.g., the warning studies being undertaken at the University of Minnesota) and such theoretical discussions which specifically addressed the question of evacuation.

In all, about 150 items were on the original master list. We believe that the search we conducted for relevant sources uncovered all but the most fugitive of items, especially in the English language (including Australian and Canadian writings on the subject). Copies of almost all references on the master list were available in the DRC library, or

were otherwise obtainable. Partial exception to this were some known writings on evacuation in Italian, Japanese and German. Even though copies of some of these works were in the DRC library, the limited funding for our project precluded any translation attempts. However, the general ideas and findings even in these non-English language sources were known[1] so that our literature review did take into account all the existing peacetime literature on the topic. (A decision to exclude the wartime literature on evacuation is discussed in the next chapter).

Two, we selectively examined already gathered DRC primary data on evacuation behaviors and problems. This included looking at several major unpublished surveys of victim populations where large scale evacuation took place, namely in the Xenia tornado and the Wilkes-Barre flood. We also reviewed the brief case studies DRC had put together for internal working purposes on chemical disasters which resulted in the large scale withdrawal of people from endangered sites. We additionally read again for purposes of this study transcripts of selected in-depth interviews with public officials involved in major evacuations in disasters DRC had studied in the past.

These three secondary reexaminations of data already in the DRC files were done for several purposes. The population surveys contained much of the little hard or quantitative data available on evacuation movement.[2] All the case studies included a very detailed sequential and chronological depiction of whatever emergency organization involvement there had been in the evacuation process. The interviews permitted a direct perception of the perspectives of local community officials on withdrawal behavior in the face of danger.

Third, in addition to looking at what others had reported and what data DRC had already obtained, we collected new data on evacuation by

undertaking two new field studies. Both focused on generally successful and large scale evacuations. One was a field study looking at evacuation in three Florida counties in the face of Hurricane David. The other, partly undertaken in conjunction with another DRC project on chemical disasters, looked at the evacuation of around 250,000 people in Mississagua, in the Toronto, Canada metropolitan area. Part of the reason for the new field studies was to give the project staff direct familiarity with evacuation phenomena and presumably provide them with a greater awareness of such situations when reading evacuation reports and accounts by others. However, the incidents were primarily studied because they did involve very massive evacuations and it was also possible to have observers on the scene as the evacuation processes in the two areas developed. Few major evacuation efforts have been directly studied and even fewer have had field researchers present while the activity was actually going on.

Format of the Report

Our objectives and the information we obtained in our study have just been indicated. In the chapters which follow, the results of our work are reported. Chapter II, reflecting an intensive reading of the literature sources mentioned earlier, presents an overall impression of the general phenomena of evacuation as discussed and written by others. In some respects, this chapter gives the implicit image of evacuation phenomena that prevails in the literature and thinking of those who have dealt with the topic. Chapter III presents a model we developed about evacuation behavior. The model not only organizes the literature but also provides an explanatory scheme for the behavior. Chapter IV presents our summary of the research findings and observations. It is based primarily on the literature review, but does incorporate ideas and data from the secondary analysis of the already

gathered DRC material as well as what we found in our two new field studies. The implications of our study are drawn in Chapter V. Also detailed in that chapter are recommendations with regard to policy, planning, operational and research activities and actions in the future. An appendix includes an annotated bibliography of the most relevant disaster literature which are numerically coded to our basic model. The brief annotations and the codes are an attempt to provide enough information about each item so that readers interested in evacuation phenomena will not necessarily have to go directly to each item to evaluate their possible value for research and other purposes.

Footnotes

1. As in the case of the words "media" and "medium" the words "phenomenon" and "phenomena" evoke different interpretations as to singular and plural usage. In this report, the word "phenomena" is usually used in the collective.

2. Because of the principal investigator's contacts and interactions with Italian, Japanese and German disaster researchers, he is generally familiar with their studies and findings. He has written the preface to the major volume reporting Italian disaster research (Cattarinussi and Pelanda, forthcoming). Japanese and DRC disaster researchers have exchanged visits and have held meetings with one another for about a decade, and Japanese students have been in residence at DRC. The principal investigator presented the keynote speech at the first symposium on social and behavioral aspects of disasters which was held in Germany (Quarantelli, 1979b).

3. There are only about a dozen large scale, random sample population surveys of impacted or threatened communities, not all of which touch on evacuation behavior. The DRC survey of Xenia was a 15 percent random sample of households in the Xenia area. All respondents were asked a series of questions about whether they had to evacuate their homes, where they went, how long they stayed away, etc. In the Wilkes-Barre study we obtained a seven and a half percent random sample of people in the flooded area. Respondents provided information on reasons for leaving their homes, where they obtained shelter, how long they were displaced, etc. In both communities, but especially in Wilkes-Barre, DRC undertook an intensive study of organizational involvement in emergency sheltering and housing.

CHAPTER II

THE PHENOMENA OF EVACUATION

In this chapter we take an overall look at what occurs during evacuation in disasters as discussed in the literature; specific research findings are taken up in a later chapter. In the first part of this chapter, we indicate the seeming pervasiveness, saliency and importance of evacuation phenomena. We then note that evacuation has not been a major research concern, and that almost no attention has ever been given to defining the phenomena. We conclude the chapter with a discussion of what is generally assumed about evacuation and try to make explicit how certain implicit assumptions have hindered serious attention to the topic.

Evacuation Phenomena in General

Leaving or withdrawing from an endangered area is, of course, a long recognized mechanism for coping with an emergency. Evacuation is not one of the newer ways of adjusting to disasters; in fact, we can speculate that it was probably among the very first responses adopted by the human race in the course of its efforts to survivie the multiple perils it faced.[1] There is evidence that mass evacuations occurred in both prehistory and antiquity. Archeological data indicate groups and tribes in the early days of human settlements left certain localities because of famines, droughts, earthquakes and floods (Sheets, 1979). As early as the fifth century B. C., Egyptians living alongside the Nile River developed the custom of leaving during the Nile's seasonal flooding (Perry, 1979b: 25). Chinese records of antiquity likewise indicate massive movements of populations before floods and after earthquakes.

In much more recent times, planning for systematic evacuation has become an integral part of large scale preparedness measures, whether it be for war or peacetime crisis. Under the label of crisis relocation, much planning for possible evacuation in future nuclear wartime situations has been undertaken (e.g., Strope, Henderson and Rainey, 1976; Laurino, et al. 1977, 1978; Sullivan, Ranney and Soll, 1978). The absence of appropriate plans to help people to leave in the face of a serious threat, as in the Three Mile Island nuclear incident, in fact, becomes the basis for serious and official criticism if not condemnation (Presidential Commission, 1979).

Whether planned or not, evacuation indicates an actual and potential dangerous situation, and it can be seriously questioned whether there is a major disaster if evacuation does not occur. If disaster implies disruption of social life, then evacuation is an indication of a disaster. Even if the exodus is a response to a possible threat rather than a realized danger, the emergency movement of people is necessarily disruptive of ongoing social routines. If mass leaving occurs after impact, it is almost always because the physical destruction and damage is such so as to make normal social life impossible, or because of the fear of such an eventuality. Put another way, the presence of mass evacuation is a very good sign of an actual or potential disaster, and apart from a transportation incident, a disaster of any magnitude is almost always accompanied by some evacuation.

Evacuation is also a staple of journalistic accounts of disasters. At least in American reports about such events, the flight or possible movement of people seems to receive attention second only to a focus on casualties and property damage. In connection with another DRC study, a qualitative examination of press accounts about disasters associated with dangerous chemical agents showed that almost always mention is made of

people leaving or possibly having to leave the endangered area. Fictional depictions of catastrophes, such as disaster movies, typically use a wild mass flight scene to dramatize the dangerousness of the situation (Quarantelli, 1980).

The importance of evacuation is self-evident or at least it is taken that way for its advantages are very seldom explicitly discussed or enumerated in the literature.[2] It is an obvious pre-impact way of mitigating the negative consequences of a disaster by preserving life, reducing injuries and saving personal property such as movable goods and cars. Pre-impact evacuation, if it is officially undertaken, may also serve to reinforce morale since it can reinforce the beliefs of citizens that the authorities are acting in the crisis. Post-impact evacuation may enable victims to more easily obtain the basic necessities of life by way of food and shelter and have greater access to normal services. Also, the absence of the normal population of an area allows the emergency organizations to more easily undertake crucial tasks such as debris and road clearance, restoration of utilities and guarding against secondary dangers.

Degree of Research Attention

Given the pervasiveness, saliency and importance of evacuation phenomena, it might be supposed that it has been the object of considerable study and attention. However, that is far from the case. This can be documented by asking the question: What is known about mass evacuation?

In part, the answer depends on the meaning given to the terms "known" and "mass evacuation." The label "mass evacuation" as used in the literature refers to a rather wide range of physical movements of people. At one extreme, there is the short-in-space and brief-in-time exit from a building or specific fixed location, as in the "evacuation" of a high rise office edifice or an athletic stadium or ship due to a fire or other kind of immediate

and direct threat. At the other extreme, the term evacuation is sometimes used to refer to the relatively long relocation of segments of a population to a distant location as in the "evacuation" of children to rural areas during wartime, or families of diplomats returning to the home country at times of an international crisis.

Several problems arise when evacuation is conceived as solely involving this range of physical flights of people and groups. As we shall discuss later, it tends to equate evacuation with withdrawal movement, a rather narrow view of the process. On the other hand, as just indicated, evacuation in such a formulation covers a very wide range of withdrawal flights rather dissimilar in time and space.

For our research purposes, therefore, we use both a more general and more restrictive conceptualization. Our definition of evacuation is that it is the mass physical movement of people, of a temporary nature, that collectively emerges in coping with community threats, damages or disruptions. This formulation emphasizes three features: 1) a sizable number of people participate; 2) the movement is "roundtrip," (Aguirre, 1980), from an area to another location and back to the original area; and, 3) the behavior is complex, rather than simple, interactive rather than individualistic and develops along multiple lines rather than a single path.

This approach treats evacuation primarily as a community level phenomena, that is, as the movement of a significant part of the population of a locally integrated social entity, usually organized around a legal corporate body such as a village, town or city. Also, on one side, this formulation excludes as evacuation, permanant or semi-permanent relocations as well as very localized flights. On the other hand, the conceptualization advanced suggests that the evacuation process be seen as involving a variety

of sets of behaviors by individuals and groups interacting together to cope with environmental stresses rather than just a simple reactive flight in the face of sudden danger.

When evacuation is viewed this way, a focus of attention is provided and an indication is given as to the core as well as the limits of the relevant literature and research data. We can exclude from examination, for instance, rather substantial although specialized bodies of studies dealing with flight movement and panic behavior in leaving buildings in the face of fires and similar immediate threats (e.g., Wood, 1972; Quarantelli, 1979b). We also will not have to concern ourselves with the numerous studies of refugees, mostly in connection with civil strife but sometimes as a result of diffuse disasters such as droughts and famines (e.g., Melander, Palandan and Weis, 1974; Holborn, 1975; D'Souza, 1979).

The question of war agent generated evacuation compared with non-war agent generated evacuation is a very complicated and complex matter. We will not treat wartime situations ourselves, however, for two reasons. First, there already exists a separate body of literature, analyzed and evaluated in different ways, of wartime evacuation (e.g., Titmuss, 1950; Ikle, 1953, 1958). Second, there are some contexts and conditions in wartime either of a different nature or absent in peacetime which limit generalizations in either direction from findings and observations from one or the other of the situations.[3] To say this, does not mean that principles cannot be transferred or that lessons cannot be drawn from one situation which would be applicable with qualifications to the other; this is definitely possible.[4] However, for our purposes here, the comparisons will be left implicit rather than explicitly made since we will not examine or evaluate the wartime evacuation literature.

As already indicated, what is "known" about evacuation is not as much as might be expected. Surface impressions of empirical accounts of disasters can give a contrary view. It might seem that evacuation phenomena is often noted in case studies and other reports by social and behavioral scientists of potential and actual mass emergencies. Much of the literature does mention discussions about leaving, actual withdrawals, going to other locations, and returning to the community. However, there is a very noticeable feature about such descriptions. Insofar as evacuation is concerned, it is rare for the process per se to be a central focus of concern or attention. Also, the withdrawal flight is usually mentioned as a consequence of something else which is treated at length such as warning. In other words, evacuation, thought of as flight behavior, is primarily treated as a secondary outcome of other disaster-related actions. As one of the very few students who has systematically examined the subject notes:

> Historically, students of natural hazards have treated evacuation as one possible protective measure which may be taken in response to a hazard warning message. Hence, in the literature of disaster research, the study of evacuation is usually subsumed under the general rubric of warning systems and individuals' adaptive or protective responses (Perry, 1979b: 26).

As implied in the quotation, empirical studies which deal with evacuation likewise downplay the phenomena as much as do the more descriptive accounts. The nature of the phenomena in its own right is simply not addressed. As another recent writer on the topic has remarked:

> ...the prevailing emphasis on the immediate predisaster period as providing the causes such as warnings for the evacuation choice, means that the study of the characteristics of evacuation as social entities, its types, its consequences, and the recurrent patterns of progression--its career and/or natural history--is ignored. An unproblematic, common sense, nominalist view of evacuation prevails. Thus, in most studies of disasters, evacuations are mentioned, if at all, in passing and in the context of the discussion of persons' responses to warning and search and rescue operations. (Aguirre, 1980: 13).

The more general theoretical literature on disasters, whether discussing preparations for, responses to, or recoveries from mass emergencies, also does not treat evacuation as a central topic. The phenomena goes almost unmentioned in the few general treatises on social and behavioral aspects of disasters (e.g., Barton, 1970; Dynes, 1975) or statements about future directions for disaster study (e.g., Quarantelli and Dynes, 1977; Quarantelli, 1978a). Summaries of the empirical literature also seldom allude to evacuation, and the activity is not used as a major category with which to pull together research findings and observations, as is done with such other impact time tasks as warnings, search and rescue, and delivery of emergency medical services (e.g., evacuation is not specifically discussed in Mileti, 1975; Drabek, et al, 1978; Quarantelli, forthcoming).

Thus, whether judged in relative or absolute terms or whether descriptive accounts, empirical studies or theoretical essays are examined, empirical studies or theoretical essays are examined, the conclusion is the same. Evacuation is not a major focus of attention in the literature. Insofar as specific items dealing with evacuation are concerned, "the literature is fairly small and widely scattered" (Perry, 1979b: 26).

Furthermore, even when some attention has been given to the phenomena, most conclusions rest on very little solid data. For example, it does appear that in the majority of situations where mass evacuation occurs, there are always some early departures.[5] Who are these people who leave often before evacuation is even mentioned or discussed? Who seems to leave when serious danger is perceived? There are hints in the literature that early evacuees are people with small children, who have known and available places of refuge and who can and will travel relatively long distances. However, insofar as evidence is concerned, these ideas are barely at the

level of educated guesses. Similarly, there are very few clues in the literature as to why in most communities with past disaster experience there is a strong tendency for residents to resist evacuating in the face of future similar kinds of dangers; whereas, in a smaller number of localities with prior experiences in disasters, there seems to be an evacuation "proneness." The research literature only vaguely implies that there may be different kinds of disaster subcultures involved.[6] Overall, there are only a few questions and issues with respect to evacuation where the findings and observations rest on substantial amounts of data and empirically well grounded research.

In addition, the literature coverage is very uneven. Some important matters regarding evacuation have been almost unexplored or little examined. For example, there is not a single study on the return of evacuees to the home localities they left. The whole area of the consequences of evacuation at any level--individual, organizational or community--is largely unexamined even though it would seem worthwhile knowing if the experience of evacuating has any long-run results or effects. In contrast, other topics such as the linkage between warnings and evacuations have been given relatively much more attention.

If evacuation is not a major focus of research attention, if there is little solid data regarding most questions about the topic, and if study about evacuation is uneven, why is this the case? A full explanation would take us too far afield and is unnecessary for purposes of this paper. However, some discussion is warranted because it will enable us to make explicit certain implicit assumptions about evacuation which have led to less theoretical and empirical attention to it than practical and operational needs in disasters require.

Implicit Assumptions About Evacuation

Viewing evacuation primarily as the outcome or product of some other disaster-related activity such as warning, leads also to a strong tendency to think of the withdrawal behavior as being intrinsically functional or good. If people leave because they are warned, this result is seen as positive. As noted earlier, the seeming advantages of evacuation are very seldom spelled out or discussed; they are taken for granted.

Yet even in descriptive accounts where flight behavior is mentioned and implicitly treated as a functional outcome, other results of the evacuations are noted which could be taken as negative. While not a frequent occurrence, evacuees sometimes unknowingly flee in the direction of greater danger. While very few casualties have resulted in such situations, which often have been the result of mistakes in instructions by public authorities, the potential for loss of life has existed. Such an incident occurred in a dangerous chemical incident in West Virginia where hundreds were misdirected along a highway right into the path of a drifting toxic cloud. Remaining at an endangered locality is not always the worst possible response to a threat. Also, having people recurrently evacuate without the actual impact of a disaster can result in the cry-wolf syndrome. For example, many of the residents of Crescent City, California, after having left en masse several times in the face of earlier tsunami warnings which proved to be false, eventually ignored a later one associated with the Alaskan earthquake. This resulted in loss of life (Anderson, 1969a; 1970b).

Over a much longer time period, evacuation can have dysfunctional mental health consequences. Informative along this line is an intensive study of those who did and did not evacuate Darwin, Australia after Cyclone Tracy. It showed that those who never evacuated were better off mentally,

followed by those who had left but had returned later. Worst off from a mental health viewpoint were those who had evacuated but had not yet gone back to Darwin at the time of the study (Milne and Western, 1976; Milne, 1977).

The examples just cited illustrate some of the possible short, intermediate and long run dysfunctional consequences of evacuation. They have been advanced merely to make the point, which is almost never directly made in the literature, that evacuation can have negative as well as positive consequences.[7] It would seem an obvious point, but the matter is seldom addressed and implicitly carried in the thinking and writing of those who deal with the subject is that the image of evacuation is and almost exclusively functional response.

This last matter is related to another implicit assumption widespread in the evacuation literature. It is to think of withdrawal behavior in terms of a stimulus-response (S-R) model. The imagery is a stimulus such as a disaster impact or a warning, with the possible response being the flight behavior. In the S-R model, evacuation is thought of as being <u>re</u>active phenomena, a response to something else. It is easy with this imagery to, therefore, think of evacuation as following a linear and singular path or sequence. That is, a disaster is seen as leading to warning or impact which results in evacuation flight.

Such a simple S-R imagery of evacuation sequence which is implicit rather than explicit in the literature can be questioned. In many ways, evacuation is a <u>pro</u>active rather than <u>re</u>active phenomena; there are often multiple and disjunctive paths in the unfolding of the behavior. This is true at both the individual and community level. For example, some evacuees may leave as soon as there is a sign of danger or right after impact;

other evacuees may delay as they assess the situation and seek additional information; others will wait and hunt for household members in the area; some evacuees go directly to one place of refuge while others make multiple stops; those who left early might be returning when others are just starting out; some potential evacuees never leave. These differential activities are all illustrated in some of the data from the Three Mile Island nuclear plant incident (See Brunn, Johnson, Zeigler, 1979; Flynn, 1979; Smith, 1979). Some studies of hurricane warnings have even attempted to quantify the differential actions although the data is somewhat suspect because it is based on predicted rather than actual behavior (Clark and Carter, 1979: 5). Community organizational involvement in evacuation may likewise reflect different degrees of initiative and response with various groups doing sequentially different things at different times. It is easy to overlook the fact that a disaster as a disaster may be over for some agencies when it is just starting for others (Quarantelli, 1977b).

Again, these observations might seen obvious, but they are not reflected in much of the literature. An implicit S-R linear and singular sequential path model is what predominates in the large majority of the thinking and writing on the phenomena. As we shall discuss in more detail later, it might be more accurate and useful to visualize evacuation as more <u>pro</u>active than <u>re</u>active, as being not an outcome but instead a flow process with different emergent stages involving various kinds of contingencies.

A roughly similar view seems to be independently developing in some of the work currently being done at the University of Minnesota. Thus, Carter talking primarily of individuals and of the warning process notes

that: "the process of response to warnings is not a simple stimulus-response process. Rather the process involves a rather complex information-processing and decision-making system that is influenced by a number of factors that have little to do with the threatening event" (1980: 10). We suggest that proactive behavior is even more likely in evacuation than in warning, and that warning is only one element, as not necessarily always the most important, in evacuation behavior.

Such a view would also be at variance with another strong implicit tendency in the literature, namely, an equation of evacuation with the withdrawal movement per se. But, this is only part of what is involved. Evacuation consists of going to as well as from some place, and almost always back to the original point of departure, a sort of round trip as said earlier. The flight away, as we shall document later, may, in fact, be the least problematical part of the whole evacuation process. However, it is that along with warning which is the general focus of much of the attention in the liaterature. An implicit consequence, therefore, is to think of evacuation as relatively homogeneous behavior, namely flight movement.

However, the behavior is heterogeneous in at least two ways. As just indicated, there are different stages of phases in the evacuation process each with their own contingencies and problems. For instance, there are different problems for organizations who have to communicate with disaster-affected populations, depending on whether the effort is undertaken during the warning, withdrawal, sheltering or return phase of the evacuation process. In addition, within each stage there can also be considerable heterogeneity or diversity. For example, the research data seem to indicate that while the bulk of who leave at the

height of the emergency in the typical American disaster go to friends and relatives, some seek private commercial accommodations such as hotels and motels with a small minority ending up in mass public shelters usually organized by the Red Cross. There is some evidence that there are strong social class factors associated with this differentiated shelter pattern. Middle class families, if at all possible, move in with kin and friends. The more affluent households find lodgings in hotels and motels, with those who primarily come from the bottom of the socio-economic ladder, converging on the mass shelters.[8] While these observations are merely illustrative, they make the point that the evacuation process can be rather heterogeneous and is not as homogeneous as implied in the literature.

The failure of the literature to define evacuation, its tendency to assume it is recognizable phenomena and functional behavior, along with the implicit view that evacuation is primarily a withdrawal response to warning or impact has had a number of consequences in the approach to the topic. We have already indicated that evacuation is not treated as a major topic of research interest in itself, leading to a neglect of studies on the characteristics of the phenomena. The dominant implicit view or image of evacuation has also discouraged the development of any general analytical theory, model or framework about the conditions influencing the evacuation process. In fact, the only explanatory scheme in the whole literature (apart from war-oriented studies) is the social-psychological one currently being produced by Perry (1978, 1979), to account for the factors in individual and family level decision-making to evacuate. It is a consciously limited effort, but it is the only attempt reported in the literature up to the writing of this report.

The implicit way the phenomena of evacuation in general has been treated in the literature, means that there is nothing explicitly available with which to organize the specific findings from the research literature and other observational data, or which can provide some explanation of the phenomena.

Faced with this finding after our review of the literature, we were forced to address the question of how we could analyze the phenomena of evacuation. Our answer was that it was only possible if we had some kind of model of the behavior. Since no such model exists in the literature, we developed one for our purposes, the specifics of which are discussed in the next chapter.

Footnotes

1. It is certainly not new in the sense that such things as land use codes, disaster insurance or formal relief agencies can be seen as environmental adjustive measures developed only in the modern era, many of them within the last century or so.

2. As we shall note later, dysfunctional aspects are even less noted although they sometimes surface in discussions of other topics such as in the comparisons of the mental health of those victims who evacuated and those who did not.

3. Some of the more obvious differences are that in war compared to peacetime crises, there is conscious human and group effort to bring about casualties and destruction; the danger to potential victims usually extends continuously over longer periods of time; and military measures, physical force or other direct social control can be brought to bear to an extreme degree not otherwise possible. The distinction between the two kinds of crises has somewhat been touched upon in the literature on mass emergencies as a difference between a consensus and a conflict type of crisis. (See Quarantelli, 1970).

4. Work being done by the National Academy of Sciences Committee on U. S. Emergency Preparedness includes looking at similarities and differences between nuclear and non-nuclear (i.e., natural and other technological disasters) situations. A report from the committee is scheduled for publication in late 1980.

5. The more specific research findings will be identified with particular studies in Chapter IV.

6. The concept of disaster subculture is discussed in Moore, 1964; Anderson, 1965b; Osborn, 1970; Weller and Wenger, 1973; Hannigan and Kueneman, 1978; and Wenger, 1978. In general, reference is to pre-impact and expectations about disasters embedded in the perceptions and beliefs of community residents and the knowledge and technology of local emergency organizations.

7. It is true that policy makers and operational personnel from emergency organizations may sometimes be reluctant to recommend or order an evacuation because of the fear that "panic" may be generated, a possibly dysfunctional result. (See Quarantelli, 1960, 1976, 1977, 1979a). However, except for denials that "panic" is a likely possibility the empirical and theoretical literature as a whole does not really discuss possible functional or dysfunctional aspects of evacuation.

8. Most people at all social levels, of course, attempt to go to friends and relatives.

Chapter III

A MODEL OF EVACUATION BEHAVIOR

An analytical model of evacuation behavior is presented in this chapter. It is used (1) to order and organize the literature and research data on evacuation behavior; and, (2) to advance an explanatory scheme of the dynamics of the phenomena. The depiction of the model, whose major components are summarized in Figure 1, is accompanied by a brief discussion of its major components and is followed by a table (Figure 2) depicting the quantitative distribution of literature sources according to the model. Although a few illustrative examples are given in this chapter, our summary of substantive research findings and observations are only presented in Chapter IV.

Major Components of the Model

For our purposes we focused on the local community level. Extra-community factors can, of course, both directly and indirectly affect the contexts and conditions involved in evacuation behavior. However, it is at the local community level where the withdrawal movement in evacuation takes place. In American society, particularly, it is within and from a community that most flight behavior occurs; simultaneous and concurrent evacuations from many communities as the result of the same disaster agent is the rarer situation from a statistical viewpoint.[1] Further, whether one or multiple communities are involved, in the vast majority of mass emergencies, the key formal decisions are at the local community level. A crisis similar to Three Mile Island in which the state government might have ordered an evacuation by many local communities does not happen often in the United States, and even in the emergency, implementation would have been at the

local community level (Presidential Commission, 1979). The peacetime situation, too, with which we are exclusively dealing, differs from wartime possibilities in which decision making at the federal level might be involved in the instance of an international nuclear weapons exchange.

The five major components of our model are the following:

1. The Community Context
2. Threat Conditions
3. Social Processes
4. Patterns of Behavior
5. Consequences for Preparedness

The specifics involved will be discussed in detail shortly. However, to provide a general introduction to the model, let us very briefly and somewhat abstractly note the relationship between the specific components.

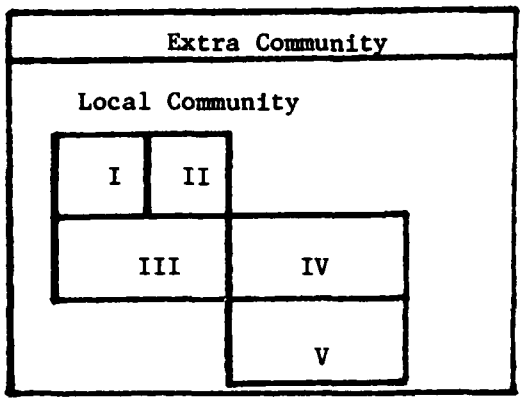
The model states that the local impacted or threatened community will provide a certain context for disaster threat or impact. The community context (CC), which can be visualized as the area's capabilities for dealing with emergencies, includes such things as resources, social linkages and social climate. When the disaster agent threatens or impacts, it creates certain particular threat conditions (TC), within the community context. The threat conditions include characteristics of the disaster agent, situational factors and the definition of the danger. The community context and threat conditions together in a disaster will generate certain social processes (SP). These social processes include attempts at communication, decision-making, coordination and task manifestation.

The social processes eventuate in particular patterns of behavior (PB). These include warning, withdrawal movement, shelter and return. The patterns of behavior may have certain consequences for community preparedness (CP). The consequences or feedback into the community context may affect resources, social linkages or social climate. In graphic terms, the general components of the model are depicted in Figure 1.

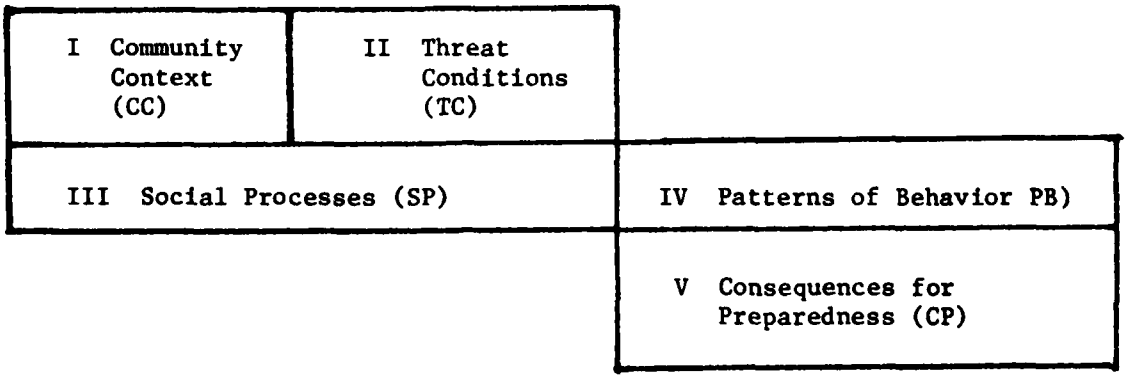
FIGURE 1

Model for Description and Analysis of Evacuation at the Community Level

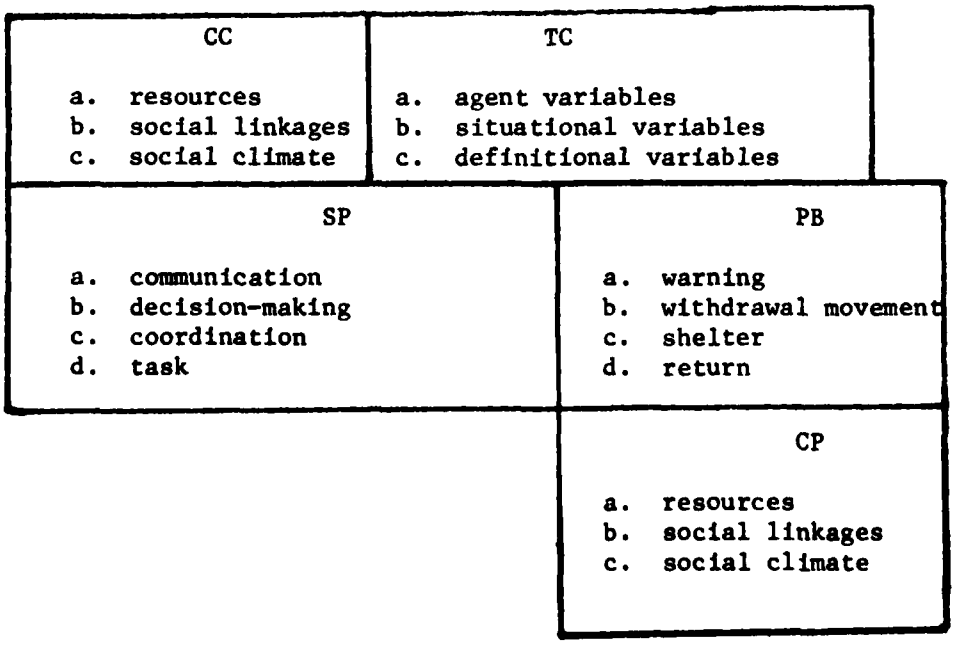
A.



B.



C.



The Community Context

The idea of the community context as an important component in understanding evacuation is drawn from other DRC analyses of disaster behavior (see e.g., Quarantelli, 1977a). The basic notion is that within any given community, prior to any disaster threat or impact, there are always some capabilities for meeting the demands which might be created by a major emergency. These capabilities can be thought of as the material and conceptual resources which can be brought to bear to meet the demands. Included in resources would be equipment, facilities and funds as well as less material items such as knowledge, information and planning. Individuals or households may, of course, have resources as well as groups.

In any given community there are also some social linkages between and among the different social entities. Individuals and households, for example, are supposedly more integrated with others in smaller American towns than in larger metropolitan areas. At the organizational level, too, there can be more or less integration. At one extreme, there might be communities in which all the emergency organizations, at least, were integrated into one system insofar as disaster preparedness is concerned. This would contrast with the more typical situation in which there might be close ties between police, fire and civil defense organizations forming one cluster in contrast to a network resulting from strong links between the community hospitals and ambulance services. The kinds and degrees of linkages can affect communications and coordination which might be necessary in a community evacuation. The fact, as a current DRC study shows, that chemical plants or industries usually have very poor or few ties with local civil defense and other public emergency agencies means

that evacuation is frequently delayed and not efficiently organized when a nearby or surrounding community is threatened by a toxic chemical cloud from an in-plant fire or explosion.

In addition, another part of community context is the different social, political, economic, legal, historical or psychological factors which might affect resources and social linkages. Such factors can be collectively thought of as the social environment or social climate. As an example, different individuals or organizations within a community might have had different experiences with earlier disasters. In fact, individuals and organizations within the same community might have different historical sets of disaster experiences. For instance, because of the great number of elderly people who have migrated to certain southern Florida communities, much of the resident population in that area will have had little or no experience with hurricanes. Yet, organizations in these localities may have a history of coping with hurricane impact. These differences could affect sensitivity and interpretations of hurricane watches and warnings; recommendations or orders to evacuate; and what could be thought of as practical and possible in the event of a major hurricane threat or impact.

Threat Conditions

While the community context provides the background for a threat or a disaster, there are more immediate factors which come into play at the time of the mass emergency. Among those which can affect evacuation are disaster agent, situational and definitional variables. These factors by themselves or in combination with the community context can make major differences in the evacuation process.

Disaster agent variables can vary along a variety of dimensions such as frequency, predictability, duration, scope of impact, destructive potential, etc. (Dynes, 1975: 51-55). They can all influence preparations for evacuation in the face of threat and the implementation of any evacuation after impact. However, two other agent characteristics are probably more influential in the process, namely speed of onset and length of possible forewarning, in that they allow the evacuation process to emerge and develop. In fact, Perry notes even more broadly that what has " a major impact upon the nature and conduct of evacuation as well as public reactions to it...are the timing of evacuation relative to disaster impact and the amount of time it is expected that evacuees will spend away from their homes" (1978: 169).

Situational variables are those factors relatively unique to different communities at different times and which can affect disaster behavior. The variable can be physical (e.g., whether the community crisis occurs in daytime or nighttime) or social (e.g., sharp seasonal variation in the number of tourists who will be present in many resort areas). Thus, for example, in the flash flood which hit Big Thompson Canyon in Colorado, far more people had to be warned to evacuate before impact as well as helped to evacuate afterwards since it hit at the height of the camping and tourist season rather than at a time when such a transient population would have been almost totally absent (Gruntfest, 1977). When Cyclone Tracy impacted Darwin, Australia, the ongoing Christmas Eve celebrations allegedly affected both individual and organizational warning responses (see Haas, et al, 1976). It is important to note that situational variables do not refer to totally idiosyncratic matters which are outside the realm of being generalized.

Finally, a part of threat conditions are the definitions of the situation that occur, how the threat or impact comes to be visualized. A basic social-psychological maxim is that "if a situation is defined as real, it is real insofar as consequences are concerned." This tries to capture the idea that subjective perception may be more important than reality as perceived by others. Thus, in many crises, it is less "what is" than "what is believed" that will affect the evacuation process. For example, in the immediate aftermath of Hurricane Betsy in New Orleans, tens of thousands of evacuees were returning to their homes, because they perceived the hurricane was over, despite the fact that the flood waters inside the levees were rising very rapidly and inundating whole neighborhoods.

Social Processes

The combination of community context and threat conditions will generate a variety of social processes. These processes could be categorized in a variety of ways. (See Haas and Drabek, 1973 for a discussion of eight organizational processes). However, for our purposes, we have singled out four of them for special attention; namely, communication, decision-making, coordination and task manifestation. There is a very rough relationship between them.[2] Communication processes are necessary for decision-making. Decision-making can lead to coordination. In turn, coordination may result in task manifestation. If organizations communicate about a disaster threat, they may decide to coordinate the varied and multiple tasks they have to do to carry out a population evacuation.

In the model, communication is used in a narrow rather than broad sense. It refers to the means and channels used in information flow and the content of messages transmitted. For example, in a current DRC study, it has been found that the mass media seldom play an alerting or warning

role in the typical chemical disaster in American society. News of the threat or the event circulates primarily by word-of-mouth, as does the notion that evacuation movement is either desirable or has been ordered.

Decision-making refers to the process by which information is received, confirmed, prioritized and utilized to result in some exercise of choice--to order an evacuation, to wait for all family members before leaving, to hold back official knowledge from the general public of an impending disaster, to leave an area, etc. Much of the disaster warning literature is concerned with this topic. "Evacuation decision-making in natural disasters" a title of one of Perry's recent publications (1979b). is indicative also of his central concern with this process.

Coordination has references to the presence or absence of joint or integrative activities, and in our broad conceptualization of this process we include conflictive behavior. At the Three Mile Island nuclear plant incident, a variety of contradictory, inconsistent and ambiguous statements and steps were made by different government agencies at national, state and local levels regarding the possibilities and probabilities of evacuation movement. This is illustrative of the kind of social process in the conflictive sense we are trying to capture under this rubric. On the other hand, in the Mississauga, Canada evacuation of 250,000 people, we have an example of highly integrative activities reflecting a positive example of the coordination process.

Task, a term borrowed from Haas and Drabek (1973: 97), has references to the sequences of specific work activities carried out by individuals or organizations in connection with the overall evacuation process. At a very mundane individual level, it refers to actions such as individuals using cars to evacuate long distances and filling up their

gas tanks before leaving, a fact empirically supported by reports of evacuation which note that extremely few cars ever have to be abandoned because they ran out of gas. At the organizational level, there are many and multiple concrete steps that have to be taken by a variety of groups before an official order to evacuate an area can be implemented. The failure to carry out a single task may interfere or hinder the whole evacuation process, as did the failure to stop charging tolls on certain highways in Hurricane David in Florida led to massive traffic backups of evacuating cars.

Patterns of Behavior

Certain patterns of behavior can be the result of the social processes generated by the community context and threat conditions. For our purposes, insofar as the evacuation process is concerned, they involve four behavioral sets associated with warning, withdrawal movement, shelter and return. Put another way, the model suggests that the social processes can eventuate in a warning stage which may lead to withdrawal movement, to shelter, and finally a return to the place of departure. Thus, the patterns of behavior are not only the outcome of the other three components (context, conditions, processes) but also involve an internal, temporal order or sequence.

The warning patterns can and do involve more than evacuation. Here, we refer to the behavior of individuals and organizations becoming alert to possible disaster threats or learning of actual impacts. As already noted, the literature on warning is substantial. We only selectively examined that which was most relevant to evacuation.

The withdrawal movement patterns refer to that part of the evacuation process pertinent to the actual physical flight behavior. As indicated

earlier, there is far more than simple reactive flight in this phase or stage of evacuation.

The shelter patterns refer to the behaviors at the place of refuge. Where do evacuees and groups which evacuate as groups (e.g., nursing homes or jails) go, and what do they do there, are central questions addressed under this rubric.

The return patterns involve the evacuees' behavior when leaving the shelter location and going back in almost all cases to the area of original departure. This stage or phase marks the end of the active part of the evacuation process.

Consequences for Preparedness

After the direct evacuation process is over, there can still be consequences. That is, the experience of the evacuation may bring about changes in the prethreat or preimpact community context. There may be alterations or modifications in the resources, social linkages or social climate of the community which then creates a different preparedness stance for that community in the event of another disaster threat or impact. In some respects our model suggests that consequences are the postdisaster feedback of the disaster into the predisaster context.

It should be stressed that the model depicted in the preceding pages is a first effort to impose an analytical framework on evacuation phenomena. We labor under no illusion that this is a final or definitive statement. There were problems in trying to order the literature in terms of the major components and specific cells.[3] As an explanatory scheme,

the model does not fully tie all the components and their subelements together. However, despite the problems and weaknesses, the model did enable us to organize somewhat the findings and conclusions from the literature on evacuation. The model also does suggest certain relationships and the overall dynamics of the evacuation process. Just as it helped us, it should help future students of evacuation phenomena who will at least have, as we did not, an initial systematic starting point from which to proceed. And as we indicate in the next section of this chapter, the model enabled us, for the first time in history, to make a numerical assessment and evaluation of the research literature on evacuation.

Literature Sources and the Model

Since one reason for the development of the model was to order and organize the literature, we made an effort to code and quantify the literature sources according to the dimensions of the model. The results are shown in Figure 2, a numerical graphic depiction. For purposes of this presentation, an additional dimension was explicitly added, that being whether the literature source primarily refers to individual (or family/households) or organizational behaviors.[4] The numbers on the left hand side of each cell refer to the number of items which had some material on individuals (or family/households), and the numbers on the right hand side of the dotted line in each cell refers to the number of items which had some material on organizations.

This numerical depiction is supposed to convey a general overall impression of the amount of attention paid in the literature to each topic. However, two important qualifications should be kept in mind in interpreting the numbers, either in relative or absolute terms. First,

while standardized coding criteria were developed and used, as in all content analysis efforts, an element of coder judgment is always involved. A different set of coders would probably not produce an identical frequency distribution. Second, the numbers depict quantity. They say nothing about the quality of the research studies examined.

Another matter not well conveyed by the graph is that the total literature divides into almost two separate streams with relatively little overlap--one focused on individuals, the other focused on organizations. As Perry (1979b: 26-27) who also calls attention to this separation stated, "processes *important in warning response* decisions proceed simultaneously at two levels of abstraction," but, "we must be concerned both with aspects of the individual" and the organizations involved. Nevertheless, there are two somewhat separate bodies of literature.

Despite these caveats, however, the graphic depiction can be taken as a very rough indication of the amount of research attention paid to different topics.[5] For example, it is clear from this graphic depiction that component V, consequences, has been the object of study far less than any of the four other major components. Similarly, the graph indicates, for instance, that organizational aspects of evacuation have received more research attention, in a ratio of about 7 to 4, than have aspects of individual behavior.

Figure 2

Quantitative Distribution of Literature Sources

By Model Categories

		I				II				IV			
		R	SL	SC	AV	SV	DV						
		A	B	C	A	B	C						
								Warm.	W. Move	Shelter	Return		
III		22 | 55	22 | 28	39 | 33	65	24 | 21	49 | 17	A	B	C	D		
Communication	A	7 | 25	13 | 17	7 | 10	15	4 | 14	26 | 19	34 | 46	23 | 14	11 | 7	9 | 9		
Decision Making	B	17 | 15	19 | 13	25 | 14	5	13 | 13	46 | 32	27 | 27	55 | 28	41 | 12	14 | 8		
Coordination	C	6 | 23	14 | 15	6 | 16	7	5 | 13	12 | 18	5 | 21	22 | 34	21 | 27	14 | 15		
Task	D	2 | 18	11 | 13	6 | 11	15	4 | 16	17 | 19	11 | 23	33 | 35	22 | 27	9 | 11		
					Resources		A	3 | 8	8 | 9	5 | 5	13 | 12		
				V	Social Linkages		B	1 | 5	4 | 4	5 | 3	7 | 6		
					Social Climate		C	9 | 6	14 | 9	9 | 3	27 | 13		

Footnotes

1. In many cases it actually might be more useful to think of every community as being faced with its own disaster agent, which might not be identical to that faced by other, even nearby communities.

2. While for analytical purposes, a logical and sequential order can be posited, it is not assumed that this is necessarily what prevails in real life.

3. In fact, the formulation presented is a second major version of the model with which we started our work.

4. From another perspective, the distinction is between literature sources which deal with micro and those that are concerned with macro phenomena.

5. Any literature source could, in principle, have been coded in every single cell. The maximum number possible was 103 which corresponds to the total number of literature sources analyzed.

CHAPTER 4

RESEARCH FINDINGS AND OBSERVATIONS

This chapter summarizes the substantive research findings and observations. It is divided according to the five major components of the model; namely, community context, threat conditions, social processes, patterns of behavior, and consequences of evacuation. Each part is further subdivided depending upon the number of major factors or dimensions within each component.

Three things are attempted in our summary. One, we try to indicate the major themes in the research literature. Two, we attempt to illustrate the more empirically established observations and findings. Three, we endeavor to point out the seemingly important topics and questions on which there is little or no literature.

No effort is made to report all that has been learned. Only major findings or especially significant observations are noted. To avoid losing sight of the forest because of the trees, the many specific topics found in each particular source are indicated in the code listing in the appended annotated bibliography, rather than enumerated in this chapter.

Greatest attention is paid to empirical studies, but more theoretical discussions involving the evacuation process are noted if especially applicable. Specific bibliographic references are to the more relevant sources; no attempt is made to list all possible references on any given topic. Examples and illustrations as well as general observations not otherwise referenced are from unpublished DRC sources or field reports.

Our concern is with any aspect of the evacuation process. There are many features of disaster response phenomena, such as planning or warning for which there is an extensive literature, but we only discuss such literature to the extent it directly and explicitly bears on evacuation phenomena. However, we do make a considerable and consistent effort to indicate where the body of knowledge is weak or even nonexistent as to topics or questions which our model or other relevant considerations suggest might be important for understanding the evacuation process.

As such, this research summary, while comprehensive in its coverage, is selective in its reporting. The existing research base has strongly structured our descriptions and analyses; so too, did the theoretical importance and saliency of evacuation related issues. In addition, we do make specific assessments and evaluations of what is known or not known about these important aspects of evacuation, although more general implications of our examination of the literature are left for the next chapter.

Community Context

According to our model, in all communities, prior to any given disaster threat or impact, there are always some factors present which will eventually affect the evacuation process. These factors can be thought of as providing the community context, the background, for any need or demand for evacuation. Most of the relevant background or context consists of various pre-emergency social environmental aspects, social ties, and capabilities which influence what can and will occur at times of community crisis. Those most importantly related to evacuation are the collective features constituting the social climate of a community, the kinds and degrees of existing interpersonal and interorganizational social linkages in the local area, and the tangible and intangible resources locally available.

Social Climate

There are a variety of social, political, economic, legal, historical or psychological factors which are part of a community's social climate, and which could affect the evacuation process. However, the research literature and data concentrates very heavily on just two limited aspects of the social climate, namely, previous disaster experiences and the demographic characteristics of the affected communities. Most other possibly relevant factors have not been the object of much attention or discussion. Legal aspects of the evacuation process, for example, are at best occasionally mentioned in passing (e.g., as in a DRC study which notes the existence of a California law which facilitated the ordering by local authorities of the evacuation of 80,000 people below the Van Norman dam after the San Fernando earthquake of 1971). Likewise, socio-economic and socio-political features which allow if not encourage people to live in flood plains, thus increasing the potential necessity of evacuation, are seldom alluded to in specific studies of evacuation and social climate. The consequences of such land use are, however, frequently discussed in more general analyses of disaster mitigation and impact (e.g., Baker and McPhee, 1975).

Prior disaster experience has been singled out as a factor in the evacuation process by different authors. It is noted that in recent years, a vast majority of communities that are susceptible to recurrent major threats from such agents as floods and hurricanes have developed some sort of evacuation plans (Strope, et al, 1977: 10). The implication is that repetitive threats encourage emergency agencies to develop preparedness measures that will organize the flight from danger.

On the other hand, a number of authors point out the tendency of individuals to build their anticipation of future events on previous successfully experienced disaster situations (e.g., Treadwell, 1962; Moore, et al, 1963; Drabek and Boggs, 1968; Wilkinson and Ross, 1970; and Mussari, 1974 among others). This tendency to look at the future in terms of what has happened rather than what the potential for disruption could be, is seen as possibly having negative consequences. Several researchers note that individuals are inclined to judge the probable destructive effects of an incoming hurricane upon the basis of the last one that affected the area, and consequently are often not inclined to evacuate (Moore, et al, 1963; Wilkinson and Ross, 1970).

The possibility that experience may influence community organizational preparedness and the attitudes of individual community members in different ways is almost never addressed. However, there are some suggestions that greater magnitudes of prior disaster impact have greater influence on expectations, responses, and consequences. Thus, a study of the Wilkes Barre flood observes that:

> Without any previous experience in a natural disaster of great magnitude, the local preparedness experts were unable to anticipate what they never thought could happen.
>
> (Mussari, 1974: ix)

On the other hand, in Galveston the tradition has been "to fight it out" (Urbanik, 1978:5) rather than to seek safety in flight, a community norm has developed since the hurricane of 1900, which, insofar as casualties were concerned, is the worst natural disaster in American history.

At the individual level, some studies report that prior hurricane experience tends to reduce withdrawal behavior in the face of threats from such agents (Moore, et al, 1963; Windham, et al, 1977). However, one of the same studies also notes that previous non-hurricane disaster experience tends to increase evacuation flight in response to hurricane threat (Moore, et al., 1963: 47). A slightly divergent finding is advanced in a survey report which states that, "...about one half of the respondents indicated that previous storm experience had directly influenced their decisions to leave or to stay before Camille." (Wilkinson and Ross, 1970: 21). That prior experiences may have differential effects is also suggested by a study of ten Colorado communities subjected to the same flood. It was found that prior flood experience or the lack of it, did evoke different responses, although in many cases other considerations such as strong direct warnings by public authories overrode the effects of a lack of prior experience and led to evacuation (Worth and McLuckie, 1977).

Inconsistent observations are made at the organizational level as well. Thus, it is said, depending on the recency and outcome of prior events, officials may be less reluctant to issue warnings and citizens more inclined to heed them if these behaviors were deemed beneficial in the past. (Blum and Klass, 1956; Treadwell, 1962; Anderson, 1965). However, in Topeka, Kansas there was appropriate warning and shelter taking when a tornado struck in 1966, even though in many prior situations such behavior had proved unnecessary.

From these and similar observations and findings it is difficult to see that there is any single theme being sounded about the role of prior

disaster experience in the evacuation process. There do appear to be some relationships between experience and evacuation; however, the literature and research data has so far failed to clearly establish the nature of the probable relationships and the conditions under which they hold. Most likely, as has been found in other areas of disaster research, disaster experience per se is not a significant factor unless in combination with other factors and under delimited conditions (for a discussion of organizational learning from general disaster experiences see Anderson, 1969a; Ross, 1978).

Interestingly, when "experience" is treated in the literature, what is being referred to seems to be general disaster experience. A distinction that is rarely made is the difference between disaster experience and evacuation experience. While studies of response to hurricane warning in particular have shown no strong consistent relationship between hurricane experience and evacuation, there is some evidence that prior evacuation experience is related positively to evacuation behavior (Urbanic, 1978).

We turn now to a variety of other studies that have examined one particular set of social factors; namely, certain demographic characteristics of threatened populations and how they might be related to different phases of the evacuation process. The purpose of this research seems to be to determine what, if any, relationships exist between such variables as age, sex, race, socio-economic level, etc. and any and all phases of evacuation (Mileti, et al, 1975). Most of the few major systematic population surveys in evacuated areas have attacked this question.

Different studies report varying degrees of relationships. However, no major finding is consistently reported. One of the propositions about

which there is most agreement is that withdrawal movement does seem to be associated with the presence of young children in the household. Some of the very earliest (e.g., Moore, et al, 1963: 77) and some of the very latest studies (e.g., Brunn, et al, 1979; Flynn and Chalmers, 1979) tend to agree on this observation.

For most other findings in this area, studies are either inconsistent, fail to provide positive evidence, or the results are ambiguous (see Baker, 1979 for an analysis of four major population surveys which dealt in part with evacuation phenomena). For example, educational level has been asserted by some to have a greater bearing on evacuation decision-making than does income or occupational status (e.g., Moore, et al, 1963: 80-83). But, while education was found to be correlated with the greater probability of withdrawal in the Three Mile Island nuclear incident (Flynn and Chalmers, 1979), education has not been found to be a significant variable in other research (Lachman, et al, 1961). Similarly, age is sometimes discounted as a significant variable, but several studies do indicate that those over 60 are less likely to leave than younger people (Moore, et al, 1963; Smith, 1979).

The question of how minority groups or non-English speaking segments of the community are involved in the evacuation process is rarely addressed. The very few studies done that touch on the matter hint at the possibility that there may be some significant differences between their responses and those of other groups in the same locality. Thus, one study found that the Spanish speaking residents of the Denver area in a flood situation tended to obtain less confirmation of warnings from the police and other public authorities, and to seek shelter with relatives regardless of social class

when compared with other affected parts of the community (Drabek and Stephenson, 1971).

There is some suggestion that religion in the collective rather than the individual sense may also be a factor in the evacuation process. That is, disasters sometimes impact localities where religious groups very strong, providing pre- and post-disaster attitudes, links and resources for their members. There are indications in research done in the Teton Dam disaster, where the Mormon church is very strong (Golec, 1980), and in Toccoa, Georgia where a fundamentalist church group was very important, that most phases of the evacuation process were materially affected by the involvement of the religious groups. But, such work is rare, with religion when it is examined, being treated as an attribute of individuals rather than of groups.

Studies dealing with demographic characteristics and evacuation are simply not conclusive. Much of the research on this topic often assumes a rather simplistic and direct relationship between a single variable and some aspect of evacuation. They generally ignore the complex and interactive nature of the relationships as posited in a recent sophisticated model of the phenomena developed by Perry (1979b). There is also as we have said a tendency to deal with individual personal attributes rather than collective characteristics which may be more important.

In some ways, the concept of disaster subculture attempts to combine disaster experience with certain population characteristics. However, many writings using the concept do not address its relationship to evacuation, either dealing primarily with questions of organizational mobilization (e.g., Wenger, 1978), or attempting mostly to specify its

characteristics rather than consequences (e.g., Osborn, 1970). Two studies which do attempt to relate the existence of a disaster subculture to the evacuation process, do not quite arrive at the same conclusion. One suggests that insofar as hurricanes are concerned, the presence of a disaster subculture is "expressed in vehement refusal to flee before the wind" (Moore, et al., 1964: 195). The other, a DRC study, states that a subculture in southern Ohio accounts for the number of residents leaving quickly upon the appearance of a flood threat (Anderson, 1965b). These differences in point of view are highly characteristic of many of the studies and research observations with regard to social climate and evacuation; there is little consensus on most matters which have been examined.

Social Linkages

The links or social ties between individuals and between organizations as they affect the evacuation process have been rather unevenly studied. More importantly, the problem has been studied piecemeal, using neither an implicit nor explicit model of interpersonal or interorganizational interaction. There is no counterpart in this problem area of even general concepts such as disaster experience and demographic characteristics as those notions are used in describing and analyzing social climate. (Perry, 1979b however, is developing a complex model on interpersonal linkages).

Therefore, to impose some order on the research findings and observations, we will use with modifications a framework developed for purposes of specifying a hierarchy of aid-seeking behavior in the immediate emergency period (from Quarantelli, 1960). The rationale for employing this particular framework is that the seeking of aid implies linkages, and the term

"hierarchy" implies ascending or descending degrees of strength. The framework indicates that disaster victims first seek aid from family or close friends, followed in succession by contact with other friends and neighbors, anonymous community members, membership groups such as churches or unions, and only as a last resort, public agencies. Empirical evidence for this has been found, among other places, in Hilo following tsunamis (Lachman, et al, 1961).

If there is one proposition in the evacuation literature which is empirically very well grounded and reiterated by almost any student of the problem, it is that the household family acts as a unit at times of mass crises. The vast majority of the literature either explicitly or implicitly indicates that instead of responding as separate individuals, family members act as collective units at times of evacuation. Household members will try to respond to warnings together, to withdraw together, and to find shelter together.

On the other hand, there have been atypical cases, characterized by atypical agents, geographic or economic factors, where significant members of households did not evacuate as units. Three Mile Island, where roughly a third of the evacuating families were incomplete (Brunn, et al, 1979; Flynn and Chalmers, 1979), and Anchorage, Alaska, where a similar pattern prevailed following the earthquake (Kunreuther and Fiore, 1966) are two examples of this type of behavior.

Several studies note that at the time of warning, the primary objective of household family members is to try to reunite at the home, of if this is not possible, to go to a place where they think others will converge (Drabek and Boggs, 1968; Drabek and Stephenson, 1971; Hultaker, 1976).

The finding that there was little internal conflict within families in Darwin, Australia regarding evacuation in the aftermath of Cyclone Tracy (Haas, et al, 1976: 56), also seems applicable elsewhere. Research on different disaster agents in American society report similar findings with the additional observation that even if disagreement about necessary action initially exists within the household family, consensus will be reached and the family will eventually act as a unit (Moore, et al, 1963; Drabek and Stephenson, 1971).

Some research notes that families who interact with relatives outside the threat area during the crisis are more likely to evacuate (Drabek and Boggs, 1968; Drabek and Stephenson, 1971). However, there is also evidence that endangered families are loath to turn to relatives with whom they have maintained little contact during normal times (Young, 1954: 388). Findings suggest that shelter--the primary form of aid given--tends to be offered by relatives rather than actively sought by victims (Hultaker, 1976). Often the impetus to withdraw from an endangered area is provided by relatives suggesting that families in the risk area spend the night with them. This phenomenon, termed "evacuation by invitation" (Drabek and Stephenson, 1971) will be discussed in more detail later.

The research literature also seems to indicate that family members are especially sensitive to ambiguous threat information, interpreting it as jeopardizing relatives who are or who may be in potentially affected areas (Form and Nosow, 1958; McLuckie, 1970; Hultaker, 1976). Once knowledge that such members are unharmed is received, families appear to more readily perform other threat related tasks. Depending on the nature of the threat, these tasks could include search and rescue and securing of personal property, as well as initiating interaction with other than family members.

Although there is strong empirical evidence that the majority of decision-making regarding evacuation takes place within the family, nearly 30 percent of respondents surveyed after Hurricane Carla reported they also discussed evacuation with people outside the family (Moore, et al, 1963: 57). Some of the studies dealing with the problem seem to differentiate between an act of deciding and an act of information sharing or gathering. Also implicit in much of the literature is the idea that if a family is ambivalent about evacuation, they will seek information about what neighbors plan to do. If neighbors evacuate, the family is more likely to do so. However, if the majority of the neighborhood is not inclined to leave the area the family will often choose to "ride it out." (Killian, 1954; Moore, et al, 1963; Baker, 1979).

There is very little in the literature, however, which deals with or explains the deviant cases, i.e., families who evacuate when most others around remain, or families who stay when most others leave.

Also left virtually unexplored is the question of what other kinds of pre-impact non-family linkages might influence the evacuation process. There is extremely little, for instance, on if and how membership in formal groups such as churches, unions and work organizations might be a factor (other than the hints about the importance of ethnic and religious membership we noted earlier). An unusual illustration of the possible relevance of work ties is the observation that when stories of a dambreak were circulating in Port Jarvis, New York, many of the residents contacted the local railroad dispatcher for information. One explanation is that many of the people in that locality were employed by the railroad company (Danzig, et al, 1958: 18). Similarly, on the first day of the accident at Three Mile

Island, most people who initially learned of the incident, were family and neighbors of those who worked there (Flynn and Chalmers, 1979).

People do turn to selected public agencies for information in pre-impact times. However, with the exception of studies about the attention paid to mass media outlets (which in the great majority of cases means radio stations) there has been very little examination of the amount and kinds of inquiries about evacuation matters received by the local police, the civil defense office, the Red Cross, etc. Most of the references to such possible operative linkages between residents of a threatened locality and these kinds of organizations are only anecdotal (the special role of the mass media will be discussed later).

Overall, the picture emerging from the literature is that family ties are a very important factor in a decision to leave or stay. A hypothesis that seems to follow from this is that in the course of the interaction leading to a decision, family members will attempt to gather additional information from both individual and organizational sources, seeking confirmation from organizations if the information is primarily from individual sources, and vice versa (Drabek and Boggs, 1968; Drabek, 1969). The distinction between information gathering and information confirmation, explicitly made in such other areas of study as the sociology of mass communication, is largely, but not exclusively, implicit in the evacuation literature.

Conspicuous by its absence is any attention paid to the social linkages important in the behavior of solo households, non-related household groupings and transients such as tourists or business travelers in an area. The evacuation literature stresses the family unit, and one of its major

contributions may be its insistence that it is the collective unit, the family, rather than individuals which should be studied and understood. However, this leaves outside of the evacuation research focus, the ever increasing proportion of Americans who are not members of household family units, which in some metropolitan communities may be a substantial proportion of the total population (Baisden and Quarantelli, 1979). Another currently unexamined question raised by this observation is, what role, if any, do non-family and unknown community members have on the evacuation response of families. When strangers are seen to leave or stay, does it make a difference?

As we shift our focus from the individual level of social linkages to the organizational level, we find a lack of in-depth attention to how pre-crisis interorganizational linkages influence the evacuation process. While the sheer quantity of studies which touch on the problem is larger than on some other evacuation topics, both the range and depth of the relevant literature leaves much to be desired. Some issues have been addressed but the findings are rather unexceptional. Many important questions simply have not been asked.

A major point made within the literature is that organizations tend to have a strong preference for doing things in a familiar way, and more importantly, for working with familiar groups (Haas and Drabek, 1973; Dynes, 1975). That is, pre-crisis interorganizational ties or lack of them are important. This finding implies that the stronger and more well defined that interorganizational linkages are prior to an event, the "smoother" subsequent evacuation related activities will go. For example, in a chlorine barge incident studied by DRC, the local civil defense office

had developed a pattern of ongoing interaction with other agencies long before the event. At the time of the incident it easily emerged as the legitimate local coordinating authority, a situation which facilitated the response of other local organizations involved in the evacuation which eventually took place.

Another observation in the literature is that in multi-jurisdictional events, evacuation related activities are strongly affected by the nature of the pre-crisis social ties that exist among the state, county, township, municipal and special governmental units in the affected area (Albert and Segaloff, 1962). If weak or poor social ties exist, there will be problems when disasters occur (Wolensky, 1977). Thus, in Darwin, Australia, the lack of legal agreements and arrangements among departments and agencies at each level of government and between each level, was a serious deficiency in mounting an evacuation effort after the catastrophe of Cyclone Tracy (Haas, et al, 1976).

There are suggestions in the literature that the nature and extent of organizational linkages can influence evacuation planning. Various authors state, for example, that planning is facilitated if certain kinds of experts are involved. Accordingly, there will be better plans if such experts as traffic engineers (Urbanik, 1978) and National Weather Service meteorologists (Riley, 1971) provide part of the interorganizational ties, as well as school board members whose buildings might be used for shelter (Killian, 1954).

Beyond such surface observations, much has not been addressed by research. It is very difficult from the studies conducted so far to ascertain which local organizations typically see evacuation as a primary or

secondary responsibility of their group. It would seem that in any given community, a variety of organizations and a varying number of agencies perceive evacuation as a disaster task, for which, to some degree, they should plan with other groups.

However, sometimes there is no coordination at all. For example, in a fairly large metropolitan area, the local Red Cross chapter and the local fire department, independently and unknown to one another, were observed to engage in preparedness planning for possible massive evacuations in future disasters. It is simply not clear which agencies are likely to be the lead organizations in pre-crisis evacuation planning, and how such groups try to integrate or coordinate the relevant activities of others. As DRC has found, a systematic look at community disaster plans will sometimes discover that some interrelated evacuation tasks are assigned or assumed to be the partial responsibility of certain organizations, but, the necessary intergroup social ties have never been made explicit (Quarantelli, Dynes and Kreps, 1980).

The research literature is also very weak in its depiction of how pre-crisis conflictive interorganizational relationships may affect joint planning for and collective undertaking of mass evacuations. In other institutional areas where conflict tends to be rife, such as among the public and private hospitals within a community, the planning for the delivery of emergency medical services in a disaster is seriously handicapped and often leads to no real service delivery preparedness (Quarantelli, forthcoming). Many of the more exhortatory writings on organization evacuation planning seem to assume nonconflictive interorganizational settings which may not be the actual state of affairs in many American communities.

The existing studies give us few clues on how conflictive social linkages may effect the community context of the evacuation process. However, some suggestions are given by an ongoing DRC study which strongly indicates a public/private sector split in most localities between emergency organizations and chemical companies, making almost impossible any overall community planning for evacuation in the case of chemical disasters (Quarantelli, et al, 1979).

In conclusion, we should report on one of the few topics where some attention has been paid to a possible link between individual and organizational social linkages; namely, to the question of possible role conflict. The concept introduced in the disaster literature by Killian (1952) suggests that a person in a disaster situation may be forced to choose between acting as a member of a family or as a member of some work organization, with the implication that family role will usually be chosen over the work role. One of the very few authors to examine this social linkages question in connection with evacuation behavior concludes that when an individual has a role to fulfill, the more clearly the role is defined and accepted, both internally and externally, the greater the likelihood that the individual will strive to play that role. The few cases of "role abandonment" noted are those which were highly correlated with ambiguous role definitions or expectations (Moore, et al, 1964; Moore, et al., 1964). This is consistent with more general studies of role conflict which have found little empirical support for the existence of such behavior (White, 1962; Bates, et al, 1963), and which had led some to conclude that role conflict, whether viewed from a theoretical or practical viewpoint, is another one of many "myths" about disaster behavior (Dynes, 1975; Quarantelli, 1978a).

There is, however, a type of interorganizational role conflict which could conceivably present problems, especially in rural areas or smaller communities. There may be multiple organizational linkages, as in Panama City, where there was extensive overlap in personnel between the civil defense and the Red Cross. By the time the civil defense was alerted, many of its members were already acting in their Red Cross roles (Killian, 1954).

Resources

The literature contains a fair amount of low level analysis and descriptive research findings on what we have conceptualized in our model as resources. Several overall implicit themes can be discerned in this material. We will note these before discussing some general observations and findings.

A major implicit theme is that nothing is a resource unless it is identified as such. Even a material thing does not by its sheer existence constitute a resource. For example, in the Rapid City flash flood of 1972, those individuals in the Emergency Operations Center (EOC) were not aware for several hours of the presence of Emergency Broadcast System (EBS) equipment in the EOC (Strope, et al, 1977). In this case, the EBS equipment was not immediately used to aid in the emergency and evacuation response because it was not seen or identified as an available resource. This example serves to emphasize the fact that resource availability, both real and perceived, is at least as and possibly more important in planning than resource type and origin. The notion of availability is also importantly related to the utilization and management of the convergence

of people, things and communication that frequently characterize disasters (Fritz and Mathewson, 1957).

In general, resources are treated in at least two different ways. Much of the planning and operational writings tend to equate resources with tangible objects such as emergency vehicles, private automobiles, gasoline and communication equipment. The more theoretical and research oriented literature, however, also visualizes certain intangibles as resources, such as the planning process, training, information and knowledge. In some ways, this last is a second major theme advanced about resources with respect to evacuation, the idea that there are both tangible and intangible resources which come into play in the process. Part of the concept of disaster subculture, in fact, implies that both tangible and intangible resources are available for use in a mass emergency (Wenger, 1978).

A third implicit theme is that resources may be internal, owned by or directly available to the user; or, they may be external--owned by or under the jurisdiction of others, although more or less available for use by the user. This applies to any type of user, be that an individual, an organization or a community. Thus, an individual may have personal transportation, or she may obtain it from a public transportation authority. An organization may have within its collective membership specialized knowledge about particular kinds of disaster agents, such as dangerous chemicals, or it may utilize various information hotlines to tap into sources of expertise originating elsewhere. A community may have a well discussed and exercised disaster plan, or it may import both specialists and earth equipment from a nearby military base.

As can be readily seen, the last two themes just presented allow the development of a framework to illustrate the literature's body of findings and observations about evacuation related resources. A two by two table is depicted below which cross classifies these resources by source and type:

	Internal	External
Tangible		
Intangible		

In the examples given above, personal transportation would be an internal tangible resource, information hotlines an external intangible resource, while planning, whether internal or exteral, can generally be construed as intangible albeit the equipment necessary to carry plans out are very tangible.

In more concrete terms, the literature seems to suggest that at the individual level, the most important internal tangible resources for evacuation are private cars, radios and telephones (Albert and Segaloff, 1962; Baker, 1979; Forrest, 1979; Urbanic, 1978). Left unsaid and unexamined are possible crisis situations, in some of our major metropolitan areas, where very large numbers of residents do not own cars or in some rural tourist areas where phones are not readily available and even radio reception may be uncertain. Thus, while cars, radios and telephones are very widely distributed and available in the United States, they are not resources present

at all times for all Americans. In fact, if usage rather than just existence is taken into account, certain resources may act to isolate rather than to inform potential evacuees, as when some ethnic groups listen only to particular radio stations. The National Weather Service and FEMA have shown some recognition of this recently in their use of Spanish language material in certain sections of the country. However, the increasing special programing of FM stations, and the spread of cable television, which further isolate audience segments, have not been examined so far for their implications on the resources that might or might not be available to people.

At the organizational level, the internal tangible resources most commonly noted as important for evacuation include trucks, gasoline (Treadwell, 1962), emergency vehicles equipped with public address systems (Yutzy, 1964a). and communications equipment (Hans and Sell, 1974). There are also various references to the importance of having buses available for transportation. However, there is a paucity of studies on the problems in either pre-crisis planning for using such resources or in mobilization difficulties at times of disaster impact. Moreover, it seems attention is paid primarily to the more manifest resources; those that are less obvious such as traffic direction signs, command vans for organizational headquarters, tow trucks and wreckers, and road flares have seldom been recognized, much less been the object of study.

External tangible resources are often mentioned in the disaster literature as typically flowing into endangered or impacted localities. We have already referred to convergence or the cornucopia effect, a massive influx from the outside (Fritz and Mathewson, 1957; Taylor, Zurcher and Key, 1970: 134-138). However, certain questions relevant to evacuation and the inflow

of materials in particular have not been well addressed. Pointing to something which probably is not as rare in major disasters as the lack of attention to it might signify, one researcher noted that, "...equipment such as beds, bedding, clothing, footware, food and coal...flowed into the stricken area while those for whom it was intended flowed in the opposite direction" (Young, 1954: 389).

At the organizational level, a similar problem may exist, but it too has been under researched. The convergence flow, also brings in a plethora of resources useful to organizations involved in evacuation. However, practically no systematic attention has been paid to the phenomenon (Quarantelli) and Dynes, 1977) since it was documented in some major works in the early days of disaster studies (Fritz and Mathewson, 1957; Moore, 1958). The major exception to this are some examinations of the role of military bases and the armed forces in providing among other things resources for evacuation (Killian and Rayner, 1953; Anderson, 1968, 1970a; Forrest, 1979). While the importance of this source of external resources is clearly indicated, the dynamics of what lays behind what is offered and provided to local communities, and the civilian pressures on the military is only hinted at in most accounts. The role of the National Guard, while frequently noted in passing, is surprisingly almost totally undescribed and unanalyzed.

One of the most commonly cited external intangible resources important throughout the threat period is information. Here a possible misdirection of the resource flow has been generally and consistently noted. In events that afford relatively long warning periods such as hurricanes and river floods, a vast majority of individuals first receive information from mass

media outlets (Moore, et al, 1963; Mileti, 1975). However, in studies of both Hurricane Carla and Hurricane Camille, it is noted that due to overlapping radio listening areas, information broadcast for one area was heard in others. This not only led to confusion, but influenced what people took into account in deciding whether or not to evacuate (Moore, et al, 1964; Moore, 1964; Wilkinson and Ross, 1970). The same problem of overlapping radio listening areas with subsequent problems for the evacuation process has also surfaced with other kinds of disaster agents ranging from floods (Worth and McLuckie, 1977) to chemical disasters (Albert and Segaloff, 1962).

The internal intangible counterpart to information is knowledge. Such research as has been done in the area does not suggest that most people have sufficient knowledge, of either the hazards to which their localities are subject, or of how they can adjust to them (Mileti, et al, 1975: 30). For example, one study found many persons who were not aware of available maps delineating flood plains, and those that were aware did not find them useful. Other studies have noted that the population as a whole has little understanding of disaster phenomena and believes many disaster myths including the notion that panic flight is a common reaction (Wenger, et al, 1975). Yet, there is some evidence that rural people are more sensitive and responsive to hurricane cues than urban dwellers (Moore, et al, 1963) and that residents of coastal areas have more accurate knowledge of the relevant hazards than do flood plain dwellers (Burton, et al, 1965). But, overall, the work on this topic is rather limited both in depth and range. Thus, it does seem as has been written in a survey of the topic, that "we have little knowledge about the role of knowledge in adjustments to hazards" (Mileti, et al, 1975: 31).

At the organizational level, the effect of both internally and externally provided intangible resources is also unclear. Training and the planning process are discussed extensively in the general disaster literature. But, few writers have specifically linked either resource to the evacuation process.

A general assumption is that better training of local agency personnel will produce better results in evacuation (Strope, et al, 1977), but this has very seldom been examined in concrete studies. Observations and impressions of DRC field teams in both natural and chemical disaster evacuations support the idea, but there are no systematic studies on the question. There has long been very strong agreement in the general disaster literature that the planning process is very important in making for more efficient and effective responses (Barton, 1970; Dynes, 1975; Quarantelli, 1977; Quarantelli and Tierney, 1979; Dynes, Quarantelli and Kreps, 1980). But, even though there is some literature on evacuation planning, most of it is fairly elementary, reaching such conclusions as that the process of planning should not be confused with the existence of a plan, which does not necessarily result in a "better" evacuation (Strope, et al, 1977). Ongoing DRC work on chemical disasters focused in part on evacuation gives support to the notion of a close correlation between effective planning and efficient evacuation, and the recent Mississauga, Canada evacuation of 250,000 persons is a good illustration of how even limited prior planning can facilitate a massive flight operation. Yet, when all is said and done, research work on the relationship between planning and the evacuation process has just begun. The existing writings relating the two is not only not substantial, but, what there is of it, is mostly technical (e.g., Urbanic, 1978), operational (e.g., Hans and Sell, 1974; Perry, 1979b) or conceptual (e.g., Strope, et al, 1977; Perry, 1979a); little, so far, is empirical.

Threat Conditions

In general, threat conditions are the specific circumstances operative during the period of increasing risk or at time of impact. If the community context sets the general parameters within which evacuation behavior can develop, threat conditions provide the immediate factors which can influence the evacuation process. Our model states that the three most important factors in the threat conditions component are disaster agent variables, situational variables and definitions of the situation.

Agent Variables

The physical characteristics of disaster agents are often noted in the general disaster literature. However, very little systematic attention has been paid to examining how such characteristics might effect human and group responses in mass emergencies. At one level it appears that a different state of affairs exists with respect to possible relationships between agent variables and the evacuation process. In our numerical coding of the literature, we found more sources touched on agent variables than any other topic specified by our model. The quantity of attention given to the topic, however, was not matched by quality in the research findings and observations. While allusions to agent variables were many, they tended to be nonspecific and gave rise to few common themes. Descriptions of agent characteristics are very seldom explicitly linked to the circumstances they establish for the evacuation process.

Several general discussions of disaster agents suggest the major dimensions along which the agents might differ and be compared (e.g., Powell, 1954; Barton, 1970). One of the more systematic treatments indicates that

there are differences in frequency, predictability, controllability, speed of onset, length of possible forewarning, duration and scope of impact (Dynes, 1975). These dimensions will be used for organizing the few explicit discussions of agent variables and social consequences in the research literature examined.

There are some suggestions that frequency of disaster agent may effect the handling of the evacuation process. Thus, rarely are communities which face repetitive seasonal threats such as floods and hurricanes without some type of evacuation plan (Strope, et al, 1977). Some writings also hint that communities which have been threatened by the same type of agent more than once may tend to react in a more organized manner after the first exposure, and are perhaps more likely to undertake withdrawal movements in the face of the later threats. Comparative studies of the responses to tsunami warnings in Crescent City in 1964 (Yutzy, 1964a) and in 1965 (Anderson, 1965a), and of the reactions to hurricane threats in 1957 and in 1961 in Cameron Parish, Louisiana (Bates, et al, 1963; Moore, et al, 1963) could be interpreted as supporting this proposition.

However, the literature is all but void of studies of emergency organizations at national, state or local levels which are involved in disasters year after year, and have to make many decisions about evacuation at the community level. Does the frequency of such experience make a difference in how they perceive and define evacuation? Also, unknown because it has not been studied, is whether there is any transferability of experiences with one disaster type to another. What difference does it make, if any, for perceptions and views about local evacuation, when some groups such as

the American National Red Cross have frequent experience with many disaster agents (Popkin, 1978), and other organizations also have many experiences but limited primarily to one type of agent, such as the U. S. Forest Service with forest fires?

The observation has been made that "with the development of means of identifying approaching hazards...in the 1950s, evacuation came to be seen as an effective defense against a wider spectrum of hazards" (Strope, et al, 1977: 3). This may be true, but it is all but impossible to find an empirical study documenting the point that greater ability to predict natural disaster agents has changed organizational views about evacuation. Questions can even be raised as to whether greater predictability in the future might not make the matter of evacuation a more complex problem for organizations than it was in the past, as can be witnessed in some research done on earthquake prediction (Panel on the Public Policy Implications of Earthquake Prediction, 1975).

This last example calls attention also to the possibility that if disaster agents which are thought to be controllable are seen as being out of control, the evacuation process will be affected. This seems particularly true for technological accidents or other kinds of disaster resulting from human actions. DRC research on chemical disasters, especially those generated by transportation accidents, and some of the work undertaken on the Three Mile Island episode (Kraybill, et al, 1979; Presidential Commission, 1979) strongly suggest that people's perceptions--whether correct or not--about the uncontrolled nature of chemical and nuclear threats is a very important element in the high degree of evacuation proneness observed in those two kinds of emergencies.

The speed of onset of different kinds of disaster agents obviously makes a difference in the time available for taking action. However, except for a few studies on flash floods, which do conclude that withdrawal movement in such situations is very heavily influenced by direct visual perception of imminent personal danger (Gruntfest, 1977; Mileti and Beck, 1975), the question of agent speed has not been much addressed. At the organizational level there are occasional indications that evacuation recommendations or orders are sometimes set aside, if it is thought citizens will not have enough time to evacuate, or worse, be caught out in the open by an onrushing disaster agent (Rayner, 1953).

The research literature does pay some attention to the length of possible forewarning and amount of withdrawal time intrinsically provided by different kinds of disaster agents. Several writers consider this to be an important distinction among various disaster types (Strope, et al, 1977: 2). Some agents such as hurricanes and river floods usually afford a considerable amount of time for advance warning and consequently pre-impact evacuation (Baker, 1979). With other agents such as tornadoes and earthquakes, there is usually little or no forewarning possible, thus, withdrawal movement in such events is usually synonymous with post-impact flight or search and rescue activities.

But, as some researchers have noted, the length of possible forewarning is irrelevant if advantage is not taken of the opportunity. Some studies report that in certain situations, cues of danger are not perceived or are misread. For example, in a Canadian mudslide disaster, evacuation was not considered prior to the event because visible cues were not correctly perceived (Scanlon, et al, 1976). The same was true for the most part in both the

Vaiont Dam (Quarantelli, 1979c) and the Buffalo Creek Dam disasters (Erikson, 1976). These examples also suggest that a long potential forewarning period might be actually dysfunctional where danger cues are ambiguous.

The duration or life span of a disaster agent would seem to have some relationship to the evacuation process. There can be considerable variation; hurricanes, for example, can be threats for several weeks, while hazardous chemicals may be dangerous for just a few minutes to several days, and flash floods are unlikely to last over an hour. Some research does note that the length of time evacuees are out of their homes is sometimes related to the duration of some disaster agents (e.g., volcanic eruption). But, on the whole, there is extremely little explicit treatment of the topic of life span of agents on the evacuation process.

The effects of scope of impact on evacuation behavior has been somewhat more examined. The notion singled out is that the greater the scope of possible or actual impact, the greater the number and variety of public and private relief and rescue groups involved, with consequent problems of interorganizational coordination (Barton, 1970; 1975). The problem tends to be magnified if the evacuation flight cuts across many jurisdictional lines (Pierson, 1956), and can be particularly serious if the evacuation involves massive numbers as in the Mississauga, Canada chemical threat incident or the Holland flood of 1953 (Ellemers, 1955; Lammers, 1955; Pilger and van Dijk, 1955). A more urgent need for public shelters is more likely, since evacuees may find that the friends and relatives to whom they would normally go have themselves evacuated, as was the case in the Friuli earthquake in Italy (Geipel, 1977). This may be a temporary need since it appears that with the passage of time disaster victims will

eventually move in with more distant kin, as happened in the Managua, Nicaragua earthquake (Trainer and Bolin, 1976). It has also been noted that if the scope of impact is relatively limited, victims may not have to withdraw as far to escape danger (Drabek and Boggs, 1968).

One surmises that the expected or potential destructiveness of a disaster agent might be related to the evacuation process; however, the research literature is mostly silent on this point. There are hints that the extensive casualties and destruction caused by Hurricane Audrey influenced some of the withdrawal undertaken in Hurricane Carla (Bates, et al, 1963; Moore, et al, 1963). And, there are some insinuations that less destructive earlier floods contributed to the slower response in the devastating flash flood of 1972 in Rapid City (Mileti, et al, 1975). A major difficulty, of course, with drawing any conclusion in such situations is that obviously it is very difficult to separate out the factor of prior experience from the factor of the nature of the experience undergone. At this point, there is little hard research evidence regarding how the degree of expected destructiveness of a disaster agent, independent of experience, may affect individual and organizational evacuation activities. That people flocked to the banks of the Rio Grande river before an announced flood (Clifford, 1955) or went out to the beach at Crescent City before a forecasted tsunami (Yutzy, 1964a) may simply indicate as discussed earlier, a lack of substantive knowledge of disaster agents.

Given the scarcity of analytical attention to disaster agent variables, it is not surprising that there is no treatment of the possible effects of multiple agents within the same situation. Hurricanes are known to spawn tornadoes. Floods may help occasion dam and levee breaks. Earthquakes can

be accompanied by tsunamis and also lead to dam failures. DRC analyses of disaster plans indicate these possibilities are very seldom taken into account in emergency planning; they have been more ignored still in evacuation-related research.

Situational Variables

Overall, situational variables have only been moderately attended to in the literature and the findings and observations made have not been very systematic or wholly unexpected. The topic of situational variables or contingencies in evacuation seems to suffer from the same problem the topic has had in disaster research generally; namely, a common sense conceptualization of the phenomena, and a tendency to seek idiosyncratic features rather than generalizable aspects. Yet enough work has been done to indicate that such contingencies have to be accounted for in any acceptable model of the evacuation process.

Insofar as individuals and families are concerned, an important situational contingency appears to be the time of day when initial warnings of threat are received (McLuckie, 1970). A theme in the research literature is that the time of day is important because it creates different social situations with respect to possible sudden evacuation (Report from DRC, 1968). This is illustrated in several case studies of disasters. In the Denver flood of 1965, public advisories were initially issued between 4 and 6 p.m. on a weekday, catching many adult family members apart but with young children home from school. This generated anxiety about missing family members and a tendency to delay withdrawal movement on the part of women who were home, especially women with young children (Drabek and Stephenson, 1971). This is very notable, because as earlier discussed, families with

young children are quite evacuation prone. Similarly, in a series of gas explosions in homes of a Rochester, New York suburb which occurred during the middle of the afternoon when most women were at home, children were in schools and many men were at work in the city, a similar reluctance to leave the endangered area was observed (Marks, et al, 1954).

However, in another flood threat situation, rumors of a dam break began to circulate at approximately 10 p.m. when almost all family members were together at home, and in that case, there was seemingly less expression of concern and the usual family withdrawal movements occurred (Danzig, et al, 1958). Other studies hint that because almost all household members are usually together in the middle of the night, indications of danger and the possible need to flee are less disturbing than might be suggested by the occasion of being suddenly awakened from sleep.

Conversely, however, nighttime seems to be a particularly negative contingency with respect to the mobilization of emergency organizations. This can be a factor, since even emergency organizations which operate around the clock, do not in the night hours usually have the full complement of personnel available, and most higher echelon rank holders are generally absent (the same is true for weekends). DRC has observed in some of its field studies a considerable delay before key officials in such situations could get to their place of work or centers of decision making. The research seems to imply, then, that situations where all household members are together may be functional for individuals and the family, but may be relatively dysfunctional for the organizations to which these persons belong, especially if they occupy important leadership posts.

Officials can also be absent from work for a variety of other reasons, ranging from being ill to being away on vacation to being out of town on other business. The disaster literature does note that, especially in smaller communities, the absence or unavailability of key emergency response officials has had consequences for the evacuation process. In a Canadian mudslide, no one was at the police station, and the civil defense director did not have his CB set turned on (Scanlon, 1976). The absence of the chief executive of the community, typically the mayor, has been noted in a number of other disasters as well (Pilger and van Dijk, 1955; Yutzy, 1964b; Fitzpatrick and Waxman, 1972). In still other disasters, the local civil defense director was not present (Bates, et al., 1963; Strope, et al., 1977: 9). These and other studies point out that in the absence of comprehensive planning which clearly specifies what positions are to take over for the absent official, decisions on evacuation were either delayed or uncertainly handled.

Not only time of day, but day of the week is proposed in some studies as being a factor in withdrawal behavior. One study indicates that an additional contingency influencing Gulf Coast residents to leave in the face of Hurricane Carla was that the threat peaked on a Friday, which meant that absence from an area during the weekend would not conflict with work or school commitments (Moore, et al, 1963). Some of the work done on the Three Mile Island evacuation implies a similar kind of operative contingency. While the incident began on a Wednesday afternoon, indications of the possible seriousness of the situation markedly escalated on Friday. One study notes that 72 percent of those who left the area did so on Friday, with most returning the next Monday (Smith, 1979). In this case and others, the day of the week in which the crisis peaked was certainly only one of the

contingencies operative in the situation, but some researchers nonetheless believe the timing involved very strongly reinforced withdrawal movement. Unfortunately, an assessment of this speculation is difficult to make since in most studies undertaken, little attention has been given to the day of the week involved, and in many cases, the information is totally lacking.

Research has also paid some attention to the seasonal presence of large numbers of tourists in an endangered area, although very little study appears to have been made of equally seasonal transients such as migrant harvest laborers, fruit and vegetable pickers, and others who are often in but not part of a community. It has long been noted that tourists leave en mass and are among the very first to go when a disaster such as a hurricane or flood threatens an area (Rayner, 1953; Urbanic, 1978). In contrast, there are barely any hints in the literature as to whether migrant laborers, for instance, leave a locality in the face of danger. On other grounds, one suspects they might be among the very last segments of a community population to even become aware of a possible danger in their locality.

There are some suggestions in the literature that a connection might exist between work cycles and shifts and organizational functioning. Thus, it as observed that the Palm Sunday tornadoes swept by relatively unreported to the public in many sections of Indiana and Ohio. In part, this was because most radio stations on such a day had only a minimal number of people available for broadcasting; likewise, many city and county police departments had only the smallest shifts possible on duty (Brouillette, 1966).

An interesting implicit theme in the literature is that very rarely do disasters--at least in the Western world--cause enough damage to make deaths, injuries or destruction of property a relevant or significant negative

contingency in the evacuation process. The impact of different kinds of disaster agents, of course, frequently creates a need for evacuation. However, almost none of the studies examined reported or suggested that either specific casualties, number of casualties in general, or the material damage made withdrawal impossible, more difficult or especially problematic. The closest indications of anything of this kind are occasional observations that certain roads or highways had to be used, rather than others which were impassable, or that electric power failure disrupted traffic lights, making evacuees' driving a little more complicated. At times, certain communication equipment is rendered inoperable, but alternate ways of communicating are usually quickly worked out (Clifford, 1955; Stallings, 1971). Obviously, there is considerable situational variability in the amount of damage or destruction a disaster will occasion; similarly, there can be considerable variability in who and what will be physically impacted. But, whatever other effects the selective and differential physical impacts of disaster may have, researchers have neither noted nor reported that such situational contingencies have had much negative influence on the evacuation process as such.

Definitional Variables

One of the earliest studied topics in the disaster area has been how individuals come to define dangerous situations (e.g., Fritz and Marks, 1954; Mack and Baker, 1961; Grosser, et al, 1964). But, interest in the topic has persisted, if not accelerated in more recent work (e.g., Mileti, 1975; Mileti and Beck, 1975; Perry, 1979b). Thus, the literature on definitional variables is fairly extensive (and to some extent, overlapping an even larger body of literature on warning phenomena, a point we shall return

to in a later section of this chapter). The basic question being asked is what and how changes in environmental cues come to be perceived as signs of danger?

Before highlighting some of the major themes relevant to the evacuation process, we should clarify our position with respect to a statement frequently made in the literature. There is almost complete consensus that people act on the basis of their perceptual definitions of situations. There is no problem with that statement except it is something accompanied by remarks that such subjective perceptions may differ from objective reality. The difficulty in making such a distinction, as some philosophers of science and social scientists have long pointed out, is that so called objective reality can be easily visualized as simply someone else's perception. In our discussion we will avoid usages of the term "objective reality," but approach the problem from the perspective of how persons involved define danger and in what ways this may affect the evacuation process.

For the purpose of organizing our discussion of definitional variables we will use a modification of a recent theoretical formulation developed to encompass the warning process (Mileti and Beck, 1975). For our purpose, the four dimensions used to account for or explain two other dimensions of the warning process, can be applied to the definitional process. In terms of our problem, we can ask what research tells us of the modes, contents, contexts and certainties of definitional variables, as well as how they account for the way environmental cues are confirmed and believed in situations of mass danger.

There is a certain amount of literature on the modes through which definitions are reached. Cues or information can be obtained by personal

observation, in face-to-face contacts, via telephone, from official sources, from mass media sources, etc. A major theme running through some literature is that personal means are more influential than impersonal means. Although this has not been empirically found in all studies, (e.g., Mileti and Beck, 1975), most research has found face-to-face or personal assessment of danger to be more likely to be taken seriously (Killian, 1954; Treadwell, 1962; Windham, et al, 1977). Information derived from official sources has also consistently been shown to be related to the undertaking of evacuation behavior (Clifford, 1955; Moore, et al, 1963; Drabek, 1969; Wilkinson and Ross, 1970; Worth and McLuckie, 1977). An implication is that a personal warning to evacuate delivered by an official is more likely to be defined as a strong indication that danger is at hand. Even more so, a person will give greater credence to one's own personal visual sighting of danger cues (Drabek and Boggs, 1968).

There are also some indications that perceptions of environmental changes are developed from a weighting of many "bits" of data from a variety of sources, and not from just one source (Drabek and Stephenson, 1971; Worth and McLuckie, 1977). Another study concluded that "warning belief increased the predictive value for evacuation as more warnings were heard" (Mileti and Beck, 1975: 43). On the other hand, it has been noted that information seeking activity that results in definition for some people may only produce an additional (not sufficient for definition) bit of information for others (Moore, et al, 1963).

Perhaps what is involved here is that definitions may be strongly affected by the amount of time available to assess the implications for self. If one perceives immediate danger, as is often the case in transportation accidents involving hazardous chemicals, there is a strong tendency

for such definitions of situations to lead to quick withdrawal movement. Generally speaking, if the perceived cues or the contents of received messages are defined as having immediate direct consequences for self, they tend to be reaction producing (a conclusion long established as a major factor in panic behavior as discussed in Quarantelli, 1954; 1979a). Personalization of danger seems to be very important in the definitional process.

Whether the context in which definitions of danger are formed is influential seems to depend again partly on the time available for responding. In a flash flood study, the conclusion was that "situational context did not account for any of the variance in evacuation" (Mileti and Beck, 1975: 44). Yet research on other kinds of flood situations have found quite the converse (Drabek and Boggs, 1968; Drabek, 1969). Thus, in a study of the Denver flood of 1965, it was noted that public notification tended to be action-producing only when the family was reunited, even though the information content of earlier and later messages were essentially the same (Drabek and Stephenson, 1971).

Since threat conditions present individuals with potential disruption of their ongoing patterns of activity, there is a tendency for people to invest time in establishing a definition not only of the possibility of environmental changes affecting them, but also of the probability or certainty of this happening. In a flood threat situation in Montana and a tsunami threat situation in California, researchers found that people tended to monitor radio for general information and to call the local civil defense offices for specific information about their personal vulnerability (Yutzy, 1964b; Anderson, 1965b). Thus, it is not surprising to encounter a study which found that when some residents who had accepted the immediacy of a

flood in Denver perceived it as not directly affecting them, withdrawal movement was reduced (Drabek and Stephenson, 1971).

There is general and widespread agreement that if at all possible, people do try to confirm danger cues (Williams, 1964). "When people have been alerted that a disaster is happening, they need to have it confirmed to them that it really is happening" (Worth and McLuckie, 1977: 73). However, it is not clear from the literature when the tendency for new stimuli to be interpreted within a framework of the known and familiar--a long standing observation in the disaster research area (Withey, 1962; Anderson, 1969a; McLuckie, 1970)--starts to shift over to attempts at confirmation of danger. There is some evidence, as exemplified in both the Denver flood and Cyclone Tracy in Australia, that perception of danger cues tends to be initially low (Drabek and Stephenson, 1971; Haas, et al, 1976). Clearly, all the factors we have presented so far do enter into the confirmation process, but it is less clear from the research undertaken what factors activate definitional processes that leads to confirmatory behavior.

Research does seem to agree that belief about danger is partly a function of the perceived certainty and the confirmation or validity of that certainty (Mileti and Beck, 1975). However, it is not quite clear how belief is related to knowledge. This could be very important. For example, public officials and disaster planners have expressed the view that the large blocks of migrants and settlers sometimes found in an area might not be as aware even of cyclical natural hazards as would local native born parts of the population. The speculation is that in certain parts of the Gulf Coast and the Southwestern United States there are many recent migrants who have little knowledge of what hurricanes might do in Florida, similarly

with flash floods in Arizona, and earthquakes in California. Thus, a belief of danger may not lead to the appropriate withdrawal behavior because of a lack of appropriate knowledge. This judgment might be valid, but anything resembling systematic research data on the question simply does not exist. In fact, as indicated earlier, there is very little knowledge about people's knowledge of disaster phenomena.

By and large the literature shows that definitional threat variables at the individual level are quite complex and probably strongly intertwined with one another. Nevertheless, a few aspects about the definitional process are clear, and the conclusion that perception of danger does not automatically lead to a response or that "evacuation is not merely a function of hearing a warning and responding" (Mileti and Beck, 1975: 43), is clearly well established.

Unfortunately, a counterpart systematic examination and set of conclusions with respect to organizational definitions of danger is nowhere available. Scattered observations here and there provide some hints of what might be involved. There sometimes are differences if not contradictions between definitions reached by different parts of an organization (Pierson, 1956; Yutzy, 1964b). Emergency groups may receive ambiguous and limited information from other agencies who are supposed to provide them with definitional cues relevant to possible evacuation (Anderson, 1965b;and 1966). DRC found another such incident with the Los Angeles police department when it was considering the evacuation of 80,000 residents below the Van Norman dam after the San Fernando earthquake of 1971. Organizations at different levels which are supposedly coordinating with one another may have different definitions as to the amount and kind of evacuation which should be undertaken;

such was the situation in the Louisville chlorine barge incident where local and federal agencies had markedly different perceptions of the seriousness of the situation (Fitzpatrick and Waxman, 1972), and at Three Mile Island, where perceptions of appropriate information dissemination and response measures also differed among federal, state, local and private groups (Flynn and Chalmers, 1979; Presidential Commission, 1979). Overall, how organizations come to perceive threats and what factors affect their collective definitions of situations remains a largely unresearched area, although some highly relevant work on the matter is currently being undertaken in a major study at the University of Minnesota (for preliminary findings, see Carter 1979; Clark & Carter 1979).

Social Processes

Community context in combination with threat conditions generates a number of social processes, that is, the various activities that individuals and organizations engage in in attempting to cope with a crisis. Our model names communication, decision-making, coordination and task manifestation as the more important of the processes and activities. They intermediate between threat conditions--especially the definitional variables--and the ensuing patterns of behavior, most importantly warning behavior. In graphic form:

definitional variables social processes warning behavior

As such, there is a fine line between some of the phenomena discussed--definitional variables sometimes overlap with communication and decision-making processes, and coordination and task manifestation activities sometimes overlap with warning behavior. To reduce redundancy, we limit our examination of social processes only to such literature and research findings as explicitly discussed them.

Communication Processes

General communication activities in disasters have been fairly extensively studied both at the individual level and the organizational level (Stallings, 1971; Dynes and Quarantelli, 1977; Office of the United Nations, 1979), although the mass media per se is a relatively unexplored area as a recent survey has reported (Committee on Mass Media and Disasters, 1970). However, there is only a limited body of data on evacuation-relevant communications, including means, channels, and informational content. In this section, we shall primarily discuss means, that is, the mechanical modes of communication such as radio, phones, sirens, etc., and will deal only with social, rather than technical aspects. Informational contents which are an element of communication processes and thus parts of social processes, have been partially examined in the definitional variable section and elsewhere in this report.

The two mechanical means of communication most discussed are sirens and the radio. Particularly as regards warning, they are clearly most relevant if the forewarning period is relatively short. Print media and to some extent television could be used with longer forewarning periods, but only occasionally has research paid much attention to them in connection with the evacuation process (e.g., Christensen and Rush, 1978).

There is fairly clear evidence that the use of warning sirens alone is totally inadequate to stimulate people to take immediate protective action. The sirens may not even be noticed; if noticed, they may be ignored, assigned everyday meaning, or as is most often the case, initiate the seeking of additional information. One study reports that many who heard sirens sounding constantly through the night had no reason to believe they meant any sort of

warning, interpreting them as signal routine fire, ambulance or police business (Albert and Segaloff, 1962). A researcher in Hawaii similarly reports that although 95 percent of his sample heard the sirens, and knew them to be associated with tsunamis, they assigned them such means as: an alerting measure, a preliminary signal preceeding an evacuation signal, a direct call to evacuate, a signal to await further information, and a signal to make preparations (Lachman, et al, 1961). Multiple interpretations of sirens is likewise reported for the Holland flood (van Dijk and Pilger, 1955; Ellemers, 1955). At best, except where they have been a traditional part of a disaster subculture (as in Topeka, Kansas for which, see Stalling, 1966), sirens may indicate that something might be wrong (Mack and Baker, 1961).

According to almost all studies on the subject, radio is the most widely used and potentially the most effective and efficient means of communicating warnings. It is widely accessible, not very vulnerable to environmental impact, highly flexible and immediate, and generally given high credibility by the public. Research data also indicates that it is frequently turned to by people in mass emergencies. In the Denver flood of 1965, a majority (52%) of people said their first warnings of a possible disaster came from the radio (Drabek and Stephenson, 1971). In fact, the ongoing University of Minnesota studies of warning have concluded that "the vast majority of the public receives severe weather warnings either directly or indirectly from the mass media" (Carter, 1980: 5). Most examinations of radio's role in warning and evacuation activities, however, note that its effectiveness is to a considerable degree dependent on its operations being congruent with the decisions and activities of local officials. Without such congruence, radio may broadcast information at variance with, if not contradictory to, the official

view of the disaster (Worth and McLuckie, 1977). As will be seen later, people subjected to inconsistent information are unlikely to heed warnings or evacuate.

An interesting dependence of local officials themselves on radio has been noted in certain kinds of mass emergencies. In technological disasters such as the Three Mile Island incident, the Louisville chlorine barge episode, and in some recent chemical disasters studied by DRC where important information was controlled by private or nonlocal governmental agencies and not always given directly to local authorities, radio can become the major source of information available to those who must make the actual evacuation related decisions (Fitzpatrick and Waxman, 1972; Rubin, et al, 1979).

In still other situations, radio may function in a more integrative role than is realized, intended or planned. In four communities along the Mississippi river that were threatened by toxic gases, one study reported that, given an absence of coordination and leadership by governmental agencies, the radio station assumed the responsibility for interpreting cues, determining risks, and making decisions regarding warning and evacuation that would ordinarily fall to local officials. The general public, realizing that the station was the only dependable source of information, listened to it extensively, believed it and later reported high satisfactor with it. Research on other disaster situations, while not reporting as extreme a coordinating role for radio, have nevertheless indicated that radio stations under certain circumstances will unwittingly take on a coordinating function with respect to warning and evacuation (Waxman, 1973). The most important and insufficiently researched point appears to be that if information from official sources is ambiguous, incomplete or suspect, unofficial sources,

including radio as well as personal information networks, will be utilized and thus become part of the warning process.

In this connection the literature alludes to but does not really report data on the development of telephone networks as people call one another to discuss and confirm warning and evacuation information (Quarantelli and Taylor, 1978). Although usually the phone system quickly becomes overloaded and few calls in the later stages get through, it does appear that the phone system carries an indeterminate part of the early communications in disaster. Almost nothing is known about this, including how such activity affects the latter part of the warning process.

There is a comparable lack of research knowledge about the use of loud speakers by emergency agencies to alert populations to danger and to urge evacuation. The impression received is that this kind of police (sometimes fire) department procedure is a very common means employed in sudden events which allow some forewarning (Ellemers, 1955; Moore, et al, 1963, 1964; Yutzy, 1964a; Anderson, 1965a; Drabek and Stephenson, 1971; Mussari, 1974; Worth and McLuckie, 1977). But, its existence is about all that the literature documents.

The relationship of formal, mechanical means to informal person-to-person communication networks is not clear either. There is some slight evidence that informal word-of-mouth networks may be extremely effective and rapid--in some cases outspeeding formal communication systems (Scanlon, et al., 1976; the DRC chemical disaster studies). If research would conclusively establish this, and the conditions under which it happens, there would be very important theoretical and practical implications for warning and evacuation planning.

As to research on intraorganizational and interorganizational communications with respect to warnings generally and evacuation particularly, the existing literature is scattered, and yields only a few limited themes. One theme concerns the communication breakdowns that can occur if different organizations have incompatible communication equipment. Thus, in the Port Alice mudslide, inter-agency coordinating efforts were hampered by lack of crossover, capabilities among the various radio networks involved (Scanlon, et al, 1976). Also noted is that at times of disasters some organizations may overhear broadcasts intended for others with consequent misuse of the information. For example, a message that a dam had broken, intended primarily for civil defense headquarters and later turning out to be false, was overheard and spread by fire department personnel who were pumping out water in basements of area residents, contributing to an unnecessary evacuation (Danzig, et al, 1958). Another theme is that it is the extremely rare disaster situation where there is complete loss of necessary mechanical communication capabilities (see however, van Dijk and Pilger, 1955). Even in the catastrophe at Darwin, despite initial accounts of lack of such facilities (Haas, et al, 1976) a systematic study discovered that at all times there were substantial communication capabilities of all kinds available in the area, albeit unknown to most local officials and agencies (Scanlon, 1978).

Decision-making Processes

Decision making is a process involved in very many aspects of disaster behavior and is accordingly a major topic of attention in the general literature (see Dynes and Quarantelli, 1977). It is also a topic of importance to those with an interest in the warning process. Our more specific concern with it is limited to whatever has been examined about decision-making in

connection with the evacuation process. There is some literature touching on several points, but the breath is not matched by similar depth.

The picture of decision making is clearer with respect to organizations than it is for individuals. For example, information about threats or the need for immediate withdrawal often reaches an organization's intermediate or lower levels rather than its top decision making levels. In other words, organizations may obtain appropriate information but it will not necessarily quickly get to those in positions of authority. In many transportation accidents involving hazardous chemicals, we have often found that both first responders from emergency agencies or on-site company personnel realize that they will have to make a decision regarding evacuation of the nearby area. Thus, people who frequently have only limited knowledge of the overall disaster plan will initiate actions which according to plan should come from the top down. This is part of a general principle in the disaster literature, that "as the degree of organizational stress increases, the number of individuals conferred with before a decision is made will decrease" (Haas and Drabek, 1973: 255). But, while the literature indicated decisions are often made at a lower level than they "ought" to be, there has not been a full examination of what this does to the evacuation process. Implications that it is dysfunctional do not seem warranted.

The literature cites more than a few cases of key decision makers not being located where they can easily participate in the process; for example, out in the field rather than at an EOC or other command location. In a Japanese disaster, the mayor was attempting to obtain visual confirmation of a threat, out of contact with headquarters, with a consequent delay in the issuance of an evacuation statement (Hirose, 1979). In an American

situation, the local fire chief got so involved in on-site fire supervision, that the issue of evacuation of the neighborhood which he initially thought about and had responsibility for, was temporarily overlooked (Yutzy, 1964c).

Apart from decisions about receiving and confirming information, organizations also find themselves at times uncertain about the kinds of evacuation "statements" they ought to issue. The literature and research observations indicate that this can be a major problem. Different organizations in the same situation may differ in both decision making procedures and actual decisions made. In some cases, the decision is to provide the public with information about possible dangers, but to hold back on recommending actions which should be followed. In other cases, the decision is to spell out details of the threat along with strong recommendations for specific actions (Moore, et al, 1963). In a study of ten communities involved in floods in Colorado, some researchers found almost all possible combinations of organizational decision making on this issue (Worth and McLuckie, 1977). However, the research literature, while frequently describing the different decision making patterns, offers little systematic data on what influences organizations to follow one pattern rather than another.

The literature does confirm that at least in American society, there is a strong expectation, shared by both the general public and holders of positions of authority, that people with responsibility for making decisions should in fact do so. That socio-cultural factors are important in this process is clearly manifested by cases where authorities in responsible positions will avoid making decisions about warning and evacuation. Thus, in one instance in India, authorities who were told 12 hours ahead of time that a dam would probably break and then given three hours notice before the

waters would actually reach a major city, "made no effort to warn the inhabitants...no effort to notify other agencies" (Burger, 1979: 407). In contrast, although few studies explicitly point this out, it sometimes appears decisions are made because of expectations that they should be made rather than because the situation requires it. Pressure from mass media personnel asking questions does seem, on occasion, to force public decisions which officials might otherwise try to delay.

On the other hand, the research literature also reports that organizational decision makers sometimes feel self projected pressure to withhold decisions because of the possible political and legal ramifications of recommending or ordering an evacuation. In fact, research observations imply that this may be more of a factor than is usually publically acknowledged. Business interests are sometimes said to be unofficially important in the official decision making process, although explicit documentation of this is rather rare (Killian, 1954; Hirose, 1979). Business interests did apparently threaten to institute a lawsuit for "false warning" against the National Hurricane Center when Hurricane Agnes did not impact Panama City (Baker, 1979). Residents of an area, also sometimes blame business interests for trying to minimize threats from hurricanes out of self interest (Windham, et al, 1977). However, studies so far fail to paint a clear picture of how potential litigation might affect official decision making with respect to the evacuation process.

As to individual decision making, one student of the problem recently wrote with regards to evacuation specifically, that "in spite of its apparent ubiquity, very little attention has been devoted to examining variables which

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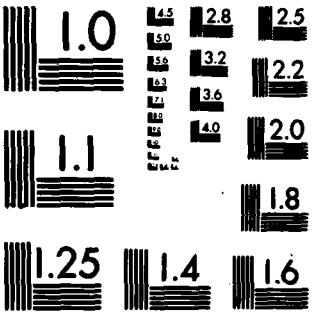

MICROCOPY RESOLUTION TEST CHART
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are important in individual's decisions to evacuate in response to a disaster warning" (Perry, 1979b: 25). Such work as exists tends to focus on particular factors--such as perception of threat as real, personal risk, family contact and kin relationships, and community involvement--with almost no attempt to order them into a general framework aimed at understanding evacuation decision making (for an exception, see Perry, 1979b).

One theme in this literature is that, for action to occur, potential evacuees must decide that they can do something about the perceived threat. Perception of a personal and real threat is not enough to generate withdrawal. The persons involved must also come to the conclusion that they can evacuate. Research has long stressed that a warning is not a warning unless the message also communicates what the danger is and what can be done about it (Fritz and Williams, 1957).

Adaptive response to information about danger is dependent on a number of factors, but it has been proposed that two in particular--warning content and prior experience--are of greatest importance (Perry, 1979: 29). Instructions or suggestions to evacuate are more likely to lead to a decision to leave if the warning communication is clear and consistent and specifically indicates that withdrawal should be undertaken (Williams, 1964). While individuals normally will not bolt in flight just upon seeing or hearing of danger (Quarantelli, 1954), a variety of studies give evidence that warnings which contain information about a danger and tell people to leave an area, will be very effective in reinforcing withdrawal tendencies (e.g., Klausner and Kincaid, 1956; Lachman, et al, 1961; Parr, 1969; Worth and McLuckie, 1977).

The research evidence, however, is not totally one sided with respect to the influence of prior experiences on the evacuation process. As we have said, disaster experience per se may influence the evacuation process in different ways, and may not be crucial in itself.

One related question somewhat addressed by the literature is whether "false alarms" are dysfunctional in that they could generate a "cry wolf" syndrome. The evidence on this is somewhat mixed. In certain situations, decisions not to leave appear to have been influenced by an earlier experience of leaving with no disaster occurring (Anderson, 1965b). But, a survey in Panama City reported respondents saying they were not sorry they evacuated even though nothing happened, with an even greater number, including some who had not withdrawn the first time, stating they would decide to evacuate again under similar circumstances (Killian, 1954). In still another study reaction to an unnecessary and not widely heeded evacuation order spanned the full range: many expressed understanding of the situation, more expressed annoyance although there was a tendency to blame the false alarm on "outsiders" rather than local officials (Rayner, 1953). Additional and more recent studies in the disaster area which examined not projections of how one would act in the future, but rather what one actually did decide in a later threat situation given earlier experiences, have also produced mixed results.

In conclusion, it should be noted that a focus on decision making may imply a more conscious and deliberative act than might often be the case at both the individual and organizational levels. There are hints in the descriptive literature that the process is frequently rather vague and not as clear cut as is implied by formal decision making theory. As we will discuss later, evacuation orders are relatively seldom issued; rather, a general

definition emerges that evacuation should occur. Similarly, it is possible that decisions to evacuate may actually be less a weighing of alternatives and deciding, than the development of an informal consensus or an implicit understanding about what should be done. The research literature has not dealt with this issue, assuming instead a model of decision making which may be more an imposition of a structure by researchers than it is a depiction of the actual processes individuals and organizations undergo which are eventually manifested in withdrawal behavior. As we discuss later in the section of this chapter on patterns of behavior, a fair amount of evacuation behavior may not involve any decision making process in the way the term implies (see especially Drabek, 1969). If this is so, a novel research strategy is necessary.

Coordination Activities

The literature in this area has several distinctive characteristics. While relatively substantial in volume, much of the literature deals with the contexts or factors which influence coordination rather than dealing directly with the process itself. Also, very many of the research studies focus on interorganizational aspects. This can be seen in the general disaster literature and also in the few works which touch explicitly on coordination activities in connection with the evacuation process. There is some material on joint or integrative activities of individuals or families, but most of it is rather implicit and highly descriptive. Therefore, in this section, we will primarily concentrate on social and behavioral studies which touch on interorganizational coordination.

One theme that comes across is that coordination among organizations involved in evacuation, in every day life (see e.g., Haas and Drabek, 1973:

66), may take different forms. Thus, it is suggested that intergroup coordination may result from standardization, that is, commonly established routines or rules. For example, coordination of an evacuation effort may be difficult between rigidly hierarchical military organizations and voluntary associations with few if any levels of authority or power. Conversely, the more organizations are similar to one another in structure and function the easier coordination will be.

The literature also notes that coordination may come about as a result of planning which prescribes schedules by which various activities may be governed. As an illustration, the shelter taking by tens of thousands of New Orleans residents at the first approach of Hurricane Betsy, stemmed from pre-impact planning for a coordinated effort between religious groups, the local school system and the Red Cross chapters (Forrest, 1979). Members of religious groups provided the necessary personnel, the schools and necessary physical space and buildings, and the Red Cross the necessary general supervision and materials to run a massive shelter operation for evacuees.

There may also be coordinating of interorganizational behavior as a result of mutual adjustment, that is, by repeated exchanges of information. For instance, as DRC field teams observed, the second set of evacuations in New Orleans generated by the unexpected flooding following Hurricane Betsy, came about because of ad hoc agreements and understandings that developed between the local civil defense office, the Red Cross chapter, local Salvation Army units, military groups and other agencies involved in rescuing victims and transporting them to newly established shelters. The division of labor necessary, and the assignment of responsibilities for different tasks in handling the evacuees was slowly worked out as these groups communicated and exchanged information about various problems.

However, while the research literature cites at least three different patterns of coordination behavior, there are relatively few cues as to why one pattern emerges over another. One study reported that, in the localities it observed, because contact was lacking in routine times with little expectation that it would intensify in hurricane situations, there was "widespread lack of coordination among the civil defense and other relevant community organizations" (Carter, 1980: 13). This clearly suggests that warning and evacuation processes would be affected. Such lack of contact among key emergency organizations is attributed to a variety of reasons. For example, the historical rivalry between the Red Cross and the Salvation Army (Adams, 1970; Ross, 1970) has interfered with the development of contacts which would allow cooperation during a mass evacuation.

Conflict, of course may, as it did at Three Mile Island, seriously interfere with an overall coordinated effort (Presidential Commission, 1979). But, interorganizational conflict, while often discussed in the research literature (Quarantelli and Dynes, 1976), is seldom examined in any depth sufficient to shed light on how this might effect the evacuation process. Passing mention of different organizational views about various aspects of the process (e.g., Moore, et al, 1964) does not yield much understanding. Neither do references noting that some organizations often do not so much conflict, as work independently of one another. Frequently singled out in this connection is mass media issuance of withdrawal information which is at variance with the position and actions of emergency agencies in the community (e.g., Worth and McLuckie, 1977). But, the conditions which result in such lack of coordination have only occasionally been explored (Waxman, 1973).

Also affecting intergroup coordination is the fact that major disasters enlist the involvement of organizations not used to this type of work, who are often unfamiliar with the activities of the more traditional emergency agencies. Thus, in one tornado situation in New England, the Red Cross estimated from experience that few emergency beds would be required, and set up only 150. However, two other agencies independently set up another 150 beds each, even though only 20 of the 450 emergency beds were ultimately used for the more than 2,000 homeless (Rosow, 1977). Groups without experience and knowledge of disasters typically will overestimate the number of evacuees who will need housing, not realizing most people seek refuge with friends and relatives; even worse, they may not be aware that other agencies such as the Red Cross have certain formal responsibilities for emergency sheltering and thus will not attempt to exchange information about housing needs.

This relates to what is a major theme in the research literature; namely, that if the formal or established groups cannot or will not coordinate in a crisis, and the situation requires it, emergent groups will take over the activity. Thus, coordination of much of the community response including the withdrawal movement, was taken over by emergent groups in Fairbanks, Alaska when 15,000--half the population--was flooded, and also in Minot, North Dakota, where 12,000 had to flee rising waters (Parr, 1969: 141, 214). However, while the appearance of emergent groups is very frequently described in the research literature, and the condition associated with the appearance of such groups have often been hypothesized (Dynes and Quarantelli, 1968; Parr, 1970; Quarantelli, 1970; Dynes, 1975; Mileti, et

al, 1975: 71-75; Ross and Smith, 1975; Ross, 1976; Forrest, 1978; Stallings, 1978), there is little so far on the specifics of emergent groups directly involved in the evacuation process.

The research literature does provide suggestions on what general factors may facilitate or hinder coordinating activities of either established or emergent groups. The conclusion is that coordination is considerably facilitated if interacting organizations all use the same EOC, or at least are at a point where information converges (Barton, 1970: 171-179). In a Montana flood, where this was not the case, the evacuation was marked by interagency conflict, overlapping activities and nonutilization of available resources for withdrawal activity (Yutzy, 1964b).

By and large, research is fairly consistent in supporting the notion that evacuation activities which involve the coordination of many public agencies, or particularly the coordination of groups from both the public and the private sector, are unlikely to proceed smoothly. Out of a number of apparent reasons, the simplest is that the greater the number of organizations involved, the more inconsistent and contrasting will be the operational styles, policies and plans that have to be coordinated. Another factor is the unfamiliarity of different organizations with one another's activities and responsibilities, and the difficulty of visualizing how actions at one point may have consequences at another. Thus, we have encountered in more than one disaster, a situation where evacuation had been ordered or recommended, yet there had been a failure to notify highway or transportation departments that perhaps traffic light systems controlling flow patterns should be changed, or that tolls ought to be waivered. Still

another factor is the unwillingness of some segments of the private sector and the inability of the public sector to agree to work out joint activities. There is, for example, typically very little pre-crisis planning between local chemical companies and local emergency organizations as to warning and evacuation responsibilities in a hazardous chemical incident; in fact, because of the different policy and value positions involved there is not likely to be much coordination even if an actual episode should require the evacuation of residential areas near the plants.

A few researchers have noted that coordination is usually visualized from the top down--a command post perspective, to use a phrase coined for analyses of different phenomena (Quarantelli, 1975). This can lead to an ignoring of the fact that lower level personnel may be seriously questioning if not failing to carry out the orders intended to achieve coordination. In one massive evacuation studied by DRC, middle and lower level police officers sometimes worked out their own informal coordination with personnel from other agencies, because of their disagreement with the central coordinating unit. Research has almost ignored crisis situations where there are discrepancies between the coordination activities at the policy level and their implementation at the operational level. There is enough evidence to suggest that there is often a substantial disparity between the two levels.

Again, an issue not well addressed is the relationship between organizational coordination and the coordination by multiple smaller units, as represented by the families which manifest the bulk of the evacuation behavior. While the term "mass assault" (Barton, 1970) has been suggested to capture part of what is involved, linkages between coordination at organizational and individual levels have not been much examined. Yet, since it has

been consistently reported in the literature that sometimes individual withdrawal behavior is at odds with the officially coordinated effort (Quarantelli, 1954; Worth and McLuckie, 1977), it would seem this issue requires far more attention than it has thus far received.

Task Activities

Except in a very general descriptive sense, the task activities of individuals in carrying out withdrawal movements have not been the object of much analytical attention in the evacuation literature. In fact, most possible topics have just not been examined. At the organizational level, there has been somewhat more descriptive attention given, but on the whole, the findings and observations are not analytically impressive. Many specific evacuation task activities are apparently seen by disaster researchers as being logistic or administrative matters rather than research questions.

Apart from noting that evacuees prefer to use their own cars to transport themselves out of an endangered area, the bulk of the literature consists of a listing of what those withdrawing take with them. One Japanese study of a post-earthquake evacuation stated that, "people carried out food, clothes, cash, blankets, transitor radios, important papers, and so forth" (Takuma, 1978: 162). Other research studies in American society likewise suggest that evacuees take items which are of a utilitarian nature (e.g., Danzig, et al, 1958; Drabek and Stephenson, 1971). There is very little evidence, despite the journalistic stories, that unusual things are typically taken.

Of course, if withdrawal has to be very rapid as in flash floods such as Rapid City or the Big Thompson Canyon (Mileti, 1974; Gruntfest, 1977), or as in many toxic chemical incidents, people will flee only with whatever they have at hand. But, where there is time to gather up things, it does

appear evacuees do collect whatever they think might be immediately useful or necessary for them (e.g., prescription medicines). If there is a belief that the evacuation will only last several hours and one's residence is not going to be physically impacted, important papers such as insurance policies may not be taken (Drabek and Stephenson, 1971: 195). However, we have no picture of who leaves without taking anything, why they do so, and what additional problems, if any, this occasions for host households or relief agencies providing mass shelters.

Some slight attention has been paid to the matter of household pets. Most attention to this question has been highly descriptive, and usually the issue is only taken up in passing. However, such evidence as there is does not provide a clear picture of the pattern--sometimes pets are taken (Drabek and Boggs, 1968), sometimes not. They are usually not allowed in mass shelters (Forrest, 1979). At least a few people are reluctant to leave without their pets; such was the case in Mississagua, Canada. Official assurances that humane society officials would go into the evacuated areas and feed the animals seemed to be important to some residents. Whether anyone actually refuses to leave because of reluctance to abandon household pets has not been explicitly shown in research data.

The literature is also unclear on how much time evacuees spend on securing their property before leaving. People have been observed to board up their homes in anticipation of hurricane impact, or move some of their furniture to upper stories in the face of a possible flood (Wenger and Parr, 1969: 40-42). But, it would be difficult from the existing data to even speculate on what percentage of evacuees take personal property security

measures, what is actually done, and if the steps actually accomplish anything warranting the delay it seems to occasion in leaving. Clearly, too, carrying out property securing tasks would seem to be a function again of the time available for acting; in the face of immediate personal threat as presented by a tornado or toxic cloud, property securement would probably not be given high priority. However, at the moment we can say extremely little of a documented nature on this question.

Even less systematic attention has been paid to what non-evacuees do by way of tasks. Apart from securing property such as by "hurricane proofing" their homes, some studies remark that stayers may procure foods (e.g., Wilkinson and Ross, 1970) and depending on the nature of the disaster agent may also attempt to obtain such items as flashlights. In the Denver flood of 1965, the statement is made that "many families resented the reluctance of local officials to provide assistance in moving possessions" (Drabek and Stephenson, 1971: 200). Whether inability to obtain food and other material assistance becomes a factor in the evacuation process is not really discussed anywhere in the literature examined.

From an organizational perspective, there are a number of specific work tasks which have to be carried out if any evacuation process is to be effective and efficient. There is considerable descriptive literature on particular tasks which would seem important in the process, but we are seldom told much of anything new. For instance, emergency organizations that attempt to initiate withdrawal movements frequently go into an area with public address systems or loudspeakers. How are the necessary items and equipment obtained, mobilized, etc? Typical of the accounts we found is

one study of Hurricane Carla which reported that certain carefully worked out plans formulated after Hurricane Audrey were put into effect and,

> About 50 specially trained deputies went on duties in their designated quadrangels, equipped with maps, badges, firearms, cars, or boats. Some had two way radios automatically tuned to the station in the county courthouse. Under their supervision, the four communities in danger of flooding were evacuated quietly.
>
> (Moore, et al, 1964: 20)

Similarly, a Canadian study reports in passing that prior to a flood withdrawal movement, necessary supplies and equipment such as boats and motors were assembled (Hannigan and Kueneman, 1978: 145).

There are frequent references to emergency groups procuring buses or collecting supplies for mass shelter operations. One DRC account of the Alaskan earthquakes describes how in the post-impact period thousands of meals were served to evacuees and others by a variety of organizations ranging from the local American Legion Post to several hospitals (Wenger and Parr, 1969: 92-96). But, most descriptions are in global terms, give little indication of what items were obtained and where, how they were transported, etc. In fact, very few studies even provide general chronological accounts of particular task activities by emergency groups (e.g., Moore, et al, 1964; Forrest, 1979). Moreover, only a very few literature sources have even remotely tried to provide some quantitative estimates of the material items organizations collect and use in connection with evacuation operations, and usually these figures are buried in discussions of other kinds of disaster related tasks (Fritz and Mathewson, 1957; Moore, 1958; Wenger and Parr, 1969; Committee on the Alaskan Earthquake, 1970).

That there are problems in carrying out specific evacuation related tasks is supported by considerable documentation both of an anecdotal and analytical nature. For example, in Hurricane Carla it was noted that the state civil defense office kept receiving requests from local groups for permission to break into facilities storing cots and beddings,

> The cots were in emergency hospitals, stored in several cities in the area. Local officials, who counted on using them, thought they had only to ask state civil defense. But, the hospitals were controlled by the Office of Emergency Planning (OEP) and compliance with required procedures for procuring them was difficult...

since the following regulations were operative:

> The state civil defense director must specify who will use all requested property, how, and where. He must state why the situation is beyond the capability of local authorities. If property is to be used by the Red Cross, that agency must concur in the request.

(Moore, et al, 1964: 25-26)

While the requirements prevailing in this particular case are more history than present day reality, recent observations indicate that the obtaining of cots and bedding can still be a problem, although for different reasons, as was the case at Three Mile Island (Popkin, 1980).

On balance, while we have many scattered descriptions of specific tasks undertaken by emergency organizations in connection with the evacuation process, we do not have a good understanding of the material items required, the typical problems encountered at the organizational level, and how the whole operation is coordinated. We know even less when a massive evaucation is involved requiring the interrelation of multiple tasks carried out by many federal, state and local public agencies and some private groups.

Patterns of Behavior

According to our model, community context in combination with threat conditions and social processes result in certain patterns of evacuation behaviors. More specifically, the four possible behavioral patterns ware warning, withdrawal movement, shelter and return. As discussed in detail earlier in this report, we do not equate evacuation solely with withdrawal behavior, but visualize it more broadly as involving all four behavioral patterns.

Warning Behavior

There are probably more studies on warning than on any other given topic in disaster research. To systematically examine all this material would be too duplicative, (see Williams, 1964; McLuckie, 1970; Mileti, 1975) and would furthermore have us deal with much phenomena only peripheral of the central concern of this report. Therefore, our examination of warning will be both very selective and focused, touching only on warning behavior which in the literature is clearly and directly related to evacuation. Even so, our discussion in this section will necessarily be more detailed and longer than our summaries and reviews of other lines of research on the evacuation process.

There is general agreement in the empirical literature that warning involves far more than a simple stimulus-response act (Mileti and Beck, 1975; Perry, 1979b; Carter and Clark, 1977). As implied earlier, warning can best be viewed as a process involving multiple actors, phases, and feedback. Warning can also be conceived of as the flow of information about a threat potential. Looked at this way, we can ask about the initiation of that flow and what affects it. The first perspective leads us to

look at organizational activity in warning--a topic not examined in depth by research--and the second directs us to individual behavior in the warning process, a matter that in contrast has been very extensively studied.

While there are emergency situations such as earthquakes where individuals can and do directly observe danger signs themselves, in the majority of cases, people usually receive at least initial word from organizational sources. Individual handling of danger signals is also heavily dependent on organizational activity, although as we shall note later, there is evidence that organizations tend to underplay personal initiative capabilities at times of stress, and to overestimate the impetus for action generated by formal groups. Unfortunately, the literature on organizational involvement in the warning process hints at rather than presents definitive conclusions. There has been little indepth research on how organizations internally process warning messages (but see Stallings, 1966), and almost no studies of how agencies arrive at evacuation orders or recommendations.

Some researchers have noted that organizations with responsibilities in the area may need to engage in warning behavior during and after initial impact, as well as before. Information needs to be provided at times about the dynamics of or changes in threat conditions, or of secondary dangers (McLuckie, 1973).

As mentioned earlier, in many natural disasters, there can be multiple agents which could impinge upon the evacuation process. In some technological disasters such as transportation accidents involving hazardous chemicals, major threats are likely to develop after the initial railroad or truck accident, from the leaking of toxic gases, possible fires or explosions from ruptured containers, etc. Among the problems associated with organizations

issuing evacuation related warning are that relevant resources may be destroyed, damaged or impaired (e.g., as result of electric power failure), that there can be difficulties in communicating with a dispersed population (Brouillette, 1966), and that there often is some uncertainty over who has responsibility for disseminating and coordinating the information flow (Moore, et al, 1963).

Other researchers have indicated that key organizational officials frequently have to decide if the public is to be warned, what they should be warned about, and whether evacuation should be advised. From an organizational perspective, there are often difficulties with all three of these aspects of warning behavior. The information available to local officials is often incomplete or ambiguous. The Three Mile Island incident is a classic illustration of this problem (Presidential Commission, 1979). The time available for decision making frequently is either short or perceived to be short as was true in the Big Thompson flash flood (Gruntfest, 1977) or for some of the communities in the Holland flood of 1953 (van Dijk and Pilger, 1955). Finally, potentially conflicting values are frequently at play, such as the political costs of a false warning, the economic losses of disrupting everyday routines, the pyschological stress of presenting threatening information, etc. (Anderson, 1970b; Barton, 1970; Dynes, 1975). Even when evacuation is recognized as necessary, as was the case following a Japanese volcanic eruption (Hirose, 1979), the negative socio-economic consequences of a large scale population withdrawal was such as to make local authorities reluctant to order or recommend such movement. DRC has occasionally observed a similar reluctance in the face of incoming hurricanes in some southern and Gulf Coast communities because of a concern that the tourist business would be negatively affected.

With respect to the cost factors, several studies have suggested certain other considerations that might enter into the reluctance of organizational officials to issue specific warnings and directives about evacuation unless fairly certain the danger will actually materialize. One major concern appears to be about the possible legal consequences of issuing false alarms, although this is sometimes balanced by worry about possible post-impact accusations of negligence (Anderson, 1965a, 1970b). There is also, as is well known, a very widespread and pervasive, although incorrect, belief that warning or evacuation calls will generate "panic" (Blum and Klass, 1956; Fritz, 1957 for earlier work and Quarantelli, 1979a; Dynes and Quarantelli, and Kreps, 1980 for later work).

Although better studied from the individual than the organization side, there are indications in the literature that consistency in the warning messages coming from different sources—the media and various agencies, strengthens those messages. A study observed that in one situation in California the arrangement between local municipal officials, disaster authorities and other pertinent organizations allowed a coordinated dissemination of information to the public which resulted in the timely withdrawal of community residents. This condition did not occur in a nearby city, which resulted in an absence of pre-impact evacuation and in some deaths (Pierson, 1956). In a chlorine gas release situation in Louisiana, lack of consistency of organizational messages led to confusion on the part of residents over whether or not the warnings were official (Segaloff, 1961). Similar observations may have led researchers to report that when given information about an immanent flood, Colorado residents often tended to focus more on gathering additional information than complying with evacuation

appeals (Worth and McLuckie, 1971). If nothing else, these examples illustrate that there is a relationship between organizational warning behavior and the warning behavior of individuals, to which the discussion now turns.

The matter of individual activities with respect to warnings, which we have already partly discussed under definitional variables and decision making, is represented in the literature by a melange of theoretical models, abstract but empirically related formulations, efforts to single out significant variables, and rather low level descriptive studies of disaster victims and evacuees. Some themes run through this research literature, and a few points seem rather well established. But, there is no overall consensus and it would be difficult at this point to indicate the most effective kinds of warning an organization could issue.

A few students of the problem still assume that what is needed is a theoretical understanding of how people come to respond to warnings. One model holds that the effects of warning messages is to create a kind of internal state, this being variously labelled fear, anxiety, vigilance, sense of risk, etc. This internal state is seen as preceding and influencing the observable behavioral responses by which decisions are expressed; in this case, regarding evacuation. Thus, one model proposes that an optimal balance between fear and vigilance will evoke a better adaptive response than just a fear state. However, the stimulus-response imagery implicit in this formulation is not consistent with most empirical field observations that warning is not best visualized as a stimulus-response act.

Another more empirically rooted view posits sequential stages where after obtaining information in initial warnings, and subsequently confirming

them, people assess the personal risk in terms of proximity, severity and certainty. The warning information is used to decide, "will I be hit and how hard?" If the answer is "probably and very" the next stage of the decision making process is entered (Perry, 1979b). While the formulation is illustrated with disaster examples in its most systematic presentation, it has not really been the basis of any actual empirical study on decision making with respect to warnings and evacuation (see, however, Perry, et al, 1980). It does at least imply, though, that individual warning activity is not a simple response.

A number of theorists and researchers have singled out several potentially significant decision making variables. Among those mentioned and sometimes empirically examined are clarity versus ambiguity (Janis, 1962; McLucky, 1970; Drabek and Stephenson, 1971); timing (Withey, 1962; Riley, 1971; Mileti and Beck, 1975); sequences (Withey, 1964; Hultaker and Trost, 1976 ; Clark and Carter, 1979); orders versus advice or recommendations (Fitzpatrick and Waxman, 1972; Worth and McLuckie, 1977; Scanlon, et al, 1976); directiveness versus instructional values (Blum and Klass, 1956; Beach, 1967; Riley, 1971); frequency (Fritz and Marks, 1954; Mileti and Beck, 1975); repetitions (Janis, 1962; Riley, 1971; Hultaker and Trost, 1976); consistency (Blum and Klass, 1956; Adams, 1965; Clark and Carter, 1979); and legitimacy (Janis, 1962; McLuckie, 1970; Scanlon, et al, 1976). Only a few authors have made even modest attempts to synthesize or order any of these variables into some dynamic view of the warning process (e.g., Mileti and Beck, 1975; Clark and Carter, 1979; Perry, 1979b). However, most users of variable terminology tend to take a dynamic view of the warning process.

There appears to be a high degree of consensus that fear alone is not a sufficient motivator to initiate withdrawal behavior; in fact, too much fear may simply lead to inaction, as shown by studies of panic flight which indicate a feeling of hopelessness which prevents any active response (Quarantelli, 1954; 1979a). On the other hand, there also seems to be relative agreement that human beings are not simply inert and passive creatures waiting to be moved into action at times of stress and crisis; rather, most people, especially in conjunction with others, actively seek to cope with and to adjust to the situations developing around them. As was documented as early as the second chapter of this report, human beings are very seldom paralyzed by the perception or information that they may be in danger--in fact, there is almost always an active seeking to ascertain what the situation is, what alternative courses of action are available, and other behaviors which reflect a proactive rather than a reactive orientation.

There is some evidence that there are certain common phases upon the hearing or observing of danger (Drabek and Boggs, 1968). One very common pattern is an initial disbelief, regardless of warning source. This is not a denial of reality as some older speculations would have it (Powell, 1954), but simply a continuation of the everyday assimilation of cues to the normal which allows people to function without undue stress. In this pattern, the initial disbelief is followed by slow acceptance combined with continued underestimation of the extent and seriousness of the threat.

Eventually, there is a gradual acceptance of the general severity of the danger, but a remaining feeling of personal invulnerability. How rapidly or slowly the process is worked through depends in part on the source of the initial warnings and opportunities for confirmation.

There are undoubtedly other patterns, but the research literature is not very informative about them, nor is it about what accounts for why some individuals exhibit one or another pattern, and if they are related to particular types of disaster agents. There are some hints that situational contingencies as discussed earlier may be more important than personality characteristics in the selection of a behavior pattern. The relative validity of these two explanations is an important issue because of the practical implications involved, with situational contingencies being easier for planning purposes.

The weight of the evidence is that unless people can confirm that they are in personal danger, flight behavior will not occur. The reluctance to withdraw in the face of warnings, long noted in the disaster literature (e.g., Quarantelli, 1954), and contrary to some implicitly negative evaluations (e.g., Boek and Boek, 1956), actually represents, in most cases, an adaptive and functional coping mechanism. If people were to bolt upon every sign or message of danger, we would truly have the chaos and dysfunctional responses that the uninformed mistakenly believe to prevail in crises.

Just as analyses have shown that organizational responses to disasters are likely to be more efficient and effective if some time is taken to assess the situation (Quarantelli, 1977b), so research observations suggest that people are likely to be better off when they seek to confirm what is happening and consider alternative courses of action open to them. An important implication of all this is that efforts at confirmation are probably more important for the evacuation process than initial warning messages. Whether better or not, confirmatory behavior in conjunction with others, is, in fact, what commonly occurs.

Theoretical or general discussions (Fritz and Marks, 1954; Williams, 1964; McLuckie, 1970) as well as empirical studies (most of those cited in this chapter) are rather consistent in their finding that human beings under stress initially tend to interpret new data in terms of the known and the familiar. People will generally believe they are not in immediate personal danger until perceptions indicate almost indisputably otherwise. Thus, the exchange of information, after initial receipt of messages about danger, becomes crucial during the warning phase. The initial warnings usually are collectively worked over as is typical in the rumor process (Shibutani, 1966), and additional information if at all possible is obtained to either confirm or deny the initial reports. When this confirming and synthesizing process clearly indicates personal danger, the probability of evacuation is strongly reinforced. Support for this can be found in those studies which have found consistently strong relationships between confirmatory activities and evacuation (Drabek, 1969; Worth and McLuckie, 1977; Baker, 1979; Perry, 1979a,b).

According to the research done, people tend to use multiple sources for confirmation, sources used depending partly on the source of the first warning, partly on the perceived reliability of various sources, and partly in the ease with which information can be obtained (Williams, 1957, 1964). Almost everybody, regardless of course of initial warning, discusses these warnings with others, especially those with whom they have close primary ties such as family members. However, those who first hear from family or peers look more frequently to official sources for confirmation, often clogging phone lines and hampering organizational mobilization in the process. Those who hear first from official sources tend to be somewhat less skeptical,

although not always. Believability of official warnings seems to be a function of the legitimacy and credibility accorded the agency issuing warnings. Organizations that are perceived as "outsiders" may not be seen as legitimate (Scanlon, et al, 1976), nor might organizations that issue incomplete or ambiguous information, nor those towards which hostility is felt either prior to or during the course of events, as at Three Mile Island (Presidential Commission, 1979).

The range of warning studies, done for different purposes and substantially varying in quality, does not directly depict what is most crucial for the evacuation process. However, a few ideas seem to have better empirical grounding than others. Most are fairly well summarized in a concluding paragraph of a report which not only pulls together the research observations about warning and evacuation activities in ten Colorado communities subject to floods, but the conclusions of other studies. After noting that evacuation follows upon confirmation of personal danger, it is said that:

> Confirmation is attested to be an essential stage by any number of studies on warning. When people have been alerted that a disaster is happening they need to have it confirmed to them that it <u>really</u> is happening. There are a number of requirements for successful confirmation. The warning messages--should be 1) available via many channels; 2) immediate; 3) consistent; and, 4) "official."
>
> (Worth and McLuckie, 1977: 73)

<u>Withdrawal Movement</u>

There are a number of major themes with respect to withdrawal movement. We will organize our discussion around six major ones, three primarily having to do with individual-household behavior, and three with organizational behavior. Secondary points will be noted under the major heading.

A strong theme is that withdrawal movement is almost always orderly and effective in getting people away from an actual or potentially dangerous location. This runs counter to widely held views among some disaster planners and emergency organization personnel that there is a need to be concerned about evacuation turning into disorderly flight if not wild panic (Quarantelli, 1954). As the Governor of Pennsylvania said in connection with the Three Mile Island incident, "there are known risks, I was told...that results from even the best of an orderly evacuation, are going to exert a toll in lives and injuries," (Presidential Commission, 1979: 120).

Since the automobile is the prime transportation mode used to withdraw from danger (Hans and Sell, 1974), if the popular image were correct, accounts of evacuation should detail many traffic accidents and cases of irresponsible driving. But to the contrary, one report after another notes the smoothness of the vehicular evacuation movement. One study specifically looked for and found only 0.6 percent of evacuees involved in a major pre-hurricane evacuation either witnessed or were involved in traffic accidents or automobile breakdowns, the latter mostly due to broken fan belts or a flat tire (Moore, et al, 1963). Only one minor accident was similarly reported in a flood situation where with only two roads out of town, 3,500 cars left in one and a half hours with a minimum of congestion (Pierson, 1956). The absence of traffic accidents and orderly motor movement characterizes both pre- and post-impact evacuation movements.

Sometimes traffic jams do occur, but they are almost always associated with an inflow of traffic to the impact area. At times, as was observed at the Beverly Hills night club fire and at the Texas City explosion catastrophe

(Logan, et al, 1952), this is the result of emergency and rescue vehicles converging on the area. Sometimes it comes about because individuals, for multiple reasons pointed out years ago (Fritz and Mathewson, 1957), similarly converge on the disaster site. More people may be coming in than are leaving as happened in San Juan where 2,500 persons were evacuated from low lying areas as a result of a tsunami warning, but about 10,000 other people came into the general area to see the high waves (Weller, 1970).

Studies which have examined deaths and injuries associated with withdrawal movement also consistently report very low figures. Both in Hurricane Carla where over a half a million people left coastal areas (Moore, et al, 1963), and in the Mississauga, Canada toxic chemical incident where 250,000 persons moved in less than 24 hours, no traffic fatalities occurred. In a study which collated reports of 64 different disastrous incidents and which involved the evacuation of over one million individuals, a total of only 10 deaths could be associated with the withdrawal movements and seven of these occurred in connection with a single helicopter crash (Hans and Sell, 1974: 8).

Another theme in the withdrawal movement literature is that there is no instant bolting into flight by masses of individuals upon perception of danger. As we have said, people assess the emergency situation, obtain confirmation of immediate and personal danger, then usually leave with the members of their most important social group, that is the nuclear family unit. Thus, in the Denver flood of 1965, of those families that were together at the time of warning, 92 percent evacuated together. About 64 percent of the families whose members were initially separated were united before the family actually fled; many of the rest who never got together

perceived no alternative but to leave (Drabek and Stephenson, 1971: 192, 196). As we have noted several times, both early and more recent examinations of evacuees stress the thesis that families evacuate as units (Young, 1954; Quarantelli, 1960b; Mileti, et al, 1975; Worth and McLuckie, 1977).

But while emphasis in the literature is placed on the nuclear family leaving together, only a few researchers have called attention to the fact that other social groupings might be involved in withdrawal. Thus, in one study it is reported that while 94 percent of all evacuees left by private car, 17 percent actually were moved by neighbors, friends and non-household relatives (Drabek and Stephenson, 1971: 196). Other studies hint that besides family members, known others will be taken along in a withdrawal (e.g., Danzig, et al, 1958). The research studies so far have not systematically looked at non-family evacuation undertaken by others in primary relationships to one another; for example, close friends, persons living in religiously oriented or ideologically linked groups (e.g., communes) and possibly even some peers in work situations. It should also be noted that an emphasis on the nuclear family perhaps ignores the possible influence on withdrawal movement of the extended family system which even today is an important primary group in many subcultures in American society. In one study it was found that evacuating nuclear families did assemble other related nuclear families and relatives living within several blocks of one another (Marks, Fritz, et al, 1954).

Clearly, more work is needed on the actual number of evacuees relative to potential evacuees. Events such as Hurricane Carla (Moore, et al, 1963), and the more recent Hurricane Frederic each involved the withdrawal of approximately half a million persons, in absolute numbers. However, it is possible

the percentage figures of those who actually left relative to those who could have fled, may not be as impressive as the numbers imply. There are some suggestions in the research literature of possible discrepancies between officially reported figures and what population surveys have found. Thus, in Hurricane Carla, a random sample of Galveston found that probably 20,000 people moved inland, or roughly 29 percent of the population. The same study noted that civil defense made an estimate of 20,000 or 30,000 evacuees--about 30-40 percent, and that local Red Cross officials arrived at a figure of approximately 85 percent. If leaving one's home rather than the community is taken as the criteria of evacuation, the random sample survey estimated about 67 percent of the city's population was displaced (Moore, et al, 1964: 206). In random population surveys of residents of Xenia and of Wilkes Barre, DRC found that its figures of withdrawal movement in those disasters were below estimates given out by community and relief agency officials. The research data, while in no way challenging that there are cases of very high population displacement, does, nevertheless, suggest further study is needed to see if there is not a tendency under certain circumstances to overestimate the number of evacuees, even by knowledgeable disaster officials. One is reminded here that when systematic studies using various techniques were made of the sizes of crowds and demonstrations, the estimates of experienced police officers and reporters were almost always found to be higher by a magnitude of at least two or three than the actual number of participants (Jacobs, 1967).

While the number of persons who flee is obviously dependent on a variety of factors, several observations seem fairly well documented. Not everyone leaves except in the most catastrophic of situations. There is a residual

number who will simply not evacuate. Even in Cameron Parish, Louisiana where 96.6 percent did evacuate their homes and 93.8 percent left the community, a handful of people remained on the scene despite their experience with Hurricane Audrey a few years before (Moore, et al, 1964). Those who remained did not do so because of lack of warning. Similarly, about 59 percent of those who heard the siren indicating the 1960 tsunami in Hawaii did not leave (Lachman, et al., 1961). And in spite of being bombarded by a variety of warnings, suggestions, and "orders" to leave, 64 percent of those studied did not leave Panama City upon the approach of Hurricane Florence (Killian, 1954).

Presumably the reverse of the factors we discussed earlier under social processes are among the conditions which motivate some to stay in the face of danger. But, the question of those who do not withdraw has not been much examined by research so far, although findings such as at Three Mile Island where only 27 percent of those who lived alone evacuated (Kraybill, et al., 1979), or studies that show the widowed and divorced are more likely to stay than to leave (Windham, et al, 1977), are suggestive.

One factor that has been singled out for special attention is whether concern about looting produces reluctance to withdraw from an endangered area. Although the rarity of looting in American disasters has been fairly well documented and is not a significant problem (Dynes and Quarantelli, 1968), the issue is whether people believe it may occur, and whether this might effect the evacuation process. It has been given as a reason for being reluctant to leave (e.g., Moore, et al., 1964: Perry, 1979a). However, even in systematic surveys, only very small percentages of the samples mention a concern about looting; for example, in a flood situation, only six percent who left said

this occurred to them, but they nontheless withdrew (Drabek and Stephenson, 1971: 201). On balance, the evidence does not suggest that reluctance to withdraw because of a concern over looting is a significant factor in the evacuation process.

This point related to another theme in the literature which is that withdrawal behavior is only at times related to a decision to leave because of a concern for personal safety. Thus, comments are made to the effect that: "For many families, the initial definition that they were not in danger was never replaced, even as they evacuated their houses," (Drabek and Stephenson, 1971: 195). In the most elaborate and sophisticated treatment of this matter, a typology has been advanced which postulates that evacuation behavior may result from at least four different processes. There is said to be evacuation by default, by invitation, by compromise, and by decision (Drabek, 1969). Evacuation by default occurs when people initially leave their residences for reasons other than concern for personal safety, such as to confirm warnings or to satisfy curiosity and then are prevented by police or other circumstances from returning. Evacuation by invitation happens when people are asked by others, especially friends and relatives, to come and join them at their homes outside of the threatened area. Evacuation by compromise occurs when there is a difference of opinion among family members about fleeing, and to satisfy the concern of perhaps only one member, all leave together. Only evacuation by decision follows the traditional model of attending to a warning, confirming the threat and then withdrawing. In terms of the research data on which the typology was developed, it is said that, "clearly the data indicated that large numbers of...families evacuated through processes other than the simplistic decision-making model

customarily used," (Drabek, 1969: 349). Unfortunately, although the typology has existed for a decade, and examples of the types can be found in research observations before (e.g., Boek and Boek, 1956) and after (e.g., Windham, et al., 1977), its formulation, it has not been systematically used or tested to date.

Other researchers, however, have also emphasized that withdrawal behavior should not be visualized as totally homogeneous phenomena. Thus, one of the more prominent analysts of evacuation behavior suggests that there are at least four different types of evacuation; namely, preventive, protective, rescue and reconstructive (Perry, 1978). Cross classifying duration of withdrawal with time of disaster impact, he arrives at the following table:

		Withdrawal relative to Impact	
		Pre-Impact	Post-Impact
Duration of Withdrawal	Short term	PREVENTIVE	RESCUE
	Long term	PROTECTIVE	RECONSTRUCTIVE

A preventive evacuation is employed to minimize loss of life in response to hazards that can be anticipated and that afford adequate warning time such as river floods. Protective evacuation is pre-impact withdrawal for a long period of time such as might be undertaken in the case of earthquake prediction. Rescue evacuation occurs post-impact, and is focused on the removal of injured and trapped victims, and is frequently treated as search and rescue in the literature. Reconstructive evacuation is withdrawal for an extended

time period to facilitate the reconstruction of an area largely uninhabitable because of physical damage such as at Skopje, Yugoslavia or because of health hazards. This formulation too, while easy enough to illustrate from disaster research observations, has not yet been systematically used in a variety of comparative studies to see whether it truly captures in a significant way the full range of withdrawal behaviors.

Researchers have implied or suggested other possible typologies. For example, it might be feasible to distinguish between early leavers, later leavers, deliberate stayers and those never involved in the emergency--a model drawn from diffusion studies. Still another formulation suggests a typology of evacuation derived from the collective behavior area. It argues that evacuating collectivities can be differentiated on the basis of new and old social relationships, with "one implication of thinking about evacuations in this manner is that it underscores the heterogeniety of evacuating collectivities potentially present in evacuation," (Aguirre, 1980: 20). In all the formulations the assumption is that different behavioral patterns are involved for the different types. Whatever the merits of any particular typology proposed, it does appear that the next major theoretical advance in the area of withdrawal movement may very well come with respects to efforts to identify and specify the heterogeneous dimensions of evacuation flight.

At the organizational level also, new ideas about withdrawal behavior are being developed, although more vaguely perhaps than with regards to individuals and families. Some researchers are starting to implicitly if not explicitly visualize the evacuation process as involving a complex set of organizations working in complicated, interrelated ways, almost as a system delivering a service. A major theme in the research literature, although it

is usually descriptively rather than analytically presented, is that multiple groups play a role in evacuation, that these groups do rather different things, and that the overall carrying out of withdrawal movement cannot succeed without some degree of coordination.

Not only is involvement of multiple groups in withdrawal behavior frequently noted, but it is observed that participation varies according to time and task (e.g., Worth and McLuckie, 1977). Thus, at the local level alone, the National Weather Service, the Corps of Engineers, and civil defense may be involved in warning decision making. The local police and fire departments as well as the mass media might be involved in warning dissemination. The Red Cross, the local bus company, the traffic department could take part in moving people. Voluntary associations, schools and churches might participate in mass shelter operations (for descriptive examples of these and the activities of other organizations in a major evacuation, see Moore, et al., 1964; for more general discussions of organizational behavior, see Barton, 1970 and Dynes, 1975). In addition, beyond the local community, there can be public and private, state, regional and national level organizations involved. However, nowhere in the research literature is there an inventory of which agencies are likely to do what at different times during the evacuation process. Such details are likely to be given in disaster plans, but it is known that planning is seldom carried out as specified in actual emergencies (Dynes, Quarantelli and Kreps, 1980). Consequently, we do not know which organizations are more likely to act as plans dictate, and where problems will most often occur, although there are hints that well established emergency agencies such as police departments do not do well if they try to engage in non-traditional tasks (Kennedy, Brooks, and Vargo, 1969).

There are indications also that some organizations may have difficulties shifting from historically given ways of doing things. For example, it has been noted that the American National Red Cross had "a notable record of providing mass shelters for evacuated flood victims in the great river-valley floods," (Barton, 1970: 94). It built tent cities in the Mississippi flood of 1927 (Daniel, 1977), and in the Ohio floods of 1937, around 698,000 persons were housed and cared for in 1,575 centers and camps (Wenger and Parr, 1969: 98). Then, when tornadoes struck in Massachusetts, Michigan and elsewhere in the 1950s, "the Red Cross tended to think of the evacuees as needing mass shelter," (Barton, 1970: 194), but this proved nowhere near to being the case (Rosow, 1977). The mass shelters prepared were seldom used, since as already discussed, evacuees tend to go to the homes of relatives or friends if at all possible. The research literature also suggests that other kinds of emergency organizations such as local civil defense offices (Anderson, 1969b; Dynes and Quarantelli, 1977) work or have worked with unrealistic conceptions, derived from past history, of their possible roles and responsibilities in the evacuation process. Unfortunately, we have a somewhat limited data base on organizational perceptions of their evacuation-related tasks and responsibilities, and how, if at all, these vary with time and by region.

Some unpublished DRC studies not only indicate that various organizations have different perceptions of their roles, but that sometimes there is little consensus on who has responsibility for what. In one study of 19 communities, ten different kinds of organizations, out of 22 possible, were assigned by other community groups as having some responsibility for evacuation in the case of chemical disasters. A current non-DRC study of eight hurricane prone communities recently concluded that, "the civil defense will be coordinated

with only two of the thirty organizations under conditions of a hurricane threat," and that, "the coordination of law enforcement agencies with other community organizations is practically non-existent," in the hurricane scenarios projected, (Carter, 1980: 13). If so, this would have very important implications for any attempt to organize a major withdrawal movement.

Apart from the absence of pre-impact contact just noted, other researchers have observed that even if there is contact and cooperation, the consequence is not necessarily coordination. It has been pointed out that a mass shelter operation requires the acquisition of bedding, sanitation facilities, water, supervisory personnel, etc., which have to be gotten from different sources and somehow all integrated together (Wenger and Parr, 1969: 98). The research literature, however, is not very informative on the kinds of patterns of organizational coordination which might develop for withdrawal behavior under different circumstances (but, see later our discussion of three different types of organizational patterns of behavior in mobilizing, implementing plans, developing new arrangements and otherwise carrying out withdrawal movements, on any scale in American society, let alone elsewhere (see DeHoyos, 1956; Carroll and Parco, 1966, Kates, et al, 1973, Haas, et al, 1964, 1976; Hirose, 1979 for possible variations in organizational involvement in the evacuation process in other societies).

The specific tasks that organizations carry out in the evacuation process is also unclear. For example, transportation of evacuees by public agencies is mentioned in many accounts (Young, 1954; Moore, et al., 1963; Hans and Sell, 1974). However, it is not uncertain how much of the task of transporting evacuees is really undertaken by emergency agencies. General statements imply

that a substantial number of people are handled by the public groups, but systematic population surveys of disaster victims do not square with global impressions. Thus, in a major flood evacuation where there was time for movement, and emergency groups made transport available to endangered residents, only 1 percent were moved by public agencies (Drabek and Stephenson, 1971: 200).

Related to this is another major theme; namely, that organizational "orders" to evacuate are quite problematic. The research done so far indicates several important findings about this matter. For one, statements by public authorities about the seriousness of a threat, are frequently interpreted as "orders" to leave. In one study it was found that 61 percent of those studied left because they interpreted warnings from authorities as prescriptive if not mandatory, whereas, quite similar information from mass media sources was seen as primarily descriptive in nature. As one article reported:

> Authorities' messages were defined as "orders to evacuate," whereas, peer and mass media messages were viewed as sources of description. This was true even in some instances where the respondent reported that nearly identical message content was received from the three types of sources.
>
> (Drabek and Stephenson, 1971: 194)

Other research also supports the notion that certain kinds of warning messages issued by community officials are frequently taken by citizens as "orders" to leave a locality, regardless of whether this was the intent of the public authorities (Rayner, 1953; Worth and McLuckie, 1977).

There is other research which indicates that organizational calls for differential actions in different parts of a community will generally create problems. In a Japanese study, it was found that an "evacuation order" for

parts of a town, and an "evacuation alert" for other sections only led to confusion; everyone tended to leave (Hirose, 1979). This is in line with the principle discussed above that warning messages from public authorities are generally taken as "orders." Yet, since there are cases where official warning statements are not so interpreted, as seemed the case at Three Mile Island (Presidential Commission, 1979), more must be involved than the official nature of the warning source.

Actually, studies have pointed out that there are a variety of problems for organizations in this whole area. Thus, a report of research on the multiple communities threatened by Hurricane Carla said that:

> Officials generally appeared to have had much difficulty in deciding on whether evacuation should be "advised" only, or "ordered," and in selecting the authority to take the initiative in moving people out of the threatened areas. Orders, or advice, to evacuate were issued by such diverse officials as mayors, local civil defense directors, county judges and sheriffs. In some cases, action was taken after meetings of the officials most concerned; in other cases, after telephone conversations. Some officials were frankly opposed to ordering evacuation..whatever they thought about whether local officials should order evacuation, most state officials were careful not to do so.
>
> (Moore, et al., 1964: 90)

Similar organizational uncertainties about ordering or recommending evacuation is reported in some of the earliest disaster studies (e.g., Killian, 1954) and some of the more recent (e.g., Worth and McLuckie, 1977).

Another research finding is that in many cases, official evacuation orders are not issued, or are issued only when the withdrawal movement is well underway, (Moore, et al., 1963). In some instances, such as in the case of chemical disasters resulting from transportation accidents, this is understandable, for often the danger is over before a decision can be made, or else first responders and informal word-of-mouth generate flight before higher level officials even become aware of the emergency. In other

cases, however, other factors must be operative. The delay in issuing a formal evacuation order to 80,000 residents below the earthquake-weakened Van Norman dam in Los Angeles, stemmed from the unwillingness of politicians to take a potentially unnecessary decision, and a preference for having the police department bear the responsibility for what might turn out to be politically negative. But, the research literature as a whole, while providing cues for why organizational orders to evacuate are delayed, does not offer much systematic evidence on why they fail to be issued at all.

In some cases, studies point out that withdrawal can be spontaneous, that is, occurring before, in spite of, or simply without any organizational decision to call an evacuation. In one Canadian disaster, a series of ad hoc organizational actions was taken, preparatory to a possible evacuation, but in retrospect, it is clear they led to withdrawal even though no formal decision was ever made (Scanlon, et al., 1976). Other disaster accounts likewise indicate that precautionary activities sometimes edge over into withdrawal even though evacuation may not be the intent (Albert and Segaloff, 1962; Yutzy, 1964c). There is enough in the literature to make a worthwhile effort to see if there are organizational level counterparts to the different kinds of individual/family patterns of withdrawal behavior that some researchers have specified (Drabek, 1969; Perry, 1979b).

The research literature is clear on one specific point, at least for American society, and that is the absence of the use of force or physical sanctions by agencies attempting to conduct an evacuation. DRC field observations in hurricanes, floods and earthquakes are that sometimes law enforcement agencies will try to convey the impression that they might physically remove reluctant evacuees, but this is not done in actuality. Occasionally,

police organizations will, if they get people outside their homes, prevent them from re-entering, but we have encountered no documented case of forceful entry into residential quarters. The use or threat of force on evacuees however, is not unknown in other societies (e.g., Clifford, 1955; Davis, 1978).

A final major research finding is that organizations typically have serious problems with the movement of institutionalized populations such as in hospitals, jails, nursery homes, mental hospitals, and in some cases, residential campuses (Hans and Sell, 1974). The possible need to evacuate such populations is seldom planned for in advance, either by the institution itself or by the usual emergency agencies. When hospitals have had to be evacuated as in the Wilkes Barre flood (Blanshan, 1975), or jails as in a propane threat in Everett, Washington, questions arise as to who can be released, how "difficult" cases can be transported, where those moved can be taken, what facilities are necessary at the new relocation place, etc. The whole topic of the evacuation of institutionalized populations badly needs research for it seems to require inordinate attention and resources and generates many problems when such withdrawal movements are required.

It should also be observed that evacuation of business districts has been paid very little attention by researchers. There are fairly frequent passing references in descriptive accounts of both pre- and post-impact transportation away from an area, of equipment, goods, and even personnel, but, the topic has largely been ignored in the analytical literature. Journalistic accounts and respondent remarks regarding the reduction of property loss via an "evacuation" of material goods, signal the need for systematic work on this aspect of withdrawal movement.

Shelter Behavior

The concept of shelter behavior attempts to capture both temporal and spatial aspects of part of the evacuation process. In terms of the basic framework we are using to organize the research data, shelter behavior is activity in the time period or phase that begins at the completion of the initial withdrawal movement from threat, and ends upon the initiation of a return movement. Shelter behavior also refers to the activities at the places to which people flee.

The bulk of the disaster research literature that touches on shelter behavior in any way, focuses on space rather than time dimensions. Additionally, such studies as there are tend to deal with activities at mass or public shelters even though as discussed earlier, such facilities are not the typical destination of most evacuees in most disasters. An additional limitation of our treatment of this topic stems from the fact that a very systematic analysis of all the literature on shelters—whether or not explicitly and directly related to withdrawal behavior, is planned as a second phase to the study summarized in this report. In what follows, we confine ourselves mainly to emergency sheltering for a few days, rather than temporary housing or long run sheltering which is sometimes necessary in the aftermath of a major disaster.

We have already emphasized that the majority of evacuees do not typically seek accommodations at times of threat in mass or public shelters. The major exception to this finding is where the disaster agent is so extensive in its destructive scope that it becomes impossible for evacuees to find unaffected relatives and friends in nearby areas. It was concluded two decades ago that, "the smaller the scope of the community disaster, the more probable is the kin group the major source of help" (Quarantelli, 1960: 262). Or, in

the words of another even earlier researcher, people will go to relatives and friends if the ecology of the disaster impact does not upset a workable ratio to untouched kin and friends (Young, 1954).

But, even when public shelters are used on a large scale, a majority of evacuees still go elsewhere. A very systematic study of Hurricane Carla estimated that around 529,000 persons withdrew from the endangered coastal regions, of which about 200,000 people were housed in 650 public shelters staffed by around 20,000 volunteers. When figures were computed for those who fled to commercial quarters (i.e., hotels, motels, etc.), the overall percentage breakdown was as follows: 58 percent went to relatives and friends, 23 percent to public shelters and 18 percent to commercial facilities (Moore, et al., 1963). Only when a finer breakdown was made of the five major counties involved, did the number of evacuees who went to kin drop below a majority in any instance; still in no case did the public shelters have more than 36 percent of any given set of evacuees. For the five counties, the percentages ranged as follows: 44 to 72 percent withdrew to relatives and friends; 6 to 36 percent fled to public shelters; and 6 to 26 percent went to commercial establishments. Other systematic studies by DRC of large scale population withdrawals, such as in the Wilkes-Barre flood, the Xenia tornado, or the Mississauga hazardous chemical incident, found that only 3.3 percent, 1.8 percent, and less than 2 percent respectively went to public shelters (although in the last case, because of shelter population turnover, about 10 percent of the evacuees eventually spent some time in a public shelter).

Studies of evacuees in catastrophes outside of the United States ocassionally report a much greater proportion going at least initially to public

or mass shelters (Davis, 1978). However, there are very many exceptions even in other societies. Thus, only 15 percent sought mass shelters in the Taal volcanic eruption in the Phillipines (Carrol and Parco, 1966). In the massive earthquake in Nicaragua, of over 200,000 evacuees from Managua, one study indicates that only 10-20 percent spent time in a mass shelter, and another reported that, "only 6 percent of the victims sampled ever used any government-provided emergency shelter," (Bolin and Trainer, 1978: 240). Even in Third World countries, an assessment of the shelter situation in about a dozen catastrophes led one researcher to conclude, "most families appear to go to official shelters only when all other alternatives have failed," (Davis, 1978: 28), and will leave public shelters as soon as possible.

Whatever the number of evacuees in either absolute or relative numbers, there is a definite relationship in American society between socio-economic level and seeking refuge in mass shelters. A majority of those who go to such shelters are from the lower end of the socio-economic scale, researchers noting that white collar and skilled trade workers tend to view the need to seek public shelters as stigmatizing, (Moore, et al., 1963). This was also found in very early disaster studies (Marks, Fritz, et al., 1954). Some research suggests that rural residents might be less inclined to choose public shelters than urban dwellers (Moore, et al., 1963). Highly impressionist observations of very small scale disasters in large metropolitan areas also seem to hint that perhaps urban victims from the lowest socio-economic levels may not be at all as disinclined to go to public shelters as the population in general. The question needs study, particularly given the fact that apparently only rarely are evacuees assigned to specific shelters--choice or selection seems to be left up to disaster victims. How evacuees learn of the existence of shelters is another unexplored topic.

In some cases, public shelters are apparently used as stops on the way to some other place (Perry, 1979a). Home-to-eventual shelter is not always a straight line (Drabek and Boggs, 1968). There are indications that at Three Mile Island, the few evacuees that used a public shelter in a sports arena stayed only a day or two while they made arrangements to withdraw to houses of relatives or friends outside of the locality of the nuclear reactor (Flynn and Chalmers, 1979). The same seems to have happened at Mississauga. The degree to which public shelter behavior is transitory, or the amount of turnover, have not been a focus of research attention. Occasionally, of course, initial shelters chosen also prove unsafe and moves have to be made to other shelters, as happened in Hurricane Carla (Treadwell, 1962), and elsewhere, but this kind of occurrence has been even less examined.

There are scattered observations that mass shelters are used for disaster-related purposes other than housing (Moore, et al, 1963; Forrest, 1979). Evacuees located elsewhere sometimes use them for meals or to obtain information. Journalists, relatives of missing persons, high level governmental officials making symbolic visits, and even researchers tend to converge on public shelters. The kinds of transients and visitors that go to mass shelters, what they do there, the problems they may cause, are topics on which there are barely any anecdotal accounts, much less systematic study.

There are only scattered observations on how mass shelters are organized. Some are set up by formal organizations and local governmental units (Moore, et al., 1964). Others are established by traditional voluntary associations with disaster responsibilities such as the Red Cross (Adams, 1970), or the Salvation Army (Ross, 1969). Still others seem to be developed by voluntary

groups without regular disaster responsibilities such as religious groups (Martin, 1976), or social service clubs (Scanlon, et al., 1976; Wenger and Parr, 1969). Some of the minimal literature available suggests there are radical differences between public shelters depending on which kind of group initially organized them (Scanlon, et al., 1976), but research data on the matter is extremely scarce.

There is a little general research evidence on what kinds of facilities are use. Churches, schools, municipal buildings, public auditoriums, and military bases are typical. Schools tend to be the most favored type of facility for mass sheltering, although there are frequent problems in getting them opened, supplied, and staffed, even with preplanning (Killian, 1954; Connell, 1966; Forrest, 1979). The literature is all but void of accounts of use of military bases, even though they often appear to be used for mass shelters when large numbers need to be accommodated.

Some general problems in shelter operations have been discussed in various studies. A few have noted that the population composition of evacuees could create particular kinds of difficulties. Singled out have been special feeding problems if many elderly are involved as was the case in the Wilkes Barre flood (Mussari, 1974). Deviant behavior especially of a sexual nature by adolescents has been remarked upon by some (Moore, et al., 1963). Tensions and conflicts possibly stemming from having blacks and whites together in common shelters were reported in some early disaster studies (Marks, Fritz, et al., 1954) but not recently. However, information on the range of problems in shelter operations and their possible association with shelter population composition comes almost exclusively from anecdotes. No systematic research appears to have ever been done on the question except possibly for an unpublished study in connection with Hurricane Betsy.

Apart from difficulties that may stem from group differences of those sheltered, research observations make frequent but vague references to a variety of other possible problem areas (Moore, et al., 1964; Hirose, 1979). The behavior of children in public shelters can be an issue, so is lack of privacy. Boredom and monotony is speculated as affecting those in the shelters. Vague references are made to disturbances associated with distributing supplies. It is said some shelter staffs find it difficult to operate for long in such settings. However, the research literature is very weak, even descriptively with regard to this whole area, and it would be difficult to enumerate the typical range of problems, their extensiveness and seriousness, what consequences they have on evacuees and staff, how they are handled, etc. Given also that families are the basic units involved in withdrawal and sheltering, it is instructive to be told that "whether in such residences with kin or temporary community shelters, relatively little has been reported about their behavior," (Mileti, et al., 1975: 109).

As implied in the last remark, information about the temporary housing of evacuees with friends and relatives is one of the greatest voids in all of the disaster literature. While there are a few studies of relationships between host families and evacuees in longer run sheltering operations (e.g., for the Holland flood, see Lammers, 1955), other than noting its occurrence, almost no one has paid much attention to the short term or emergency sheltering of evacuees by relatives and friends. This is true even though the phenomenon was observed in the very first systematic social science study of disasters, the work on the Halifax explosion (Prince, 1920). A few DRC disaster population surveys contain unanalyzed data on certain aspects of this topic, as did the NORC study of the Arkansas tornado (Marks, Fritz, et al., 1954),

and some of the research on the Colorado floods of 1965 (Drabek, 1969). But, basically, published data of any kind is almost nonexistent.

Of course, the question is not only about individual and family behavior. It is also about organization behavior in sheltering activity, which ranges from how volunteers are used, to operating under unclear legal mandates, to balancing competing interactions from a variety of public and private groups with different expectations and responsibilities. In short, insofar as empirical research data is concerned, we know practically nothing of a systematic nature about the sheltering behavior aspect of the evacuation process.

Return Behavior

Of all the patterns of behavior in the evacuation process, the return behavior as conceptualized in our model, has been least examined. In fact, the topic has been rarely discussed under any rubric in the disaster literature. Even when long run issues are addressed (Haas, et al, 1977; Rossi, et al., 1978), they seldom focus on the immediate return behavior. In the great majority of studies on evacuation, the research extends at most to the period and the activities associated with seeking shelter, which as we have just seen is itself not very rich in information.

Perhaps the strongest theme is that evacuees tend to decide themselves when they will attempt to return, and that this process does not always correspond to organizational perceptions and decisions. Efforts to return start quickly. As one of the earlier disaster studies stated:

> If the disaster site is accessible and the threat of future danger to life is not immediately apparent, the convergence of returnees may be expected to begin within a few hours following the disaster...The returnees will normally have a strong sense of legitimacy in entering a disaster area and may intensely resent any attempts to prevent them from doing so unless the reasons for exclusion are obvious and compelling.
>
> (Fritz and Mathewson, 1957: 35)

A much more recent piece of research reports that nearly one third of those who withdrew in the face of a flood threat soon returned and in many cases, infiltrated police barricades (Drabek and Stephenson, 1971).

There is evidence returnees have very strong feelings that they have a legitimate right to return to their homes. The official position that there still might be danger (e.g., Moore, et al., 1963) is countered by the view that if returnees want to jeopardize themselves, they are entitled to do so. But, sometimes evacuees see positive reasons for their actions. The presence of health hazards from animal carcasses, debris and water ridden streets, lack of drinking water, and damaged sewer facilities and utilities were not accepted as sufficient reasons for staying away by some evacuees in Hurricane Carla (Moore, et al., 1964). In fact, observers said that mass media accounts which emphasized these impact consequences of the hurricane contributed to the strong desire of evacuees to return and assess their own personal losses (Treadwell, 1962). Livestock owners seemed particularly concerned about the conditions of their animals (Moore, et al., 1963).

Return activities particularly seem to generate conflict. For their part, organizations tend to perceive return in terms of preventing unwanted people from coming into an impacted area, while permitting access to residents and emergency workers (Hans and Sell, 1974). Often, however, organizational attempts to control return activities are complicated by the fact that residents

may not have identification papers, may have sent nonhousehold relatives or friends to the area in their place (Fritz and Mathewson, 1957), or there are unresolved differences among agencies on the pass system in effect. Disputes at roadblocks are a frequent occurrence with returning evacuees, who sometimes, as after Hurricane Audrey, threaten to use force if not allowed immediate reentry (Bates, et al., 1963).

Often, there is no official announcement that people may return. At times, all that is given is an "all clear," via mass media outlets (Anderson, 1965a; with little else said (Worth and McLuckie, 1977). Descriptive accounts of disasters suggest that minimal guidance is offered on how people should return, what routes should be taken, if difficulties might be encountered in returning, etc. Although there is no solid research data on this, it seems officials see their responsibilities on this matter as extending only to providing the "all clear" signal. Some DRC field observations found that occasionally, some additional information may be provided in those cases such as the Mississauga incident and Hurricane David in Florida, where official sources provide public transportation out, so that it was felt that return transport should be provided as well. While reports for other disasters (Blum and Klass, 1956; Scanlon, et al., 1976; Hirose, 1979) indicates this happens, it is not really clear from the research literature if this happens in all similar cases or what causes the differences in the official actions, if they do occur.

Some degree of control was exercised by Australian authorities following the evacuation of Darwin after Cyclone Tracy. Evacuees had to meet certain requirements before return was authorized. The meeting of these requirements--proof of employment and a place to live--was facilitated by evacuee information with assistance centers located by the government in areas to which evacuees

had withdrawn (Haas, et al., 1976). Perhaps the actions take in this disaster were dictated by the very isolated geographic location of Darwin and the extensive destruction of the residential areas of the city. Even the Holland flood of 1953 which displaced 16.5 percent of the total population of the country did not seem to generate (or permit) the same kind of control over returning evacuees (Lammers, 1955).

Actually, it is not even clear what criteria American officials use to make an all clear announcement. Research observations imply different factors may be at play in the decision. In some cases, an all clear seems delayed because it is thought the presence of large numbers of evacuees might hamper debris and clean up operations. There is also worry that looters will take advantage of the situation, using those returning as a cover, if the area is reopened too quickly. On the other hand, it has been remarked that there is at times pressure from local business groups on government officials to permit re-entry to an evacuated area as quickly as possible so as to minimize financial losses. Evacuees themselves may be concerned about suffering income losses as a result of employment interruptions. But, anecdotes apart, there is very little research evidence on the whole question.

There is an implication in the literature that the kind of disaster event may influence the return pattern. Thus, in slowly building disasters, where the period of threat extends over several days, withdrawal may extend over the full time period (Moore, et al., 1964; Wilkinson and Ross, 1970; Flynn and Chalmers, 1979), but the return movement tends to be more concentrated--more people coming back at the same time. Thus, in a toxic gas incident, evacuation proceeded at a steady pace with no traffic problems, but a radio announcement of all clear generated a massive return movement which quickly clogged the roads (Albert and Segaloff, 1962).

In certain other kinds of disasters of longer duration and/or of a more complex nature such as hurricanes followed by tornadoes, earthquakes by fires, or incidents cutting across several jurisdictions, some withdrawal may be going on concurrently with return behavior. A consequence is often several streams of opposing and intersecting movement which may create both individual and organizational confusion. Whether or not the two patterns just discussed are valid ways of looking at the problem, the more important point is that the proposed relationships suggest some of the complications involved in return behavior. Perhaps return behavior may also have to be seen as being heterogenous phenomena parallel to the heterogeneity suggested earlier for withdrawal movements. However, without the accumulation of even descriptive accounts of return behavior, only speculations can be advanced.

Consequences

Our model implies, and logic suggests that the foregoing component--patterns of behavior in the evacuation process--could have consequences once the withdrawal movement is over. These effects could be rather short term (and a few have been noted in the earlier section on return to place of original departure) or they could be relatively long term. The outcomes could be manifested in a variety of different places in different ways. But, while all such results are possible, there is no way we can trace out all such effects of the evacuation process. Our goals are much more modest, for the reasons outlined below.

The different phases of evacuation--warning, withdrawal, shelter and return--while analytically separable, sequentially meld and merge into one another in reality. The problem of identifying and discriminating the

consequences of each of the separate behavioral patterns would be extremely difficult. To try further to separate out consequences for individuals and for organizations in a discrete way from each of the separate phases is all but impossible. Thus, we will primarily attempt to indicate important global outcomes of evacuations which have occurred, rather than try to relate the particular outcomes to specific phases of the process.

Even if finer analyses were possible, the existing research literature fails to make such distinctions nor does it lend itself well to finer categorizations. Part of this stems from the fact that few longitudinal studies of any kind have been conducted in the field of disaster, so the question becomes not what the research data show, but whether there are any observations or findings at all regarding most matters. With the exception of work on mental health effects (summarized in Quarantelli, forthcoming), and on outcomes for family and kin relationships (Drabek and Key, 1975a; Drabek, et al., 1975b), most of the research literature primarily focuses on "lessons" organizations learned from the disaster experience (e.g., Anderson, 1970b, 1969; Ross, 1976, 1978), or to a lesser extent, on changes in community composition or structure (e.g., Prince, 1920; Rossi, et al., 1978). Although opinions as to what constitutes a longitudinal study can differ, according to most reasonable conceptions it would be difficult to list more than a dozen or so pieces of systematic research which involve an extended time frame of at least a year (Quarantelli and Dynes, 1977). Thus, we have a very limited data base from which to draw findings and conclusions about consequences of the evacuation process.

By contrast, there are several studies alluding to or speculating about the possible effects of prior disaster experience; some of these were discussed earlier under social climate. However, it is equally difficult to separate

out experiences derived from the evacuation process, from the experience of the total disaster. As we also pointed out earlier, these two types of experience are not necessarily synonymous. Moreover, there is a sense in which certain consequences may, in fact, develop from the experience as a whole rather than from any one part of it.

Aside from holistic effects there may well be cumulative consequences, not directly related to the evacuation process, which, nonetheless, could influence future evacuations. For example, victims of disasters develop essentially negative or positive images of local agencies which could affect the relationship with such organizations in a future emergency (Bourque, et al., 1976; Wright, 1976, 1978).

Given all of this, we present such findings as we have encountered under the three general rubrics of resources, linkages and climate. We report on consequences or changes in these dimensions of community context as a result of a disaster experience involving evacuation. Such consequences can be seen as post-impact feedback into the community context, which in turn becomes the new pre-impact context for a future disaster.

Resources

There appear to be more references in the literature to changes or modifications in resources than to other community context dimensions; perhaps because many resources are more tangible and easily observed than less obvious disaster-related changes. It is also probable that more attention is given to physical resources because there is a strong tendency, at least in American society, to equate disaster planning with the acquisition or identification of equipment, facilities or material goods.

The literature frequently mentions that there is much organizational discussion in the immediate post-impact period about rebuilding, replenishing or obtaining new emergency resources, such as amphibious vehicles, walkie-talkie radios, better equipped EOCs, dedicated phone lines, etc.,--all potentially useful for future warning and withdrawal movements. However, as even some of the earliest disaster studies showed, the post-impact talk of resource changes is seldom anywhere fully implemented, even in the long run. Follow-up studies as much as five years after the Indianapolis Coliseum explosion, the Alaskan earthquake and the Topeka tornado, found relatively little resource augmentation as a result of the experience (Adams, Stallings, Vargo, 1970; Ross, 1978). Nor have DRC follow-up studies of major chemical disasters in Waverly, Tennessee and Youngstown, Florida discovered much change in the emergency resource base of the involved communities despite much post-impact discussion about the need for change. There is a marked discrepancy between what is talked about and what is actually acquired.

In fact, it is possible to point to clear cases of non-change. In the Three Mile Island area, local agencies were unprepared for evacuation at the time of the incident (Presidential Commission, 1979). Six months later, they have spent little time refining evacuation plans (Flynn and Chalmers, 1979). Nor has the attitude that evacuation is not the proper concern of local township authorities changed as a result of the experience, in spite of claims such officials made at the time about being ill informed and excluded from decision making (Brunn, et al., 1979). The conditions making for change and non-change are far from clear in the research so far undertaken, and certain aspects have not yet even been addressed. Public interest groups are starting to appear in the disaster area as well as on the larger American scene.

An example is the just cited Three Mile Island case where citizens have been pressuring for the development of autonomous response and evacuation planning (Flynn and Chalmers, 1979). In combination with the emergent local victim protest groups that are an ever-increasing post-impact feature of recent large disasters in American society (Parr, 1970; Forrest, 1978; Stallings, 1978), it is possible that one of the consequences of future disasters, especially if warning/withdrawal/shelter/return is not handled well, will be citizen interest groups pushing for changes, in disaster planning.

Disaster experiences undoubtedly lead to gains in evacuation-relevant knowledge and information. But, as stated much earlier in this chapter, whatever the relationship between individual and organizational disaster experience and evacuation, it is neither a direct nor a simple one. The feedback from such experience has simply not been examined in any great depth or along any broad range. Passing comments, for example, that some people had flashlights handy because of prior disaster experience, hardly constitutes systematic research data.

The literature does suggest that if there are changes in resources, they are likely to be additions in equipment or facilities. Occasionally, EOC sites have been established or modernized. Communication systems are sometimes improved upon or added to in significant ways. However, it is rare for emergency organizations to acquire additional funding or personnel because of a disaster, and no literature source examined mentioned the acquisition by local emergency organizations of tangible resources specifically or uniquely relevant for evacuation.

The development of intangible resources such as improved disaster is somewhat more frequently found among the aftermath of mass emergency. For

example, following a poorly managed and largely unnecessary mass evacuation in Port Alice, Canada, limited rather than total evacuation plans were designed to make use of parts of the town for shelter purposes so that evacuees need not be sent off to host communities elsewhere (Scanlon, et al., 1976). In some multi-jurisdictional disasters, experience may highlight the desirability of integrating the several levels and constituencies of local governments into coordinated disaster plans so as to bridge the various autonomous authorities (Albert and Segaloff, 1962).

This is not to say that disaster experiences typically lead to a reworking or an upgrading of emergency planning. Indeed, a major theme in the literature is that experience per se seldom directly and by itself results in changes in organizational or community disaster plannning (Anderson, 1972). If anything, a contrast can be drawn with another kind of collective community stress situation; namely, civil disturbances, which have been shown to lead to substantial changes in planning for such events (Kreps, 1973). Disasters do not seem to have such consequences for community resources.

Social Linkages

Changes in social linkages as a consequence of disasters can be documented. At both the individual and organizational levels, there is some evidence of changes in interpersonal and in interorganizational relationships which can be attributed to the experience of a disaster. In some cases, it has even been shown that such changes have something to do with the evacuation process. However, there is almost no systematic research on what differences any modification in social linkages might make in a later disaster.

There are a number of studies which indicate disasters may have long-run consequences for family and kin relationships and even secondary relationships.

Some of this research is among the best conducted in the disaster field, especially studies of the Topeka tornado of 1966 and the Denver flood of 1965 (Drabek, 1969; Drabek and Stephenson, 1971; Drabek and Key, 1975a; Drabek, et al., 1975b). Among other things, this work found that families which interacted with kin during disasters--mainly involving some sort of exchange transaction whereby the victim received aid, most often shelter--tended to related more frequently to kin afterwards and more so than to friends. These families also more often afterwards identified kin verbally as a source of future help although behaviorally they tended not to actually seek out such help. In addition, heavily impacted families compared with less impacted families generally had closer internal ties and had undergone fewer family disruptions such as divorce.

Positive consequences of disaster experience are also reported in studies of the elderly after the Wilkes-Barre flood, many of whom were evacuees. It was found that large numbers of the aged developed new church and club associations. Settling into new neighborhoods and/or reestablishing ties in old ones was not problematic. Some of the evacuees had a greater number of social contacts than before (Poulshock and Cohen, 1975; Cohen and Poulshock, 1977). Although not as strongly, studies of the aged in the Omaha tornado also showed a broadening of post-impact social ties (Bell, Kara, and Batterson, 1978: 79).

More anecdotal material from the Buffalo Creek catastrophe suggests that disasters do not always make for closer social ties, even with kin (Erikson, 1976). However, the atypicality of that event as well as the fact that the data was gathered for litigation purposes, argues for a degree of caution in interpreting most of the research done on the incident (Lifton and Olson,

1976; Titchener and Kapp, 1975). That there can be negative outcomes, nevertheless, is also suggested by the research done on the Holland flood of 1953 which showed that as long periods of time passed, there was a tendency for friction to develop between evacuees and their hosts including relatives (Lammers, 1955).

As we have stated, the literature on whether individual disaster experience makes a difference in later disasters is far from conclusive. No research examined had looked at disaster victims in a second disaster after they had been studied in an earlier one. Research which analyzes disaster experience typically asks individuals about their history prior to the event regarding which they are being studied. Such retrospective work poses a series of serious methodological problems although clearly it is the best that can be done in most circumstances. It should be born in mind that observations of individual decision making in a disaster being affected by earlier disaster experience (e.g., Treadwell, 1962; Bates, et al., 1963) is dependent on retroactive memory recall, which may or may not be valid data.

The research literature on the consequences of disasters for organizational social linkages is less specific and clear cut than the case for individuals. Along some lines there are suggestions that some local ties are strengthened because the organizations have worked together. Organizational leadership roles can become more visible in the aftermath of a disaster. Another outcome may be that lines of authority become more recognized and the need for cooperation is learned, resulting possibly in tighter communication networks. These and similar general notions are stated in a variety of studies (Rayner, 1953; Stiles, 1955; Blum and Klass, 1956; Albert, 1962; Anderson, 1965a, 1966; Scanlon, et al, 1976), but rarely are they tried to empirical data.

On the other hand, the disaster literature also notes that the immediate post-impact stage of high cooperation is usually replaced by a later stage of extreme local interorganizational conflict (Quarantelli and Dynes, 1976). Such clashes typically rise out of both new community problems generated by the disaster, and the resurgence of pre-impact differences and hostilities. This finding, which rests primarily on impressionistic observations, clearly implies that working together during a disaster does not necessarily result in closer or better working relationships afterward.

Researchers through the years have identified instances where local organizational decision making in disasters was apparently influenced by prior experience (e.g., Stiles, 1955; Anderson, 1966; Strope, et al., 1977). However, as in the case of individuals, the evidence for the relationship rests on very weak empirical grounds. Our suspicion is that for both individuals and organizations, different disaster experiences create different outcomes, sometimes resulting in closer post-impact social ties and sometimes driving groups even further apart then they were before. However, research work on the problem has barely reached the general descriptive stage.

The assumed connection between social linkages and the evacuation process merits further examination. Are groups which work together during this process more likely to work together in the future? In what ways, if any, does a major experience of that kind lead to mutual efforts on behalf of preparedness or even prevention? There is probably a difference depending on the organizations involved and their goals. Thus, some unpublished DRC data on the post-impact activities of local financial institutions does suggest closer post-impact ties, but not necessarily for the purpose of preventing future similar disasters--in fact, the object was to rebuild a

business district at the same physical location that had just been completely flooded. But, in another DRC studied situation, a local emergency agency successfully took the lead in bringing together other local groups to plan for future emergencies, one concrete result being the establishment of the first common EOC to exist in that community.

Overall, the research so far undertaken on disaster consequences for social linkages is very suggestive and has produced some unexpected findings, especially at the individual level. However, far more work is needed on the consequences of disasters for interorganizational ties. And, even more important, in both cases, there is a strong need to identify the potential connections between an evacuation experience and new post-impact social linkages, and to ascertain any differences these make in coping with a later disaster.

Social Climate

There is a growing literature on such longer run consequences for social climate such as economic outcomes (e.g., Dacy and Kunreuther, 1969) and population changes (e.g., Rossi, et al., 1978). However, the research on consequences for social climate with the more evacuation-relevant implications have primarily focused on two topics. An increasing body of research, characterized by contrasting points of view, deal with the possible mental health effects of disasters. Some of the controversy is associated with evacuation. A much smaller and less specific collection of writings touches on how long disaster experiences last and whether such experiences sometimes have a holistic rather than particularistic effect.

There have now been about fifteen systematic or semi-systematic studies done on the mental health effects of disasters (These are listed in Quarantelli,

forthcoming). The great majority of the research argues that disasters do not bring about serious or long lasting pyschological consequences. Stress may be experienced, but it is not said to result in psychoses, severe mental illness, or even functionally dishabilitating behaviors. It is acknowledged that a significant number of disaster victims do manifest minor symptoms such as sleeplessness and listlessness, and in some cases, victims acquire a hypersensitivity to cues signalling a possible recurrence of disaster. Most such psychological difficulties, however, appear to be transient and situational, attributable not so much to the threat or impact of the disaster, as to quite reasonable frustrations and annoyances arising from dealing with impersonal and sometimes inefficient emergency and relief organizations.

The minority point of view among researchers looking at mental health effects, maintains that disasters can elicit severe and long-lasting psychological disturbances. Proponents of this viewpoint allege that the psychological effects of disasters are often latent or delayed, and that claims of mental well being by victims cannot be accepted at face value. While it is admitted that true psychoses are seldom caused by a disaster, the argument made is that no disaster victim can escape being affected in some important way. The extreme stress created by the danger to self and loved ones, and the physical and psychological destruction of one's world is at the heart of the problem. Thus, the trauma of the experience itself is seen as a major consequence of disasters.

The effects of evacuation on mental health have been directly examined in a few studies with Drawin, Australia following Cyclone Tracy receiving particular attention. One of the studies found relatively little in the way

of psychological distrubances among those who stayed (Haas, et al., 1976). Another researcher found some degree of fairly severe but short-lived disturbances among those who actually suffered trauma during the incident, but more and long lasting symptoms among those who were relocated (Parker, 1977). But, in both studies, the level of psychopathology reported had fallen, as measured 14 months after the disaster when relocation problems for the most part had been resolved, to normal levels for the Australian population. The clearest evidence that evacuation can have negative consequences comes from a study which found fewest signs of psychological stress among those who did not evacuate, more among those who did but eventually returned, and most among those who never returned to Darwin (Western and Milne, 1976). Research in the Wilkes-Barre flood also found some degree of disturbance among the elderly who were relocated--often being moved two or three times before permanently resettling--but the symptoms tended to be situational, temporary and did not incapacitate functioning (Poulshock and Cohen, 1977). A Japanese study found the people in shelters suffered anxiety, insomnia, various psychosomatic complaints, feared the loss of livelihood and manifested rather extreme discontent at times (Hirose, 1979). More impressionistic studies have noted that dissatisfactions, hostilities and aggressive behaviors were somewhat ameliorated among those evacuees willing to talk about their losses and worries about the future (Treadwell, 1962; Connell, 1966), and that there was a resurgence of morale and constructive behavior once people returned to their communities (Treadwell, 1962).

Our interpretation of the totality of the research data available and particularly the evidence from the more systematic studies, lead us to believe that evacuation itself, may result in some degree of stress, but

certainly not mental illness, and generally few symptoms that are behaviorally dysfunctional. However, since evacuees are even more likely than non-evacuees to be enmeshed in a complex of different and highly bureaucratic relief, welfare and service delivery systems, it is probable that the "problems of living" such encounters generate, may be more productive of psychological stress than the experience of the disaster impact itself. However, the question is not resolvable on the basis of the research done so far and it is almost certain different sets of conditions may be productive of different psychological states with, for example, the degree of social support evacuees receive being a crucial determinant of any significant mental health effect.

There is one fairly well documented organizational after-effect of disasters in this area. That is, in American society in the last decade, events of at least moderate magnitude generate a substantial increase in programs and organizations delivering mental health and related services in the middle to long run recovery period (Baisden, 1979). However, a DRC study in Xenia did not find that the emergent activities and organizations became an institutionalized part of the pre-impact mental health delivery system. While such new structures may not survive beyond the recovery period, it can be speculated that in those disaster-impact areas where emergent services appear and then disappear, a certain residue of ideas about stress phenomena and appropriate responses remains in the mental health sector of the community.

This related to what has been another focus of research attention--what disaster-learned lessons become internalized or institutionalized into the behavior of individuals and groups in an impacted community? Some of the specifics of this work have been discussed in earlier parts of this chapter.

We only very briefly touch here on two general points most relevant to the different social climate a disaster might leave behind.

One question that has been raised, and not well answered, is how long does the experience of a disaster last? As noted earlier, many individuals develop a sensitization to dangerous weather cues. This obviously could effect their warning and evecuation behavior in later emergencies. Organizations learn "lessons" from their problems in trying to cope with a threat or actual disaster impact. This, too, could influence disaster decision-making with respect to the evacuation process. There seems to be some agreement that while some such things become part of the social climate of the community, they normally do not represent permanent changes. Individual sensitivity to cues seems to diminish after nonthreatening intervening experiences (Anderson, 1965a). Turnover in staff personnel, particularly key officials, means that as time passes, there are fewer and fewer people around to sustain the organizational "memory" of the event. However, all the research data on such matters is very weak because of the absence of longitudinal studies and much needs to be done before there is any clear picture of what sorts of experience leave a residue, and what conditions affect their longevity.

Although very seldom specifically addressed in the disaster literature except in passing, major disasters at least seem to become historical benchmarks in the life of a community. To a degree, time is frequently measured or divided into "how things were before the disaster" and "how things were afterward." When a disaster has been massive in terms of casualties and destruction, as was the Texas City explosion (Logan, et al., 1952) or the Buffalo Creek catastrophe (Erikson, 1976), the social climate of such communities are subtlely, broadly and deeply changed. Similarly, massive uprootings

of populations, even if they last only a few days as in Mississauga, become part of the collective mem y and symbol in those communities. There is not and cannot be a return to what was before the event. The very few studies that have glanced at communities beyond the first impact year, such as has been done in the Teton Dam disaster (Golec, 1980), imply that a different social climate seems to develop. Global conceptions and views about disaster phenomena, the meaning of life, etc., appear to have changed. Research has not at all well captured what is involved possibly because some of the changes may be of a holistic nature, and not reducible to specifics. The concept of disaster subculture (Moore, et al., 1964), just touches on this notion.
At any rate, there are sufficient hints in research observations to indicate a need to examine how the post-impact social climate generated by mass damage and/or evacuation contributes to new views and behaviors with respect to future threats or disasters for that community.

CHAPTER 5

IMPLICATIONS AND RECOMMENDATIONS

This chapter first briefly discusses the general implications of our study. Most of the chapter, however, is given over to the presentation of a series of selected general recommendations with regard to policy issues, planning, operational activities, and future research studies on evacuation behavior and problems. We conclude with some suggestions as to the need for certain methodological improvements in future work.

General Implications

Our study shows that we do currently have some knowledge and understanding about evacuation phenomena in disasters. The literature and research data gives us a comprehension beyond common sense notions, however, the evidence suggests that at times citizens in general and officials in particular may be working with incorrect assumptions and beliefs about the phenomena. On this topic, as is true of many other matters of disaster behavior, mythologies and misconceptions abound.

Thus, contrary to widespread concerns and ideas, research observations tend to show that the withdrawal behavior within the evacuation process usually proceeds relatively well.[1] The flight tends to be orderly, reasonable from the perspective of the evacuees, and generally effective in removing people from danger. The withdrawal movement does not show panic characteristics, nor is it chaotic or disorderly.

Most of the problems with evacuation occur before and after the flight behavior itself. At almost all levels, there is poor organizational preparedness for initiating and conducting mass evacuation efforts in the natural and technological disasters that occur in peacetime America. This partly reflects a failure to treat evacuation as a major policy issue, and a tendency to view it mostly as a secondary reaction to other disaster activities.

Planning for evacuation is often unrealistic, assumes that evacuees have to be controlled, and generally does not address the distinctive features and special problems which can be involved in mass evacuations. Written plans for evacuation need to be grounded in the realities of the local community situation; they frequently are not. Too often it is taken for granted that people will or should adjust to the specifications of the planning, and since this is unlikely to occur, the question for authorities incorrectly becomes one of what social control measures organizations will need to impose on evacuees. Planners seldom seem to recognize and therefore do not take into account that much evacuation takes the form of either informal or formal group movement, rather than flights by individual.

Whether in plans or in actual instances, little consideration is given to the fact that evacuation involves going to some other area, as well as movement from some locality and almost always a return to the original point of departure. Evacuation involves more than leaving some place. To ignore the directed and roundtrip nature of the evacuation process, is to miss much of what must be dealt with in practical terms.

Part of the failure to understand the generic nature of evacuation stems from a general absence of systematic studies on the consequences of evacuation when it occurs. A failure to attempt to trace the effects of evacuation and the lessons derived from the experience, means that we have little knowledge about what is accomplished and what problems arise in the behavior. Such knowledge, if it is to be general and useful, cannot be generated only by those involved in the process; it must be sought by researchers making many comparative and in-depth studies.

Almost certainly such research would eventually force an examination of general background factors or pre-disaster community contexts which influence disaster preparedness and thus any evacuation activity. Evacuation does not occur in a social vacuum, it takes place in the context of an existing social

climate, linkages between organizations and availability of resources. The specific influence of some of these factors on evacuation was noted in the previous chapter, although it was also clear that our knowledge about such matters is limited. As was also noted, we know even less about the social processes at play, with our understanding of the patterns of behavior in the evacuation process being particularly uneven.

In sum, we know certain things and do not know others about evacuation behavior and problems. That evacuation flight normally proceeds well, that evacuation takes a proactive and group form, that evacuation movement is of a roundtrip nature, and a wide variety of other matters can all be empirically documented. But as a whole our general knowledge and understanding of evacuation does not rest on a totally solid or satisfactory base. The phenomena has not been a major focus of systematic examination. Our comprehension of many facets of the process is inadequate. Theoretical treatments of evacuation are even fewer and less informative as a whole than the descriptive and case study literature which provides the bulk of the findings and impressions.

Of course an overall assessment of what is and is not known about evacuation partly depends on the criteria used. If measured against what ideally might be desired, or relative to our understanding of other disaster phenomena, this is not a topic which merits high marks. Much yet needs to be explored and even more should be examined in greater depth. On the other hand, as said earlier, we do have fairly well empirically grounded knowledge about certain aspects of evacuation, and we have educated guesses about considerably more. There are practical implications which can be drawn that go beyond common sense notions, and consumers of research can find corrective ideas about pervasive misconceptions and myths.

Given this, we make selected recommendations in the next section with respect to policy, planning, and operational aspects. This represents an effort to encourage practical implementation of what is already known. We also advance

a series of recommendations on studies which ought to be undertaken. This represents our attempt to indicate the theoretical and research inquiries which need to be pursued to learn what we do not yet adequately know about evacuation in disasters.

General Recommendations

Our selected recommendations fall into two major categories; those most relevant to policy, planning, and operations, and those with pertinance for future studies. Since the implications of many of the research findings were either implicit or made explicit in the previous chapter, only particularly important or salient recommendations are made in what follows. The general format is to make an overall recommendation followed by a brief discussion of relevant points.

Policy, Planning, and Operations

1. Evacuation should be approached as a proactive policy matter important in itself.

In the main, evacuation is not considered a basic policy issue in the disaster area. It is treated primarily as something which will or will not result in response to warning activities or to impact. It is not seen as a distinctive and separate phenomena in itself.

The major exceptions to this are that evacuation is sometime viewed, although often implicitly, as a policy issue in certain communities where relatively predictable danger threats make the possibility of large scale withdrawal movements more salient. Thus, evacuation is a policy matter in some southern coastal areas and cities subject to hurricanes, and very recently has become a strongly figural issue in localities around nuclear plants. Interestingly, it always has been viewed as a matter of policy with respect to wartime situations; the very concept of crisis relocation points to the importance of evacuation as seen within that context.

Peacetime evacuation as a whole should be approached in a parallel fashion to crisis relocation as treated in the literature on wartime emergencies and as

viewed by some federal agencies, as well as in the localities just mentioned. It should be seen as an important question that might have to be addressed in any mass emergency, and not merely as a technical matter of implementing warnings or as a logistic exercise of removing people from an area after impact. Treating evacuation as a matter of basic policy is the only way to insure that it will receive the explicit attention it merits, and that all facets of the process are systematically addressed.

One possible major advantage of treating evacuation as a policy issue would be the likelihood of increasing recognition of the proactive nature of the phenomena. It could be more easily seen that evacuation is not simply a response to a threat. Consideration might be given to the dysfunctional aspects of withdrawal movement. The pros and cons of alternative ways of coping with a danger might also be given more serious attention. All this and more can be noted in the current controversy surrounding the development of evacuation plans around nuclear plants.

A step in the right direction was taken with the recent publication of the FEMA phamplet, A Public Official's and Citizen's Guide to Evaluating Local Hurricane Evacuation Plans: A Self-Survey. While the focus is on hurricanes and coastal storms, it does raise evacuation to the status of local community policy. The evacuation process is treated as a proactive phenomena, with a specification of issues and problems to be considered long before action might be required. The complexity of the process is suggested by the presentation of a series of questions about individual and group activities. It implies that the failure to carry out certain actions may be dysfunctional. Alternative ways of dealing with the dangers are indicated by a listing of predisaster mitigation measures.

2. Planning should visualize evacuation as a flow process with different emergent stages involving various kinds of contingencies.

There is a strong tendency to see evacuation as developing in a singular and linear path. Here is the threat or the disaster impact, and there is the outcome, the flight withdrawal---such is the predominant imagery in much planning activity about emergency evacuations. But in line with the research findings summarized in the prior chapter, planners might better think of evacuation as developing along multiple and disjunctive paths. There is a need to consider different issues and possible problems at various points in the evacuation process.

We could elaborate on this in different ways. We choose simply to present some ideas planners ought to keep in mind. The following examples are meant to be illustrative and in no way a definitive inventory.

With respect to the community context component of our model, it is clear that it is necessary to keep in mind that intangible resources may be more important than tangible ones. The obvious evacuation relevant resources, such as private automobiles, are not always readily available in some metropolitan areas. There is little probability that officials will abandon their formal work roles in an emergency, so other issues ought to have higher priority. It is very easy to overlook non-nuclear family households and plan solely around nuclear families.

As to threat conditions, it is necessary to take into account the dimensions of different disaster agents since they can create radically different emergency demands. Confirmation of warnings can be more important than the initial warnings; in fact, the latter may have no consequences without the former. Community vulnerability is not a fixed condition-seasonal changes can affect who and what might be threatened. The absence of key officials at crucial times has to be assumed and planned for accordingly.

With regard to social processes, adequate information for confirmation is not the same as for decision making. Communication failure usually results from human error or absence, not from equipment breakdown. Coordination can be achieved in different ways, but there are different consequences depending on the model

used. Warnings can reach populations which need not be warned, but if it happens, they become part of the evacuation process.

As to patterns of behavior, what are perceived as orders to evacuate and what are intended to be orders, may correspond very closely. Effectiveness of organizational mobilization can be dependent on the work cycle. Concern about looting will not prevent people from withdrawing. There are special problems in evacuating institutionalized populations.

3. Operational personnel should consider the full range of the patterns of behavior that are involved in evacuation, from the warning to the withdrawal to the shelter and to the return stage.

Evacuation is not simply withdrawal. Furthermore, withdrawal is not necessarily the most problematical stage of evacuation. It might be more useful for operational personnel to think of evacuation as involving the four interrelated stages, visualizing it as a roundtrip process, and not merely a movement away from danger. In addition, the phenomena should be recognized as heterogeneous rather than homogeneous. The evacuee population consists of a number of rather different subgroups, who, moreover will not all be at any given point at the same time. Some may be just starting to withdraw as others are reaching their chosen shelter and still others are returning to their homes. Management of such operations is akin to conducting a symphony orchestra rather than controlling an assembly line.

Operational personnel should keep some things in mind. Planning, of course, is critical, but plans, like a musical score, provide only the framework; the music produced depends on the executive skills of the conductor. Similarly, the outcome of an evacuation is dependent upon the guidance of operational personnel. We now give a few selected examples of what such personnel need to take into account.

In the warning phase, sirens may signal that something is amiss but they

can seldom identify what is wrong and what should be done. People pay most attention to and are most influenced by other people, especially when they seek confirmation of warnings of personal danger. There is need to know what to say when people begin making initial inquiries about what is happening, if the warning process as a whole is to be effective.

As to the withdrawal phase, not all segments of a community are likely to be ready to leave at the same time, nor may this be necessary. If elderly and minority groups are not in the mainstream during routine times, they will not be there at times of emergencies unless an effort is made to involve them. Since some people will not withdraw under any circumstances, an assessment might be made of how much time, effort, and resources to devote to such recalcitrants, and how much might be better spent on other problems.

The time to work out arrangements with school boards and church groups for housing evacuees is not during the shelter phase. Members of separated families will seek one another in shelters so ways of facilitating their reunion should be developed. Officials operating outside of their usual headquarters should have other sources of information and means of communication than the mass media.

Evacuees will seek to go back on their own, particularly if they are given no cues as to what situations they will face in the return phase. Just as people will not automatically flee because there is danger, people will not automatically stay away because there is danger. Conflict is almost inevitable since the insistence of evacuees on returning and staying will run counter to organizational efforts to clean up an impacted area and otherwise restore community services.

Research

The need is not so much for more research in the evacuation area as is for better, more systematic, and directed studies. In-depth work is wanted on unex-

plored topics, unsystematically examined issues, and selected questions important for operations and planning. In addition, theoretical work integrating empirical findings is required while methodological improvements in the research undertaken would also help in producing better and more applicable findings.

Before elaborating on these matters, we should note that although it is not standard procedure to do so, we recommend that one line of past research is the evacuation area should not be pursued further, and additional empirical studies on another should be delayed.

Individual population surveys primarily attempting to relate demographic variables to evacuation behavior do not seem worthwhile. The studies done have provided scant knowledge, have shown little predictive capability, have probably used the wrong basic unit of analysis, and often seem to have been undertaken because of the ease of the methodology rather than because they were addressing important questions. The time, effort and resources spent on such surveys could be better employed on more meaningful substantive questions, explored with more imaginative research designs and methodologies.

As discussed earlier, a variety of studies have been done on the social psychological aspects of the warning process, and especially decision making in withdrawal behavior. Further research on this should be delayed until models which attempt to integrate the different variables proposed as being important, can be further developed. Two such formulations have been advanced (by Mileti and Beck, 1975, and by Perry in several publications, 1978, 1979b). The latter model in particular is sophisticated and rooted in larger social science theories, and is the kind of model building which should be strongly pursued before further atheoretical empirical studies are done. A good model will allow much more pointed research on social psychological aspects of warning, thus yielding much greater payoff, both theoretically and practically.

The field in which future research would be both possible and fruitful is wide open. Both general areas and specific questions relevant to the evacuation process need to be examined. Studies could be done on almost all the things discussed in the previous chapter, although, of course, some matters are more important than others. Among them, although not necessarily listed in order of priority, are the following:

1. The knowledge people and emergency organizations have about the nature and effects of different disaster agents.

2. The ways different dimensions of disaster agents can influence the evacuation process.

3. The development of disaster subcultures and how they enter into the behavior of evacuating or nonevacuating individuals and groups.

4. Which community organizations see evacuation as part of their responsibility?

5. The roles played by the military, including the National Guard.

6. The emergency sheltering of people by kin and friends.

7. The consequences of evacuation for organizations, individuals, and communities at large.

8. The number of people who actually leave and how estimates of evacuees are derived.

9. Organizational problems in reaching evacuation related decisions, including the target(s) of and content of warning messages.

10. The problems in evacuating institutional populations.

11. Does prior evacuation experience, independent of disaster experience, make a difference in a later evacuation situation?

12. In what ways and to what extent do legal political problems influence organizational decisions on withdrawal?

13. Organizational problems in mobilizing resources for evacuation.

14. The kinds of inquiries regarding evacuation directed to various organizations and the responses made.

15. Are false alarms completely dysfunctional?

16. The processes by which organizations define community danger.

17. The effects of different patterns of interorganizational coordination on the evacuation process.

18. Organizational problems in guiding return behavior.

19. The return behavior of evacuees.

20. The relationship between convergence behaviors and the outward movement of evacuees

Attention should also be directed to examining existing trends and technological developments with implications for the evacuation process. For example, if spot gasoline shortages become a hallmark of American life, what does this suggest for future disaster planning? As fewer Americans live in nuclear households, the traditional unit by which people withdraw, what consequences might there be for evacuation planning--in short, will the ever increasing proportion of single households create new problems of warning and moving such people? Cable television will probably reach half of American households in about a decade, if not sooner. Can advantage be taken for evacuation preparedness purposes of the actual and potential feedback capabilities of some cable systems? Could national or regional computer disaster data banks be devised, which could be linked to and provide quick feedback to locally based policy, planning, operational, and research groups? Examples like those just mentioned hopefully illustrate the more fundamental point, that attention should be given to developing an agenda for the future-a state of the arts document addressing not what is, but what is likely to be.

In addition to empirical studies, there is a need for conceptual and theoretical work. The heterogeneous nature of the withdrawal phenomena suggests the working out of a typology of the behavior. The group nature of much of the evacuation process implies that researchers ought be also thinking of ways of conceptualizing evacuating collectivities (a term already advanced by Aguirre, 1980) and collective processes (as partly suggested by Drabek, 1968) instead of just focusing on individuals and their personal perceptions. However, what is probably most needed is a way of understanding the meshing of individual and

organizational behavior in the evacuation process. Empirical studies can contribute data that will help in the understanding, but the actual integration necessitates a theoretical model.

In conclusion, we should also mention that need for certain methodological improvements in connection with many of the substantive studies discussed above. These should be more on-the-scene observational work, more longitudinal research, and more cross-cultural studies and collaborative efforts with non-American disaster researchers.

1. More on-the-scene observational field work should be undertaken.

As has been true of social and behavioral studies in general for several decades, and is recently becoming truer for disaster studies, those doing studies are increasingly separated in time and space from the individuals and groups being studied. Some current researchers have never been in an actual disaster situation, either during immediate pre-, trans- or post-impact periods. They have never directly experienced as researchers the phenomena of a disaster. Their familiarity with their subject, as such, comes from a chain of intermediaries or secondary sources of information, which often are some time distant from the actual happenings. This occasionally results in a laborious struggle towards incomplete research conclusions on the basis of secondary data analysis, when what is being studied could be far better understood and more fully grasped with the use of primary data obtained in direct observations. For some kinds of disaster studies, the lack of personal professional familiarity with disaster phenomena is not crucial, but for most research in the area, it is a major handicap to producing the best data gathering, processing, analysis and reporting possible.

The evacuation area is one where many of the questions which can and should be studied, could be better understood through on-site field research observations. This is particularly true of research issues in two of the major components of our model, namely social processes and patterns of behavior in

evacuation. The dynamics of the processes and the characteristics of the behavior are especially good candidates for field studies. They are phenomena which cannot be well understood by researchers removed in time and space from their actual occurrence.

Necessary to this kind of work are stand-by field teams trained for systematic large-scale field observations. Prior training is essential, as teams cannot be adequately prepared after a disaster has happened. The skills and knowledge needed in order to fully grasp the problems and opportunities of field observational work require far more intensive training than what is needed, for example to produce a survey interviewer. It is also vital that field teams have well rehearsed procedures and prepared instruments since the observational data to be obtained should be systematic and large scale. Such teams could take advantage of certain technological tools seldom used in disaster research such as aerial photography, tape recordings of sound phenomena, time-sequence photography, instant filming, and color movies (for a discussion of how visual social aspects in general can be studied see Curry and Clarke, 1978). In addition, field teams could engage in systematic documentation, gathering records and data primarily available only at the time of disaster, somewhat parallel to the information gathered by physical scientists and engineers in the immediate pre, trans and post impact periods of the physical impact of a disaster (as is currently done by some National Academy of Sciences groups and the Earthquake Engineering Research Institute in California). Given the systematic nature of the observations desired, and the diverse field skills required, such work requires a team operation; it cannot be adequately performed by a few ad hoc researchers.

2. <u>More longitudinal research should be conducted</u>.

The great majority of disaster research undertaken so far has been rather

static or cross-sectional in nature. That is, data has been gathered at a particular point in time, without later follow-up on whatever was studied earlier. A few exploratory longitudinal studies done by DRC strongly suggest the value and payoff of such work (Anderson, 1966; Longitudinal studies could furthermore be incorporated into and related to pre-impact and post-impact reserach designs).

The evacuation area would seem a prime candidate for longitudinal studies. The patterns of behavior component of our theoretical model would lend itself well to such studies. Cases could be especially well "tracked" if the observational field teams mentioned earlier were used to carry out a comprehensive study of the withdrawal movement, the sheltering phase and the return aspect. Another component of our theoretical model, the consequences of evacuation behavior and the feedback into a new community context, would also lend itself well to longitudinal examination. In fact, a major reason for the lack of knowledge that exists about the consequences of evacuation is due to the scarcity of studies on evacuees who have returned home or of long-post impact studies on communities which have undergone large-scale evacuation. Most disaster research of post-impact phenomena has been indirect and "one-shot" efforts; few certainly have attempted to follow along and follow up on the evacuation process itself.

If longitudinal studies are to be undertaken, certain organizational arrangements must be made. Planning and conducting longitudinal studies requires assurance of funding support over an extended period of time. With imagination, it might even be possible to graft longitudinal research onto past studies which were not originally set up for such a purpose. In one sense, base line data currently exists for a number of relatively recent disasters in American society. Those data sources could probably be used in some cases to do future studies to determine if changes have occurred in people and/or groups since the original study was conducted. In principle, the technical problems of longitudinal work in the

disaster area can be solved. The major hindrance to such research is absence of support.

3. Cross-cultural studies and collaborative research with non-American disaster researchers should be initiated.

Until recently most disaster research in the social and behavioral areas was done by Americans studying primarily American disaster (Quarantelli and Dynes, 1977). However, in the last decade disaster research as a field of study has developed in at least a dozen countries around the world. Systematic and large-scale research is underway notably in Japan, Italy, and Australia, and there are active cores of researchers in Sweden, Canada, England, and West Germany. The days of the overwhelming predominance of American academicians in disaster research are over. This affords an opportunity for Americans to join with other researchers elsewhere, to share findings and observations, to learn about how studies and research are done elsewhere, and to collaborate in future studies.

For several reasons, evacuation studies could be a central focus of collaboration. For one, evacuation research has very high priority in empirical studies elsewhere, such as in Japan and Italy. In fact, evacuation studies done or underway in Japan, Italy (with West German collaboration) and Australia have generally been larger scale, more systematic and wider ranging than the American work in the area. Important theoretical work on the topic is being done in Sweden. In addition, massive and frequent evacuations are a much more common occurrence in disasters outside of this country, especially in the Third World. While generalizing disaster experiences in non-urban and non-industrial societies to the United States has to be done with considerable caution and qualification, nonetheless such events if studied could be very informative. Observations of differences as well as similarities can be useful in policy, planning and operational issues if for no other reason than they suggest alternative courses of action which might otherwise be overlooked.

Cross-cultural studies and collaborative research should be pursued. This requires working out very complex relationships because of differences in funding patterns, styles of research, socio-political constraints and limitations, and a variety of other matters (Quarantelli, 1979b). However, an international network of communications now exists among disaster researchers. They have increasingly met in conferences and meetings, exchanged visits, and have expressed interest in working together. Encouragement and support by Americans would greatly facilitate this coming together, with benefits for all and certainly for disaster researchers and research users in this country.

Footnotes

1. We will generally not provide specific literature references in this chapter, since almost all the substantive points made will have been referenced to specific studies in the previous chapter.

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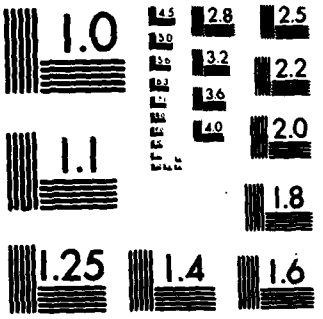

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APPENDIX

ANNOTATED BIBLIOGRAPHY ON EVACUATION BEHAVIOR AND PROBLEMS

Explanatory Note

References include only English language sources and are divided into two major categories: primarily empirical studies and essentially theoretical discussions. Authors' own abstracts of their writings, when used, were partly rewritten. The abstracts provided emphasize those aspects most relevant to the non-wartime evacuation under discussion, and are not necessarily a comprehensive abstract of the total substantive content of the publication. Whether mentioned in the abstract or not, all references in some way touch on evacuation behavior and problems.

The dimensions of the model of evacuation behavior developed by the Disaster Research Center were used to code each publication and its content. The results of the coding are presented in two ways. First, a graphic depiction of the model is reproduced containing the total numerical distribution obtained by a content analysis of all the publications. The frequencies shown indicate the total number of publications discussing in some way the designated model dimension or topic of evacuation. Second, the prime topics discussed, in terms of model dimensions, are listed after each abstract. A notation is also provided as to whether the description and/or analysis is primarily at the individual or organizational level.

A reader of the abstract and the topic listings should be able to make an assessment about the focus on evacuation behavior and problems in each publication. Both the general and the specific coding as well as the abstracts are subject to inter-coder variations of interpretation, and, thus, frequencies, abstracts, and topic listings should be read with that reservation. In general, code categories were defined broadly rather than narrowly.

Because the research on warning is covered extensively elsewhere, references dealing with warning studies are only included if they had explicit discussions of evacuation phenomena. For summaries of research on warning, see especially McLuckie (1970) and Mileti (1975). Items dealing with sheltering aspects are also only included if they specifically dealt with evacuation.

To provide some guidance to the literature, about a dozen references are listed below by author(s), title and date of publication (complete citations appear in the body of the bibliography). This reflects a staff judgment that these are among the more important of the writings on evacuation behavior and problems, and should form part of the core reading of anyone generally interested in the subject.

1. Earl J. Baker, "Predicting response to hurricane warnings: a reanalysis of data from four studies," 1979.

2. Thomas E. Drabek, "Social problems in disaster: family evacuation," 1969.

3. Thomas E. Drabek, "When disaster strikes," 1971.

4. J. E. Ellemers, Studies in Holland Flood Disaster 1953, Vol. 4, 1955.

5. C. B. Flynn and J. A. Chalmers, The Social and Economic Effects of the Accident at Three Mile Island: Findings to date, 1979

6. Joseph M. Hans and Thomas C. Sells, Evacuation Risks--an Evaluation, 1974.

7. J. Eugene Haas, et al, "The consequences of large scale evacuation following disaster: the Darwin, Australia cyclone disaster of December 25, 1974," 1976.

8. Harry E. Moore, Tornadoes over Texas, 1958.

9. Harry E. Moore, et al, Before the Wind, 1963.

10. Ronald W. Perry, "Letter to the editor: a classification scheme for evacuations," 1978.

11. Ronald W. Perry, "Evacuation decision making in natural disasters," 1979.

12. Walmer Strope, et al, "Importance of preparatory measures in disaster evacuations," 1977.

13. Gerald O. Windham, et al, Reactions to Storm Threat During Hurricane Eloise, 1977.

14. Marti F. Worth and Benjamin F. McLuckie, Get To High Ground: The Warning Process in the Colorado Flood, June 1965, 1977.

Quantitative Distribution of Literature Sources

By Model Categories

		I				II													
		R		SL		SC		AV	SV		DV								
		A		B		C		A	B		C								
III		22	55	22	28	39	33	65	24	21	49	17							
Communication	A	7	25	13	17	7	10	15	4	14	26	19	34	46	23	14	11	7	9	9
Decision Making	B	17	15	19	13	25	14	5	13	13	46	32	27	27	55	28	41	12	14	8
Coordination	C	6	23	14	15	6	16	7	5	13	12	18	5	21	22	34	21	27	14	15
Task	D	2	18	11	13	6	11	15	4	16	17	19	11	23	33	35	22	27	9	11

	Resources	A	3	8	8	9	5	5	13	12
V	Social Linkages	B	1	5	4	4	5	3	7	6
	Social Climate	C	9	6	14	9	9	3	27	13

IV

Warn.		W. Move		Shelter		Return	
A		B		C		D	

Albert, Michael B. and Louis Segaloff. "Task silence: the post-midnight alarm and evacuation of four communities affected by an ammonia gas releasee." Philadelphia: Project Summitt, The Institute for Cooperative Research, University of Pennsylvania, 1962. 37 pages. A case study based on interview and documentary data from officials, rescue workers and evacuees involved in a 1961 incident near Peoria, Ill. which required extensive warning activity to see that all residents were awakened and transported quickly. The authors determined the patterns of individual and community response, and attempted to relate these patterns to the social and political patterns of the communities.
Model Dimensions: (I) Resources, Linkage, Climate; (II) Agent Variables; (III) the effects of Community context on Coordination, Communication and Decision Making, and of situational variables on task and Communication; (IV) during Warning, Withdrawal, Shelter and Return; (V) with Consequences for Warning and Withdrawal Resources, Linkage and Climate.
Level: Primarily Organizational

Anderson, William. "The Baldwin Hills, California dam disaster." Research note #5. Columbus, Ohio: The Disaster Research Center, The Ohio State University, 1964. Briefly discusses the warning, evacuation and restoration activity that occurred before, during and after the break of an earthen dam in the Los Angeles area. Specifically noted are task and decision making processes as well as communication and coordination activities.
Model Dimensions: (I) Resources and Climate; (II) Situation variables and Definition; (III) the effects of Definition on Coordination and Decision Making; (IV) during Withdrawal.
Level: Primarily Organizational

Anderson, William. "Crescent City revisited: a comparison of public warning procedures used in 1964 and 1965 emergencies." Research note #11. Columbus, Ohio: The Disaster Research Center, The Ohio State University, 1965a. Compares the response by public agencies in Crescent City, California to notifications of possible tsunami activity in 1964 and 1965. Although warning messages were ambigous in both instances, the response in 1965 seemed to be more rapid and more comprehensive. Although no wave activity occurred in 1965, the author hypothesizes that failures in the 1964 warning process and subsequent damage tended to structure the later response.
Model Dimensions: (I) Social Context; (II) Threat Conditions; (III) their impact on Coordination, Communication and Decision Making; (IV) during Warning and Withdrawal; (V) with Consequences for Warning, Linkage, and Climate.
Level: Organizational

Anderson, William A. "Seismic sea-wave warning in Crescent City, California and Hilo, Hawaii." Working paper #11. Columbus, Ohio: The Disaster Research Center, The Ohio State University, 1966. Compares warning and

community response in four tsunami incidents, including one resulting in a major disaster. Focuses on the decision making role of local officials, vis a vis. The given warning system views warning as a process involving 1) collation and evaluation of incoming information 2) decision making about content, mode and target of warnings, and 3) transmission of the messages.
Model Dimensions: (I) Resources, Linkage, Climate; (II) Agent Variables; (III) the effects of Resource, Climate, Agent and Definition on Communication and Decision Making; (IV) during Warning; (V) with Consequences for Warning Resources, Linkage and Climate.
Level: Primarily Organizational

Anderson, William and Robert Whitman. "A few preliminary observations on 'Black Tuesday' the February 7, 1967 fires in Tasmania, Australia." Research report #9. Columbus, Ohio: The Disaster Research Center, The Ohio State University, 1967. Details the massive conflagration in Tasmania from data derived interviews with key responders and documentary in both rural and urban areas, especially around the capital city of Hobart. Second focus is on police activities. Major problems were found to be traffic control and communications.
Model Dimensions: (I) Resources; (II) Situational Variables; (III) the effects of Resources, Linkage, Climate, Situation and Definition on Coordination, Task and Communications; (IV) during Warning and Withdrawal.
Level: Organizational

Baker, Earl J. "Predicting response to hurricane warning: a reanalysis of data from four studies." Mass Emergencies 4: 9-24, 1979. Data from four post-hurricane sample surveys (from Hurricanes Carla, Camille, and Eloise) are reviewed and reanalyzed with respect to the single dependent variable: whether or not respondent evacuated in response to warning. Aim of this secondary analysis was to identify useful prediction variables. No powerful individual predictions were found which suggests future research in how combinations of variables affect behavior, as well as in methodological improvements.
Model Dimensions: (I) Resources, Linkage, Climate; (II) Agent; (III) the effect of Climate, Agent and Definition on Task, and of Resources, Linkage, Climate and Definition on Decision Making; (IV) Decision Making in Withdrawal; (V) Climate Consequences.
Level: Individual and Organizational

Bates, F. L., C. W. Fogelman, V. J. Parenton, R. H. Pittman, and G. S. Tracy. The Social and Psychological Consequences of a Natural Disaster: A Longitudinal Study of Hurricane Audrey. Disaster Study No. 18. Washington, D. C.: National Academy of Sciences, 1963. A field study conducted over a period of 4½ years from the date of the 1957 hurricane affecting Cameron Parish, La., with emphasis on long-term social change. Discussion of evacuation behavior is present but of

secondary importance, however, some attention is paid to the influence of prior experience, as evidenced by a comparison of behavior in Audrey with that of behavior in Hurricane Carla which threatened Cameron Parish 3 years later.
Model Dimensions: (I) Linkages and Climate; (II) Agent, Situational Decision Making, and of Definition on Coordination, task, Communication and Decision Making; (IV) during Warning, Withdrawal, Shelter and Return; (V) with Consequences for Climate regarding Withdrawal.
Level: Individual and Organizational

Blum, Richard H. and Bertrand Klass. A Study of Public Response to Disaster Warnings. Menlo Park, California: Stanford Research Institute, 1956. Compares responses to evacuation warnings in Pala Alto, Yuba City, and Marysville, California during the 1955 floods, using interviews, weather records, content analysis of media releases, and subjective accounts. The different community contexts, source of belief in and verification of warnings, perception and subsequent evaluation of the situation, and other influences were examined for their influence in the decision to evacuate.
Model Dimensions: (I) Climate; (II) Threat Conditions; (III) the effects of threat conditions, especially Definition on Coordination, Tasks, Communications and particularly Decision Making; (IV) during Warning and Withdrawal; (V) with consequences for Resources, Linkage and Climate.
Level: Primarily Individual

Boek, Walter and Jean Boek. "An exploratory study of reactions to an impending disaster." Albany, N. Y.: N. Y. State Department of Health, 1956. Descriptive account derived from pre-impact interviews from 13 households at high risk during an impending flood in Schenectudy. Six types of reaction were observed: 1) family moved out of home; 2) family in process of moving; 3) possessions stored above expected high water mark; 4) wait and see; 5) family remaining for reasons of personal security; 6) family remaining as protection against looters.
Model Dimensions: (I) Climate; (II) Agent; (III) effects of Agent and Situation on Coordination, of Linkages on Communication, and of Definition on Decision Making; (IV) Communication of Warning, Decision Making on Warning and Withdrawal.
Level: Primarily Individual

Brunn, Stanley, James Johnson and Donald Zeigler. Final report on a Social Survey of Three Mile Island Residents. East Lansing, Michigan: Department of Geography, Michigan State University, 1979. A study of 150 residents living within thirty miles of the nuclear plant. Topics examined include initial awareness of the accident, numbers evacuating, level of confidence in information disseminated by federal and utility company officials, and measures of perceived personal and environmental impact.

Model Dimensions: (I) Resources, Climate; (II) Agent; (III) effects of Resources and Agent on Coordination, of Linkage and Agent on Communication, and of Resources, Climate, Agent, Situation and Definition on Decision Making; (IV) Communication of Warning, Decision Making in Warning through Return; (V) with Climate Consequences.
Level: Individual and Organizational

Carroll, John J., S. J. and Salvador A. Parco. "Social organization in a crisis situation: the taal disaster." Manilla: Philipine Sociological Society, 1966. An empirical case study of the Taal Volcano eruption of September 28, 1965. Discusses the effects of patterns of social interaction on the response of individuals to an unexpected crisis situation. Among the findings are : that widespread panic does not occur; that families tend to evacuate as a unit; and, that in general, former patterns of behavior are rapidly adapted to the needs by a changed environment. Of interest are the similarities on rates and characteristics of persons seeking public vs. private shelters between U. S. and Philippine cultures.
Model Dimensions: (I) Resource, Linkage and Climate; (II) Agent, Situational Variables and Definition; (III) the effects of Linkage on Coordination and of Climate on Decision Making; (IV) during Withdrawal and Shelter.
Level: Individual

Carter, T. Michael, John Clark and Robert Leik. "Organizational and household response to hurricane warnings in the local community." St. Paul: Department of Sociology, University of Minnesota, 1979. Report on a study of organizational and household preparedness for response to hurricane warnings in six communities. Predisaster interviews were conducted with organizational representatives, focussing on the coordination and communication linkages existing under both routine and threat conditions. Telephone surveys were also conducted with 200 randomly selected households in each community. Preliminary findings are given with future reports to deal with the post-impact data called for in the research design.
Model Dimensions: (I) Resources, Linkages, Climate; (II) Definition; (III) the effects of Linkage on Coordination and Communication, and of Resources, Linkage, Climate and Definition on Decision Making; (IV) during Warning and Withdrawal.
Level: Individual and Organizational

Clark, John P. and T. Michael Carter. "Response to hurricane warnings as a process: determinants of household behavior." St. Paul: Department of Sociology, University of Minnesota, 1979. Briefly outlines an emerging model of individual response to natural hazard warnings based on the notion of "bounded rationality", which assumes incomplete information, as opposed to the maximum utility model commonly used. Implications of the model for hurricane warnings are given, utilizing responses to a survey of 200 households on anticipated reactions to a warning.

Model Dimensions: (III) effects of Resources, Climate and Agent on Decision Making; (IV) during Warning and Withdrawal; (V) with Climate Consequences.
Level: Individual

Clifford, Roy A. The Rio Grande Flood: A Comparative Study of Border Communities on Disaster. Washington, D. C.: National Academy of Science, 1955. A comparative field study of the warning, response and some of the recovery of two adjacent communities, one Mexican and one American on the Rio Grande flood of 1954. Differences in the efficiency of formal and informal organizations. The political structure of warning, evacuation and relief efforts, residents response to and evaluation of relief efforts, patterns of helping behavior and response do "outside" organizations are examined in terms of the political and social structures and cultural values of each community. Findings generally support the notion that clearly defined roles and communication channels established prior to emergencies increase the effectiveness of response.
Model Dimensions: (I) Resource, Linkage, and Climate; (II) Agent, Situational Variables and Definition; (III) the effects of Climate and Definition on Coordination and Decision Making, and the effects of Resources and Linkages on Task; (IV) during Withdrawal and Shelter.
Level: Individual and Organizational

Cohen, Elias S. and S. Walter Poulshock. "Societal Response to Mass Dislocation of the Elderly." The Gerontologist 17: 262-268, 1977. A three year study of the impact of the 1972 Wilkes-Barre flood on the elderly. Survey data from a sample of 250 elderly victims revealed that anticipated adverse long-term effects, even on those who underwent considerable displacement, were not realized. The community steady state was restored within 100 days; while one year later some elderly had actually accrued benefits in terms of improved housing and greater family support.
Model Dimensions: (I) Linkages, Climate; (II) Agent, Situational Variables; (III) the effect of Resources and Situational Variables on Coordination and Task; (IV) during Shelter and Return; (V) with consequences of Return on Resource, Linkage and Climate.
Level: Individual and Organizational

Connell, Michael L. "Groups in disaster." Paper presented at the American Psychiatric Association Meeting, Atlantic City, 1966. Records observations made during a physician's tour of duty in the massive shelter operation following Hurricane Betsy in New Orleans 1965. Once medical needs were attended to a number of groups were formed to deal with possible emotional trauma. Noticeable in the groups were: 1) a high degree of emotional involvement 2) a hunger for information, and 3) spontaneous discussion of issues such as group formation, loss of loved ones and property, feelings about the experience and plans for the future. A change in the character and composition of the shelter population, and in group behavior, was observed over time. Apparently, groups serve useful morale and task purposes, however, their effects on preventing mental illness is as yet unknown.

Model Dimensions: (I) Resources, Climate; (II) Agent and Definition; (III) the effects of Linkage, Climate and Definition on Coordination and Communication; (IV) during Shelter and Return; (V) with Resource, Linkage and Climate Consequences.
Level: Primarily Individual

Danzig, Elliott, R., Paul W. Thayer and Lila R. Galanter. The effects of a threatening rumor on a disaster-stricken community. Washington, D. C.: National Academy of Sciences, 1958. A study of the behavior of the population of Port Jarvis, N. Y. in response to a rumor that a nearby dam had broken. Using interviews with officials, a descriptive account is presented of the communication networks involved in both the spread of rumor and of official denial. A random sample of residents and a saturation sample from a previously flooded area were also interviewed. General conclusions were that the organizations involved did not spread the rumor but rather sought confirmation before strongly advising any action. Individuals, on the other hand, tended to act on the strength of their beliefs. The stronger the belief in the rumor, the greater the likelihood of rapid evacuation and the lower the acceptance of the initial denials.
Model Dimensions: (I) Resources, Linkages, Climate; (II) Agent and Definition; (III) the effects of Linkage, Situational Variables and Definition on Communication and Decision Making; (IV) during Warning and Withdrawal.
Level: Individual and Organizational

Drabek, Thomas E., and Keith Boggs. "Families in disaster: reactions and relatives." Journal of Marriage and the Family, p. 443-451, 1968. Hours before a massive flood struck Denver in 1965, approximately 3700 families were hurriedly evacuated, warning coming from authorities at first, relatives and the mass media later on. A random sample of 278 families was interviewed to learn initial and subsequent response to warnings. The initial response was marked disbelief regardless of warning source with extensive confirming behavior following. Families evacuated as units with a strong tendency to go to homes of relatives rather than in public shelters. This tendency was significantly and positively affected by social class and by the degree of interaction between relatives during the warning period.
Model Dimensions: (I) Resources, Linkages, Climate; (II) Agent and Definition; (III) their effects on Communication and Decision Making; (IV) during Warning, Withdrawal and Shelter.
Level: Primarily Individual

Drabek, Thomas E. "Social processes in disaster: family evacuation." Social Problems 16: 336-349. Responses to disaster warnings were studied through analysis of random sample interviews with 278 families who were suddenly evacuated prior to a major flood in Denver in June, 1965. Using a symbolic interactionist approach, analysis of the data revealed a series of inter-related but qualitatively distinct processes of warning,

confirmation and evacuation. The relationship between warning and response was found to be more complex then is implied by the simplistic decision-making model customarily used.
Warning occurred through 1) authorities, 2) family/peer groups and 3) mass media, with source apparently influencing behavior more than content. Warning triggered various responses, from immediate withdrawal to various kinds and degrees of confirmation behavior. Evacuation behavior itself followed four general patterns: 1) by default, 2) by invitation, 3) by compromise, and 4) by decision.
Model Dimension: (I) Linkages and Climate; (II) Agent and Definition; (III) the effects of these on Coordination, task, Communications and Decision Making; (IV) during Warning and Withdrawal; (V) with Consequences for Climate.
Level: Individual and Organizational

Drabek, Thomas E. and John S. Stephenson III. "When disaster strikes." Journal of Applied Social Psychology, 1: 187-203, 1971. Following the Denver flood of 1965, 278 randomly selected families were interviewed and response patterns were analyzed. A model of evacuation patterns emerged which includes evacuation by: 1) default; 2) invitation; 3) compromise; and, 4) decision. The article also discusses individual confirmation behavior, the behavior patterns of separated families and shelter patterns.
Model Dimensions: (II) Agent, Situational Variables and Definition; (III) the effects of Situation and Definition on Coordination, Task, Communication and Decision Making; (IV) Coordination of Withdrawal and Return, Tasks of Warning and Withdrawal, Communication of Warning, and Decision Making in Withdrawal, Shelter and Return.
Level: Individual

Drabek, Thomas E. and William H. Key. "The impact of disaster on primary group linkages." Paper presented at the annual meeting of the American Sociological Association, San Francisco, 1975a. Using data from the Denver 1965 flood, this paper deals with linkages of nuclear families to kin, friends, neighbors and voluntary associations. Trends in the data suggested that linkages of victim families to friends and relatives were slightly stronger, those to neighbors and voluntary associations were weaker, except for links between victims and religious institutions.
Model Dimensions: (I) Linkage, Climate; (III) the effects of Resources and Linkages on Communication and Decision Making; (IV) for Shelter and Return; (V) with Consequences for Resource, Linkages and Climate.
Level: Individual

Drabek, Thomas E., William Kay, Patricia Erickson and Juanita Crowe. "The impact of disaster on kin relationships." Journal of Marriage and the Family. p. 481-494, 1975b. The existence of baseline data, permitted a quasi-experimental design and longitudinal comparisons of kin relationship patterns between victim and non-victim families of the 1966 Topeka, Kansas tornado.
Data on interaction patterns prior to and immediately following the event was obtained from 138 victim families and a matched control group. Three

years later it was found that the greater the intensity of kin relationships prior to the tornado, the greater the propensity to receive aid from relatives. Victim families also reported increased interaction with immediate kin, and a greater tendency to see relatives as future help sources.
While some of the differences are slight, they nevertheless show clear patterns, and are indeed a result of the tornado.
Model Dimensions: (I) Linkages, Climate; (III) the effects of Resources and Linkages on Communication and Decision Making; (IV) for Shelter and; (V) with Consequences for Resources and Linkage.
Level: Individual

Dynes, Russell R., J. E. Haas, E. L. Quarantelli. "Some preliminary observations on organizational responses in the emergency period after the niigata, Japan earthquake of June 16, 1964. Working paper #3, Columbus, Ohio: The Disaster Research Center, The Ohio State University, 1964. Descriptive account of observations made immediately following the earthquake. The focus is on community response, in terms of the identification and mobilization of critical resources (plans, facilities/equipment and personnel) and of the resolution of key functional problems (coordination, authority, communication). Evacuation is noted, cross cultural differences are discussed, as are differences from other earthquake responses.
Model Dimensions: (I) Resources, Linkage; (II) Agent, Definition; (III) the effects of Resources and Linkage on Coordination, task, and Communication and of Situation and Definition on task and Communication; (IV) in Warning, Withdrawal and especially Shelter.
Level: Primarily Organizational

Ellemers, J. E. Studies in Holland Flood Disaster 1953. Volume IV. The Hague: Institute for Social Research in the Netherlands, 1955. The fourth and summary volume of a series on the sociological and psychological effects of the Netherlands flood disaster of 1953. Subjects studied were a) the communications systems before and during the flood; b) a survey of evacuation problems and disaster experiences, presented as a statistical analysis; and c) a survey of three communities struck by the flood, presented in case-study format. Extensive theoretical interpretation is given to the findings.
Model Dimensions: (III) effects of Social Climate on Coordination; (IV) Coordination of Withdrawal, Shelter and Return and tasks of Shelter.
Level: Individual and Organizational

Erikson, Kai T. Everything in its Path. New York: Simon and Shuster, 1976. A very detailed case study of the dam flood disaster in the Buffalo Creek mining area of West Virginia. Most of empirical data used primarily in-depth interviews of victims, were obtained in connection with a law suit instituted by victims. Emphasis is on the short and long run psychological effects on victims, explained primarily in terms of massive dislocation and the destruction of the very social fabric of the community.

Model Dimensions: (I) Resources, Linkages and Climate; (II) Agent and Definition; (III) The effects of Resources, Linkage and Climate on Decision Making; (IV) during Withdrawal, Shelter and Return; (V) with Resource, Linkage and Climate Consequences.
Level: Primarily Individual

Fitzpatrick, John S. and Jerry J. Waxman. "The March 1972 Louisville, Kentucky chlorine leak threat and evacuation: observations on community coordination." Working paper #44. Columbus, Ohio: The Disaster Research Center, The Ohio State University, 1972. Provides a brief descriptive chronology which highlights the major decisions and activities connected with the evacuation of thousands of people. The analysis focusses on the activities and problems of the two major coordinating agencies: the OEP and local CD.
Special attention is paid to issues arising out of the fact community evacuation decisions--a primarily local responsibility--were contingent upon technical and engineering decisions made by federal agencies.
Model Dimensions: (I) Resources, Linkages; (II) Agent, Definition; (III) the effects of Resource and Linkage on Coordination and Communication, and the effects of Agent, Situation, and Definition on Coordination, Task, Communication and Decision Making; (IV) mainly during Withdrawal.
Level: Primarily Organizational

Flynn, C. B. and J. A. Chalmers. The Social and Economic Effects of the Accident at Three Mile Island: Findings to Date. Tempe, Arizona: Mountain West Research, Inc., with Social Impact Research, Inc., 1979. Reports on the finding to date, grouped into the effects of the accident on 1) the regional economy, 2) institutions, and 3) individuals. Data sources include published documents and statistics, telephone survey of 1,500 households, other research, newspaper files and interviews of key informants. Focuses on the two week emergency period and on continuing effects through September 1979. A two volume case study is forth coming.
Model Dimensions: (I) Resource and Climate; (II) Agent, Situational Variables, Definition; (II) effects of Resources on Coordination, task and Communication, and of Climate, Agent, Situation and Definition on Communication and Decision Making; (IV) during Warning through Return; (V) with Resource, Linkage and Climate Consequences.
Level: Individual and Organizational

Forrest, Thomas R. Structure Differentiation in Emergent Groups. Report series #15. Columbus, Ohio: The Disaster Research Center, The Ohio State University, 1974. Examines in theoretical terms the characteristics and conditions associated with emergent groups in natural disasters. Chapter V applies empirical evidence from a 1971 flood in Southeastern Pennsylvania to the framework presented, paying particular attention to the operating structures developed by a relief group that emerged.
Model Dimensions: (I) Resources, Climate; (II) Definition; (III) the effects of Resources, Linkage and Climate on Coordination, task,

Communication and Decision Making; (IV) Coordination of Warning through Return, Tasks of Withdrawal and Shelter, and Communication during Warning; (V) with Consequences for Resources, Linkage and Climate.
Level: Individual and Organizational

Forrest, Thomas R. Hurricane Betsy, 1965; a selective analysis of organizational response in the New Orleans area. Historical and comparative disaster series, report #5. Columbus, Ohio: The Disaster Research Center, The Ohio State University, 1979. A case study looking at the local Red Cross, Salvation Army, Civil Defense, utilities and telephone company responses and problems in the hurricane. Three major points are: 1) behavior in disaster situations is purposeful and not irrational or random; 2) the greater the level of preparation, the greater the likelihood of an effective response; and 3) the crucial role of communications in the structuring and facilitating of all phases of the response. Notes Red Cross shelter policies and how that organization handled evacuees.
Model Dimensions: (I) Resources, Linkage and Climate; (II) Agent, Situational Variables and Definition; (III) effects of Climate on Coordination and Resources, Linkage and Definition on Decision Making; (IV) Coordination and tasks of Shelter and Decision Making during Withdrawal and Shelter.
Level: Primarily Organizational

Fritz, Charles E. and Eli S. Marks. "The NORC studies of human behavior in disaster." The Journal of Social Issues. 10: 26-41, 1954. A selective analysis of open-ended interview data obtained from nearly 1,000 disaster victims, including quantitative data from 139 respondents in an Arkansas tornado. Primary emphasis is on types of individual disaster reactions in the immediate pre and post impact period, and how such factors as forewarning, separation from family members, and sight of casualties affected those responses. Major conclusions are that panic flight and other highly uncontrolled forms of behavior are very rare, that in the immediate post impact period there is much uncoordinated behavior because people are acting on the basis of individual and often conflicting definitions of the situation, that the amount of warning available affects very much actions taken and losses sustained, and that emotional reactions to disaster may be greatly aggravated by separation from other family members.
Model Dimensions: (II) Agent and Definition; (III) effects of Definition on Coordination, Communication and Decision Making; (IV) Tasks of Warning, Decision Making in Warning and Withdrawal; (V) with Resource and Climate Consequences.
Level: Primarily Individual

Gruntfest, Eve C. "What people did during the Big Thompson flood." Working paper #32. Boulder, Colorado: Institute of Behavioral Science, University of Colorado, 1977. Behavior patterns which were adopted at the time of the flood are analyzed, partly to improve warning systems designs for communities vulnerable to flash flooding. Comparisons are made between

actions taken by survivors and non-survivors, the warned and non-warned, groups taking and not taking action, and local and non-local groups.
Model Dimensions: (II) Agent; (III) the effect of Agent on Task, Communication and Decision Making; (IV) during Warning and Withdrawal.
Level: Primarily Individual

Haas, J. Eugene, Harold C. Cochrane and Donald G. Eddy. "The consequences of large-scale evacuation following disaster: the Darwin, Australia cyclone disaster of December 25, 1974." Working paper #27. Boulder, Colorado: Natural Hazard Research, The University of Colorado, 1976. A case study of the post-impact evacuation of 36,000 residents of Darwin, following the Christmas disaster. The focus is on individual and organizational activities as well as the economic impact of the disaster and subsequent evacuation.
Model Dimensions: (I) Resources, Linkage and Climate; (II) Agent, Situation, Definition; (III) Resources and Linkage on Coordination, Task and Communication and Situation and Definition on Decision Making; (IV) during Withdrawal, Shelter and Return; (V) with Consequences for Resources and Climate.
Level: Individual and Organizational

Haas, J. Eugene, Robert Kates and Martyn Bowden. Reconstruction Following Disaster. Cambridge, Massachusetts: MIT Press, 1977. A systematic analysis which presents a model of disaster recovery activities, and applies it to findings from the San Francisco, Anchorage and Managua earthquakes and the Rapid City flood. The central issues around the reestablishment of homes and jobs are discussed from the standpoint of both the community as a whole and the individual household. Evacuation relevant issues are implicit since these disasters resulted in massive post-impact relocation involving complex patterns of withdrawal, shelter and return.
Model Dimensions: almost all
Level: Individual and Organizational

Haas, J. Eugene. "The Philippine earthquake and tsunami disaster: a reexamination of behavioral propositions." Disasters 2: 3-11, 1978. Events following the Philippine disaster of August 1976 serve as the basis of comparison with selected propositions of the disaster literature, i. e., role conflict, land use reform and the pace of reconstruction. The findings challenge established views of convergence and the temporary change in status distinctions following disaster. As a cross cultural study it offers clarification of our understanding of issues related to evacuation in sudden, no warning situations and highlights the need for other such studies.
Model Dimensions: (I) Resources, Linkage; (II) Agent, Situational Variables, Definition; (III) their effects on Coordination, Task and Decision Making; (IV) during Shelter and Return; (V) with Resource and Climate Consequences.
Level: Individual and Organizational

Hans, Joseph M. Jr. and Thomas C. Sell. "Evacuation risks--an evaluation." Las Vegas, Nevada: U. S. Environmental Protection Agency. Office of Radiation Programs, 1974. Secondary analysis of 64 selected cases of evacuation, occurring between 1960 and 1973, which closely approximate the situation presented by a nuclear plant accident. Seeks to determine the risk of death and injury, costs of evacuation, and the parameters affecting risk and their potential use for predicting risk.
Concludes that large or small populations can be effectively evacuated with minimal death and injury risks, and that, in most cases, such populations can take care of themselves provided adequate plans are developed to minimize potential problems that may occur peculiar to the impact area.
Model Dimensions: (I) Resources, Climate; (II) Agent, Situation; (III) the effects of Climate, Situation and Definition on Coordination, Communication and Decision Making; (IV) Coordination of Withdrawal, Shelter and Return, tasks and Decision Making in Withdrawal, and Communication of Warning.
Level: Individual and Organizational

Hudson, Bradford B. "Observations in a community during a flood." (no date) Qualitative observations made by researcher participating as a volunteer during a July 1951 flood in Miami, Oklahoma. The period of time covered was about seven hours before impact until the waters had returned to normal. Problems and processes of community leadership, communications and shelter are briefly discussed, as well as individual decision making, against the background of the emergent conditions of the threat period.
Model Dimensions: (I) Resources, Climate; (II) Agent, Definition; (III) the effects of Resources and Agent on Communication during; (IV) Warning, and Coordination, task and Decision Making on Withdrawal and Shelter.
Level: Primarily Organizational

Kennedy, Will. "The Jamaica, Queens New York explosion and fire." Research note #13. Columbus, Ohio: The Disaster Research Center, The Ohio State University, 1967. Describes the response of the New York City Fire Department and the Brooklyn Union Gas Company to a gas leak and subsequent explosion/fire in Queens, New York at 5:30 a.m. on January 13, 1967. Concentrates on the initial evacuation, conducted by the first fire crews at the scene.
Model Dimensions: (I) Resources; (II) Agent, Definition; (III) effect of Climate on Coordination, Communication and Decision Making; (IV) Tasks and Decision Making during Warning.
Level: Primarily Organiztional

Killian, Lewis M. "Evacuation of Panama City fire 'Hurricane Florence'." Washington, D. C.: Committee on Disaster Studies, National Academy of Sciences, 1954. Following the hurricane threat to Panama City, Florida in 1953, which resulted in the evacuation of at least 10,000 people. A random sample of 71 households was interviewed, plus an additional 19

households from the beach area. The purpose was to learn more about reasons for evacuating as opposed to not evacuating, and about possible reactions to what turned out to be a "false alarm".
Primary factors in the decision appeared to be type (ownership and quality) and location of residence, and the nature of warning information, which was frequent, stressed the potential for danger, but allowed for individual decision making. The false alarm seemed not to have negative effects, with an increase afterward in the number of people who said they would be willing to evacuate again in similar circumstances.
Model Dimensions: (I) Resources, Linkage, Climate; (II) Agent; (III) effects of Resources, Linkage and Climate on Coordination, Task, Communication and Decision Making, and of Definition on Communication and Decision Making; (IV) Coordination and Tasks during Shelter and Communication and Decision Making during Warning through Return; (V) Consequences for Climate.
Level: Individual and Organizational

Klausner, Samuel Z. and Harry V. Kincaid. Social Problems of Sheltering Flood Evacuees: Final report. New York: Bureau of Applied Social Research, Columbia University, 1956. A major study of warning, withdrawal and especially shelter patterns of Farmington, Connecticut residents during and after flooding associated with Hurricanes Connie and Diane in 1955. 231 evacuees and 183 host households were interviewed. Chapters include: Crisis Behavior, Finding Shelter, Tension, Time Remained with Host and Host Attitudes. Instruments used are reproduced.
Model: Almost All
Level: Primarily Individual

Lachman, Roy, Maurice Tatsuoka and William Bonk. "Human Behavior during the Tsunami of May 1960." Science 133: 1405-1409, 1961. An open-ended questionnaire was administered to a non-random sample of 327 victims. Research aims were to explore subjective interpretations of the ambiguous warning received, and resultant behavior. Behavior fell into three categories: 44% waited for further information, 32% evacuated at the signal, and 15% continued normal routines. Analysis of data concluded that formal education was not a determinant of adaptive behavior and that prior experience played only a minor role. Suggests that personality factors may have strongest explanatory value.
Model Dimensions: (I) Resources; (II) Agent; (III) effects of Resources and Definition on Communication and Decision Making; (IV) during Warning and Withdrawal; (V) Resource and Climate Consequences.
Level: Individual and Organizational

Lammers, C.J. Studies in Holland Flood Disaster 1953. Volume II. The Hague: Institute for Social Research in the Netherlands, 1955. The second volume on the social-psychological effects of the Holland flood disaster is largely composed of the results of a time study conducted to determine what factors influenced the amount of tension that occurred between evacuee and hosts during the extended shelter period following the disaster. Tentative suggestions offered are that few single factors, in and of themselves, were major contributors to tension, but rather various combinations of variables. (234 pages)
Model Dimensions: (I) Resources, Linkage, Climate; (II) Agent, Situation, Definition; (III) effect of Definition on Coordination, Communication and Decision Making; (IV) during Warning through Return.
Level: Primarily Individual

Lewis, James. "Volcano in Tonga", Journal of Administration Overseas. 43: 116-121, 1979. Historical account of evacuation and relocation of inhabitants of Niua Fo'ou following the volcanic eruption of 1946. Report is based on a diary kept by an islander, and chronicles the relocation and subsequent return of the island inhabitants.
Model Dimensions: (I) Resources, Climate; (II) Agent; (IV) Tasks of Withdrawal and Shelter, Communication in Warning and Withdrawal, and Decision Making in Withdrawal; (V) Resource Consequences.
Level: Individual and Organizational

Lifton, Robert Jay and Eric Olson. "The Human Meaning of Total Disaster. The Buffalo Creek Experience." Psychiatry 39: 1-17, 1976. An analysis of the psychological effects of the 1972 Buffalo Creek, West Virginia dam disaster, which resulted in 125 deaths and nearly 5000 left homeless. The study was done at the request of lawyers representing townspeople in a case claiming "phychic impairment".
Authors conducted 43 interviews involving ministers, volunteer workers, and 23 Buffalo Creek survivors. Findings revealed that all exposed to the disaster experienced some or all of the following: death imprint and death anxiety, death guilt, psychic numbing, counterfeit nurturing and unfocused rage, and struggle for significance.
Five special characteristics of Buffalo Creek flood are given: suddenness, relationship of disaster to callousness and irresponsibility of others, continuing relationship of survivors to the disaster, isolation of area and community, and totality of communal destruction. It is noted that occurrence of all 5 characteristics in one disaster is highly unusual.

Model Dimensions: (I) Linkage, Climate; (II) Agent, Situation, Definition; (IV) Coordination of Shelter; (V) Resource, Linkage and Climate Consequences.
Level: Primarily Individual

Mack, Raymond W. and George W. Baker. "The Occasion Instant-The Structure of Social Responses to Unanticipated Air Raid Warnings." Publication 945. Washington, D. C.: National Academy of Sciences, 1961. A quantitative examination of the attitudinal responses of citizens in three American cities to the unanticipated signal for an enemy air attack. Data base is personal interviews with persons who heard or heard of the warning signal. Most conclusive general finding is that a warning signal alone is totally inadequate to stimulate people to immediate protective action. Explores reasons for lack of appropriate response including factors which affect the definition of the situation, the behavioral response, and the retrospective interpretation. (69 pages)
Model Dimensions: (II) Agent, Situation, Definition; (III) effects of Linkage, Climate, Situation and Definition on Decision Making; (IV) Coordination and Decision Making in Warning and Withdrawal; (V) Climate Consequences.
Level: Primarily Individual

Mileti, Dennis S. and E. M. Beck. "Communication in Crisis: Explaining Evacuation Symbolically." Communication Research 2: 24-49, 1975. Using a symbolic interactionist perspective, the authors formulate a model of individual response to short-term natural hazard warnings, and then assess it in terms of data gathered from a random sample of family responses to the 1972 Rapid City flash flood.
Warning is conceptualized as a complex social process involving evaluation, dissemination and response, wherein variables of context, perceived context, communication mode, confirmation and warning belief are all interrelated, and the variable of time is of critical importance for explaining evacuation behavior.
Model Dimensions: (I) Linkage, Climate; (II) Agent, Definition; (III) effects of Linkage and Climate on Coordination, and of Linkage, Climate, Agent and Definition on Communication and Decision Making; (IV) during Warning and Withdrawal; (V) with Climate Consequences.
Level: Primarily Individual

Moore, Harry Estill. Tornadoes over Texas: A study of Waco and San Angelo in disaster. Austin: University of Texas Press, 1958. General findings regarding the evacuated population include: 1) those forced to relocate incurred greater cash and work loss; 2) most people forced to move from their homes moved several times before "finally" settling; and 3) there seemed to be a tendency for people to resettle as close to their original dwelling as possible.
Describes the May, 1953 disaster and the organizational response. Major emphasis is on reconstruction and mental health consequences, some of the topics being legal and governmental problems in relief and reconstruction, temporary and permanent housing, the aged, race differences, donors and donation communications and long and short term emotional effects. Substantial victim interview data is provided. (334 pages)
Model Dimensions: (I) Resources, Linkage, Climate; (II) Agent, Situation, Definition; (IV) Tasks of Warning and Shelter, Decision Making on Shelter;

(V) with Resource and Climate Consequences.
Level: Individual and Organizational

Moore, Harry Estill, Fredrick L. Bates, Marvin V. Layman and Vernon I. Parenton. Before the Wind-A Study of the Response to Hurricane Carla. Disaster Study Number 19. Washington, D. C.: National Academy of Sciences, 1963. The first systematic work on a major evacuation, this case study, done nine months after the event, analyzes field data from 1500 household interviews in five areas hit by Carla in 1961, comparing urban-rural and high-low evacuation levels. Focus is on warning system effectiveness, evacuation decision making, establishment of and assignment to shelters of various types, organizational functioning trans-disaster and during return, and a comparison of voluntary and involuntary evacuation. (169 pages)
Model Dimensions: All
Level: Individual and Organizational

Moore, Harry E., et al. ...and the Winds Blew. Austin, Texas: The Hogg Foundation for Mental Health, The University of Texas, 1964. A companion volume to "Before the Wind". Presents a chronology of events occurring along the Texas and Louisiania coasts from the first reports of Hurricane Carla, through the evacuation, to the rehabilitation process. Emphases include the extreme orderliness of the withdrawal movement, the interrelation between media coverage and individuals behavior and the decision-making by individuals and organizational representatives regarding warning, withdrawal movement, sheltering and return phase of the disaster. (221 pages)
Model Dimensions: (I) Resources, Linkage, Climate; (II) Agent, Situation, Definition; (III) their effects on Communication and Decision Making; (IV) Coordination of Withdrawal, Shelter and Return, Tasks of Withdrawal and Return, and Communication during Warning and Return.
Level: Individual and Organizational

Mussari, Anthony J. Appointment With Disaster: The Swelling of the Flood. Volume I, Wilkes Barre, Pennsylvania: Northeast Publishers, 1974. A historical account based on participant observations and formal and informal interviews of the events prior to the impact of the Agnes Flood in Wilkes Barre in June 1972. Some discussion of withdrawal behavior and both short run and long run sheltering problems. An attempt to present observations and reports in larger social context of the area. (158 pages)
Model Dimensions: (I) Resources, Linkage, and Climate; (II) Agent; (III) the effects of Situational Variables on Coordination, Task and Planning; (IV) during Warning through Return.
Level: Individual and Organizational

Oliver-Smith, Anthony. "Traditional Agriculture, Central Places and Post-Disaster Urban Relocation in Peru." American Ethnologist, 4: 102-116, 1977. Treats the well-documented, cross cultural tendency for people to remain in or return to areas that continue to be dangerous. Following a catastrophic earthquake-avalanche in Peru in 1970, survivors quickly resettled themselves in a nearby location and resisted government efforts to relocate them a second time to a safer place. Utilizes the central place theory from geography to show the importance of socioeconomic and geographic factors in understanding post-disaster reluctance to relocate. The research suggests that, as well as having strong emotional ties to the site of their

destroyed home, survivors demonstrated a rational assessment of the functional prerequisites for urban growth.
Model Variables: (I) Resources, Linkage, Climate; (II) Agent; (III) effects of Resources, Agent and Definition on Task, and Resource, Linkage, Climate and Definition on Decision Making; (IV) Decision Making during Withdrawal; (V) with Resource, Linkage and Climate Consequences.
Level: Individual and Organizational

Parker, Gordon. "Cyclone Tracy and Darwin Evacuees: On the Restoration of the Species." British Journal of Psychiatry 130: 548-555, 1977. A validated objective measure of psychological functioning was used to determine the incidence and course of dysfunction in veterans of the massive evacuation from Darwin following Cyclone Tracy. Dysfunction increased initially, apparently related to fears of imminent death or injury, and at 10 weeks, apparently related to the stress of relocation. At 14 months the dysfunction levels had returned to normal and reasons for this decrease are discussed.
Model Dimensions: (III) effects of Resources, Linkage and Climate on Decision Making, and of Agent on Coordination and Task; (IV) during Withdrawal, Shelter and Return; (V) with Climate Consequences.
Level: Primarily Individual

Rayner, Jeannette F. Hurricane Barbara: A Study of the Evacuation of Ocena City, Maryland, August 1953. Unpublished Report. Washington, D. C.: Committee on Disaster Studies, National Academy of Sciences, 1953. One week following the event, the author conducted fifteen interviews with officials, local businessmen, permanent residents and tourists. Compared are the relative strengths of motivations to leave as opposed to motivations to remain, with discussion of such factors as perception of risk, attitudes toward authority and decision making. The conclusions note the effect on individual and community response of prior hurricane experience and fear of losing tourist revenues. (17 pages)
Model Dimensions: (I) Resources, Linkage, Climate; (III) The effects of Resources and Linkage on Decision Making, and of Definition on Communication and Decision Making; (IV) during Warning and Withdrawal; (V) with Climate Consequences.
Level: Individual and Organizational

Scanlon, Joseph, Jim Jefferson and Debbie Sproat. The Port Alice Slide. Field Report 76/1. Ottawa, Canada: Emergency Planning Canada, 1976. A descriptive and analytic case study of the evacuation resulting from a 1975 mud slide which threatened the town of Port Alice, British Columbia. The authors combined official interviews, documentary records and extensive follow-up or trace interviews to reconstruct the event following the slide. All major aspects of evacuation are covered including warning, individual and official response, transportation, sheltering and return. Recommendations are based on the finding that initial response to disaster is both high speed and generally outside any plan that may exist. (63 pages)
Model Dimensions: Almost All
Level: Individual and Organizational

Schaffer, Ruth C. and Earl Cook. Human Response to Hurricane Celia. College Station, Texas: The Environmental Quality Program, Texas A & M

University, 1972. A survey of 235 middle and upper class Corpus Christi residents for attitudes and behavior regarding Hurricane Celia. Most did not evacuate and found that their property losses were covered by insurance. It is suggested that attitudes and experiences of people at this socioeconomic level may bias community decision making in ways that limit disaster response toward those unable to take full advantage of present loss-prevention mechanisms. (50 pages)
Model Dimensions: (I) Resources, Climate; (III) the effect of Resources on Task and Decision Making; (IV) Task and Communication during Warning and Shelter; (V) with Resource and Climate Consequences.
Level: Individual

Segaloff, Louis. "Task Sirocco: Community Reaction to an Accidental Chlorine Exposure." Philadelphia, Pa.: The Institute for Cooperative Research, University of Pennsylvania, 1961. A descriptive case-study discussing the reaction of two rural Louisiana communities to a train wreck at 8:15 a.m. on January 31, 1961 which produced a cloud of chlorine gas. Focuses on the formation of the perception of the threat, the immediate rescue activities, the evacuation of two schools in addition to the village and the mobilization and utilization of local resources. (42 pages)
Model Dimensions: (I) Resources, Linkage and Climate; (II) Agent, Situation and Definition; (III) effects of Linkage and Climate on Communication, of Linkage, Situation and Definition on Decision Making, and of Definition on Coordination and Task; (IV) Coordination and Tasks of Warning, Withdrawal and Shelter.
Level: Individual and Organizational

Smith, Martin H. "The Three Mile Island Evacuation: Voluntary Withdrawal from a Nuclear Plant Threat." Greenvale, New York: Department of Sociology and Anthropology, Long Island University, 1979. An attempt to determine and analyze the public's perception of the accident, use of various information sources, and resulting behavior. Open-ended telephone interviews were conducted with a systematic sample of 135 households beginning 3 days after the accident. 57% of respondents voluntarily left the area, for reasons related to perceptions of threat and perceived illegitimacy of information sources. (21 pages)
Model Dimensions: (III) the effects of Resources, Linkages, Climate, Agent, Situation and Definition on Decision Making; (IV) Communication of Warning and Decision Making in Warning through Return.
Level: Individual

Stiles, William W. "How a Community Met a Disaster: Yuba City Flood, December 1955." The Annals of Political and Social Science, 309: 160-169, 1957. Descriptive account by a Public-Health official, of the massive flooding of the Yuba City-Marysville, California area in December 1955. Discusses mobilization of resources, warning and communications, evacuation, rescue and return, response to a renewed threat 2 weeks later, public and personal losses and government relief. Flood post mortem suggests that long postponed central measures might have staved off disaster.
Model Dimensions: (I) Resources and Climate; (II) Agent, Situation and Decision Making; (III) their effects on Coordination and Task, of Resources and Linkage on Communication, and of Resources and Definition on Decision Making; (IV) during Warning through Return; (V) with Resource and Climate Consequences.

Level: Individual and Organizational

Strope, Walmer, John Devaney and Jiri Nehnevajsa. "Importance of Preparatory Measures in Disaster Evacuations." Mass Emergencies 2: 1-17, 1977. Analyzes scholarly studies, official reports, and other documentary information from 56 evacuations, with respect to the existence of emergency plans, predisaster public information, and testing procedures. Found that: evacuations have been routinely successful even without advance planning; familiarity with and involvement in the planning is highly correlated with use of a plan; public participation in practice drills is difficult to achieve and probably counter-productive; and that efforts spent on intensive public pre-education or evacuation might better be spent on advance preparations of message content and means of dissemination of authoritative, unambiguous information during emergency.
Model Dimensions: (III) the effects of Resources, Agent and Definition on Coordination and Communication, and of Linkage, Climate, Agent and Situation on Task; (IV) Communication of Warning, and Coordination of Withdrawal.
Level: Primarily Organizational

Treadwell, Mattie E. Hurricane Carla-September 3-14, 1961. Office of Civil Defense, Region 5, Denton, Texas: U. S. Government Printing Office, 1962. A case-study which describes preparedness, warning, and mobilization efforts, but focusing on evacuation, reception, and re-entry phases of the disaster. Details successful movement of 80,000 Louisiana residents and 500,000 Texans, including county by county descriptions of each phase from evacuation to return.
Success of operation is largely attributed to previous experience with Hurricane Audrey. Local governments who "ordered" evacuation achieved 90-100% success: where people were given a choice, less than 50% left. Also offers lists of principles for successful shelter management as well as possible solutions to re-entry problems.. (97 pages)
Model Dimensions: Almost All
Level: Individual and Organizational

Urbanik, Thomas. Texas Hurricane Evacuation Study. A working paper. College Station, Texas: Texas Transportation Institute, Texas, A & M University, 1978. An analysis evaluating the ability of the existing highway system to accomodate evacuees from Gulf Coast barrier islands during hurricane threats. The methodology developed and described involves the use of census and Department of Transportation data, traffic engineering techniques and meteorological forecasts. (52 pages)
Model Dimensions: (I) Resources, Linkage and Climate; (III) the effects of these and of Definition on Coordination, Task, Communication and Decision Making; (IV) during Warning and Withdrawal.
Level: Primarily Organizational

Wallace, Anthony F. C. Tornado in Worcester: An Exploratory Study of Individual and Community Behavior in an Extreme Situation. Disaster Study #3. Washington D. C.: Committee on Disaster Studies, National Academy of Sciences, 1954. A case study analyzing behavior during the 1953 Worcester tornado in terms of a time space model. Response is also discussed in terms of four other theoretical frameworks: the disaster syndrome, the

counter disaster syndrome, length of the isolation period, and the cornucopia theory. Although evacuation is not a primary focus the data presented provides a clear picture of the background against which evacuation takes place. (163 pages)
Model Dimensions: (I) Resources, Linkage, Climate; (II) Agent, Situation, Definition; (III) effects of Definition on Coordination and Decision Making; (IV) Tasks, Communication and Decision Making during Warning and Withdrawal and Coordination of Warning through Shelter.
Level: Individual and Organizational

Weller, Jack M. "Response to Tsunami Warning: The March 1964 Prince William Sound Earthquake." Working paper #15, Columbus, Ohio: The Disaster Research Center, The Ohio State University, 1967. Summary of the tsunami warnings associated with the 1964 Alaskan earthquake. Explores range of warning and evacuation responses in the areas affected. (7 pages)
Model Dimensions: (II) Agent; (III) effects of Resources and Agent on Coordination and Communication, and of Climate, Agent, Situation and Definition on Decision Making; (IV) Tasks of Withdrawal and Return, and of Communication and Decision Making during Warning and Withdrawal.
Level: Individual and Organizational

Western, John and Gordon Milne. "Some Social Effects of a Natural Hazard: Darwin Residents and Cyclone Tracy." Paper presented on a Symposium on Natural Hazards, Canberra, 1976. From a questionnaire administered to 501 victims (including random and purposive samples) a Disaster Impact Scale was devised to assess the social and psychological consequences of Cyclone Tracy. Findings show that victims who were evacuated and had not returned some seven to ten months later, were worse off in a number of respects than those who stayed in Darwin, with evacuees who had returned falling in between. (33 pages)
Model Dimensions: (II) Agent; (III) the effects of Agent and Situation on Decision Making; (IV) Task and Communication during Warning, Decision Making in Warning through Return; (V) with Resource and Climate Consequences.
Level: Individual

White, Meda M. Role-Conflict in Disasters: Not Family but Familiarity First. Final Report. Washington, D. C.: Disaster Study Group, National Academy of Sciences, 1962. Examines factors in decisions to assume or reject emergency role responsibilities, using retrospective data gathered from interviews with members of disaster response organizations in the 1953 tornadoes in Waco, Texas, Flint, Michigan and Worcester, Massachusetts. The major element in predicting behavior was the strength of the member's motivation to avoid role failure, which appears to be a function of familiarity with the role and high levels of responsibility. 77% were found to do their job first, without serious diversion to family roles, with another 12% joining in within a few hours. (53 pages)
Model Dimensions: (I) Linkages; (II) Agent and Situation; (III) effects of Linkage and Climate on Coordination and Decision Making, and of Situation on Communication; (IV) during Withdrawal and Shelter
Level: Individual and Organizational

Wilkinson, Kenneth P. and Peggy J. Ross. "Citizens' responses to Warnings of Hurricane Camille." Report 35. State College, Mississippi: Social Science

Research Center, Mississippi State University, 1970. The study was concerned with factors which influenced decisions to leave or stay in the face of widespread and generally accurate official warnings of Hurricane Camille's strength as it approached the Mississippi coastline on August 17, 1969. A random sample of 384 respondents or 59.3% of the total sample were interviewed and formed the data base. The major conclusion was that the individual's perception of the level of self-danger was most strongly associated with an eventual decision to evacuate or to remain in the threatened area. (60 pages)
Model Dimensions: (I) Resources, Climate; (II) Agent, Situation, Definition; (III) the effects of Linkage on Communication; and of Situation and Definition of Coordination, Task, Communication and Decision Making; (IV) Coordination of Warning and Shelter and Decision Making in Warning through Shelter.
Level: Individual and Organizational

Windham, Gerald O., Ellen I. Posey, Peggy J. Ross, and Barbara G. Spencer. "Reactions to Storm Threat During Hurricane Eloise." Report #51. State College, Mississippi: Social Science Research Center, Mississippi State University, 1977. Using survey instruments and interviewers trained in advance, 380 interviews were obtained from residents of two areas one week after being struck by Eloise in 1975. Focus was on differences between evacuees and non-evacuees, for purposes of improving hurricane warning and preparedness programs. It was found that newcomers are more likely to evacuate than long-time residents or those who have lived in the area for a few years and hence have adjusted to the hurricane "culture". Also that people mistakenly fear wind much more than water, and that they have inaccurate perceptions about the magnitude and unpredictability of hurricanes. (74 pages)
Model Dimensions: (I) Resources and Climate; (II) Agent and Definition; (III) effects of Definition on Decision Making; (IV) Coordination, Communication and Decision Making during Warning.
Level: Individual and Organizational

Worth, Marti F. with Benjamin F. McLuckie. "Get to High Ground! The Warning Process in the Colorado Flood-June 1965." Historical and Comparative Series #3. Columbus, Ohio: The Disaster Research Center, The Ohio State University, 1977. Comparative analysis of the disaster warning process based on the re-examination of a series of field studies in connection with floods in 10 different communities in Colorado in June 1965. Warning problems, including confirmation, reluctance to evacuate, and spectators are examined in communities which received no warning, moderate, and extended warning. Implications and suggestions for future evacuation planning are noted. (76 pages)
Model Dimensions: (I) Resources; (II) Agent; (III) the effects of Resources, Linkage, Situation and Definition on Coordination, of Resources, Climate and Definition of Communication, and of Agent and Situation on Decision Making; (IV) during Warning, Withdrawal and Shelter.
Level: Individual and Organizational

Young, Michael. "The Role of the Extended Family in Disaster." Human Relations, Vol. 7: 383-391, 1954. The results of a survey that examines the role of kinship ties in providing refuge and support to victims of the February 1953 flooding of the English coast. Confirmed hypotheses are that

evacuees prefer refuge by relatives rather in official shelters, but that kinship ties apparently weaken with distance. Three recommendations or conclusions are drawn: 1) evacuation of entire family units rather than "women and children" first; 2) distribution of relief supplies throughout the shelter areas rather than concentrating them in the impact area; and, 3) rapid provision of free transportation for evacuees to their relative's homes.
Model Dimensions: (I) Resources, Linkage; (III) the effects of Resource and Linkage on Coordination, Task, Communication and Decision Making, and of Definition on Communication and Decision Making; (IV) Coordination and Decision Making during Shelter.
Level: Primarily Individual

Yutzy, Daniel. "Aesop 1964: Contingencies Affecting the Issuing of Public Disaster Warnings at Crescent City, California." Research Note #4. Columbus, Ohio: The Disaster Research Center, The Ohio State University, 1964a. Deals with contingencies affecting the issue of public warnings, from interview data from some local officials involved in the 1964 tsunami response. Focuses on the influence of previous warnings that proved unnecessary, but led to evacuation and of limited warning information on official decision making. (8 pages)
Model Dimensions: (I) Resources, Climate; (II) Agent, Situation, Definition; (III) effects of Climate and Linkages on Coordination, and of Resources, Climate, Situation and Definition on Communication and Decision Making; (IV) during Warning.
Level: Organizational

Yutzy, Daniel. "Authority, Jurisdiction and Technical Competence: Interorganizational Relationships at Great Falls, Montana, During the Flood of June 8-10, 1964." Research Note #7. Columbus, Ohio: The Disaster Research Center, The Ohio State University, 1964b. Based on participant observations and informal interviews, this note focuses on interorganizational relationships in the pre and trans period of the disaster. Decisions made and problems which arose are examined. Some attention is paid to evacuation decisions and activities. (22 pages)
Model Dimensions: (I) Resources, Linkage, Climate; (II) Agent and Situation; (III) effects of Linkage, Climate and Situation on Coordination and Communication, and of Climate on Decision Making; (IV) Task and Decision Making in Withdrawal.
Level: Organizational

Yutzy, Daniel. "Some Organizational and Community Activities After an Explosion at the Thompson Chemical Company, Attleboro, Massachusetts." Research Note #2. Columbus, Ohio: The Disaster Research Center, The Ohio State University, 1964c. This research note describes organizational problems and implications in response to fixed site chemical incident and fire. Topics include coordination and control, communications, alerting and mobilization, and public vs. organizational perception of tasks. There is a brief discussion of evacuation activities. The need for and lack of a central information processing facility are noted. (18 pages)
Model Dimensions: (I) Resources, Linkage and Climate; (II) Agent and Definition; (III) their effects on Decision Making, and the effects of Resources on Coordination and Task; (IV) Decision Making during Withdrawal and Shelter.
Level: Organizational

THEORETICAL DISCUSSIONS

Aguirre, Ben E. Evacuation and Migration. Unpublished paper. College Station: Department of Sociology, Texas A & M University, 1980. Analyzes the empirical and conceptual similarities between migration and evacuation. Emphasizes the dimensions of distance, permanence, and voluntarism in distinguishing migration and evacuation, as well as causes and effects of the academic separation of the two areas and the potential benefits in their unification. Examples from the literature are given that show how the study of evacuation could be improved by the adoption of migration methods and the utility of a collectual behavior view of evacuation in addition to the psychological framework which dominates existing research.
Model Dimensions: (I) Resources, Climate; (IV) Coordination, Tasks, and Decision Making in Withdrawal, Tasks of Shelter; (V) Climate Consequences.
Level: Individual and Organizational

Diggony, J. C. and A. Pepitone. Behavior and Disaster. Unpublished paper: University of Pennsylvania, 1953. On historical survey of specific behavioral phenomena in the context of actual disasters based on the premise that populations will select and undertake that course of action which they perceive will minimize the probability of losing valued objects. Drawing on data from past epidemics and natural disasters, paper focuses on evacuation and other evasive actions, defensive measures, panic, communications, crime, exploitation, work altruistic behavior, and orgiastic behavior.
Model Dimensions: (I) Resources, Climate; (II) Definition; (III) Effects of Linkage on Coordination, of Climate and Definition on Task and Decision Making, and of Definition on Communication; (IV) Tasks of Warning, Withdrawal and Shelter and Communication and Decision Making in Warning and Withdrawal.
Level: Individual and Organizational

Fritz, Charles E. and J. H. Mathewson. Convergence Behavior in Disasters: A Problem in Social Control. Disaster Study Number 9. Washington, D. C.: National Academy of Sciences. A comprehensive analysis of convergence behavior in its many forms, as observed in a large number of empirical studies. Notes and discusses the existence of three types of convergence--personal, informational, and material; and of 5 types of convergers--returnees, the anxious, the helpers, the curious, and the exploiters--lately to be found in all disasters. Also discusses some of the techniques which have been used to deal with this serious and complex problem.
Model Dimensions: (III) The Effects of Linkage and Climate on Coordination, and of Climate and Situation in Decision Making; (IV) Coordination, Tasks, and Decision Making in Withdrawal, Shelter and Return.
Level: Primarily Individual

Fritz, Charles E. and Harry B. Williams. "The human being in disasters: a research perspective." Reprinted from The Annals of the American Academy of Political and Social Science 309: 42-51; 1957. A review was made of nearly forty studies of disasters to pull out salient general findings about typical and recurrent behaviors in disasters, and those observations of particular pertinence for disaster preparedness, control, and amelioration. Among the subjects discussed are warnings and effects on eva-

cuation, immediate impact survival behavior, post-impact emergency behavior, convergence, coordination and control of rescue and relief activities, psychological effects, and the sources of possible conflicts between rescue and relief agencies and their clients.
Model Dimensions: (III) Effects of Definition on Decision Making; Coordination of Warning, Withdrawal and Shelter, Tasks of Withdrawal, and Communication and Decision Making in Warning; (V) with Climate consequences.
Level: Individual and Organizational

Hultaker, Orjan E. and Jan E. Trost. "The Family and the Shelters." Disaster Studies Report #1. Uppsala, Sweden: Department of Sociology, Uppsala University, 1976a. A brief review of empirical literature focusing on two major problems connected with long-term evacuation in particular. One is the difficulties for authorities to convince inhabitants to evacuate or take other protective measures. The other is the fact that although there are positive effects of keeping families together, this is difficult to do and still maintain high employment rates for both men and women. The authors stress the need for active interchange between planners and researchers on the subject of what kinds of family reunification behavior will prevail under different situations.
Model Dimensions: (I) Linkage; (II) Definition; (III) The Effects of Linkage on Coordination, Tasks, and Decision Making, and of Situation and Definition Decision Making; (IV) Decision Making in Withdrawal.
Level: Primarily Individual

Hultaker, Orjan E. "Evakuere." (Evacuation with an English summary) Disaster Studies Report #2. Uppsala, Sweden: The Department of Sociology, Uppsala University, 1976b. In Swedish, however, the English summary describes a theoretical model for predicting the effects of different warning messages in relation to people's earlier knowledge and to the objective disaster reality. Four warning themes are analyzed, having to do with: probability of disaster occurence, negative consequences thereof, probability of occurence of negative consequence, and probability distribution over time. A model of prescribed time sequence of different messages is developed, with the message defining time periods that fulfill different functions before disaster occurs.
Model Dimensions: (III) The Effects of Resources, Linkage and Climate on Decision Making, and of Definition on Task, Communication and Decision Making; (IV) Communication and Decision Making in Warning; (V) with Resource, Linkage and Climate Consequences.
Level: Individual and Organizational

Hultaker, Orjan E. "Evakueringar: Storbritannien under andra varldskiget." (Evacuations in Great Britain during World War II, with an English summary). Disaster Studies Report #3. Uppsala, Sweden: Department of Sociology, Uppsala University, 1977. An examination of the literature and data from three major British wartime evacuations using the model presented in Disaster Studies #2. It was found that people tended to evacuate when the period of actual threat was short and when they were able to assess the joint probability that there would be danger and that they would be hurt. The article discusses issues of shelter and return as well as withdrawal.

Concludes that the best evacuation programs under the situation's described are those that assist individuals when they themselves feel the need to leave.
Model Dimensions: (I) Resources; (II) Agent and Definition; (III) The Effects of Resources, Climate, Agent and Definition on Decision Making; (IV) during Warning Through Return; (V) with Resource and Climate consequences.
Level: Individual and Organizational

Ikle, Fred, Jeannette Rayner, Enrico Quarantelli and Steven Withey. Withdrawal Behavior in Disasters: Escape, Flight, and Evacuation Movements. Unpublished report. Committee on Disaster Studies, National Academy of Sciences, 1957. A description and analysis of the characteristics and consequences of movement away from actual or anticipated threat. Based on a general literature review. Considers the nature of withdrawal behavior, movement in relation to different time phases, conditions under which withdrawal occurs, and public control of movement. Characteristics of movement during pre-, trans-, and post-impact stages are compared.
Model Dimensions: (III) Effects of Agent Variables and Definition on Coordination, and of Resources, Linkages, Agent, and Definition on Task and Decision Making; (IV) Coordination of Withdrawal and Shelter, and Tasks, Communication and Decision Making in Warning, Withdrawal, and Shelter; (V) with Resource and Linkage consequences.
Level: Individual and Organizational

Kunreuther, Howard and Elissandra S. Fiare. The Alaskan Earthquake: A Case Study in the Economics of Disaster. Washington, D. C.: Institute for Defense Analyses, Economic and Political Studies Division, 1966. An analysis based on mostly secondary sources and data on the immediate post disaster recuperation and long-term recovery from the 1964 Alaskan Earthquake. Topics such as post-disaster organization, supply and demand problems, public and private reconstruction, and others are extensively discussed from an economic perspective. Mostly passing treatment of evacuation supports finding in withdrawal, shelter and return patterns seen in other studies.
Model Dimensions: (I) Resources; (II) Agent, Situation; (III) the Effects of Resources and Agent on Communication, and of Situation on Coordination; (IV) Tasks and Decision Making in Withdrawal, Shelter and Return; (V) with Resource and Climate Consequences.
Level: Individual and Organizational

McLuckie, Benjamin F. "Response to Warnings of Danger," p. 36-51 in The Warning System in Disaster Situations: A Selective Analysis. Report #9. Columbus, Ohio: The Disaster Research Center, The Ohio State University, 1970. Within the framework of an examination of the overall warning process, this chapter discusses factors that influence individual and group responses to warning. Looks specifically at the sociocultural context, the historical setting and the immediate ongoing situation. Also notes the relationship and differences between response to later versus earlier warning messages.
Model Dimensions: (I) Climate; (II) Definition; (III) Effects of Linkage, Climate, Situation and Definition on Communication and Decision Making, and of Agent on Coordination, task and Decision Making; (IV) during Warning, task and Decision Making during shelter.

Level: Individual and Organizational

Mileti, Dennis S. Natural Hazards Warning Systems in the U. S.: A Research Assessment. Boulder, Colorado: Institute of Behavioral Science, The University of Colorado, 1975. Assesses research on hazard warning systems to date in terms of its social utility and heuristic value. Utilizes an integrative perspective, which includes every stage of the process from just cues through public response, and relates information from hazard specific research to cross hazard warning. Given that public response is the ultimate reason for having warning systems, the lack of serious attention paid to it in both preparedness planning and research is found puzzling.
Model Dimmensions: (I) Resources; (II) Agent; (III) the Effects of Agent on Communication; (IV) Coordination, Tasks, Communication in Warning, and of Coordination and Decision Making in Withdrawal.
Level: Primarily Organizational

Perry, Ronald W. "Letter to the Editor: A Classification Scheme for Evacuations." Disasters 2 (February/March): 169-170, 1978. (correction page in volume 3:2, p. 237.) Presents a 4-fold scheme for developing terminology to describe evacuation processes based on timing and duration of evacuation: Categories proposed are : preventive, protective, rescue, reconstruction.
Model Dimensions: (II) Definition; (III) its Effect on Task; (IV) Coordination, Tasks and Communication during Warning through Return.
Level: Individual and Organizational

Perry, Ronald W. "Incentives for Evacuation in Natural Disaster." Journal of the American Association of Planners 42 (October), 1979a. Stressing the role of preparedness, Perry formulates a number of recommendations for building "incentives to evacuate" into warning systems, that utilize normal behavioral tendencies which have been observed in past warning responses. Five issue areas were selected that have been problematic in evacuation: adaptive plans, warning confirmation behavior, role of the family, security and property protection and sheltering.
Model Variables: (I) Resources; (III) Effect of Resources on Tasks, Communications during Warning, Withdrawal and Shelter; (V) Consequences of Withdrawal for Climate.
Level: Individual and Organizational

Perry, Ronald W. "Evacuation Decision Making in Natural Disasters." Mass Emergencies 4: 25-38, 1979b. A review of a number of empirical studies of warning response, focusing on pre-impact evacuation. Discusses various theoretical perspectives before explaining preference for an emergent norm approach. Findings of the studies are summarized in the form of a conceptual framework of inter-related hypotheses, drawn from variables past research suggests are important in individuals decision to evacuate.
Model Dimensions: (I) Resources, Linkages, Climate; (II) Definition; (III) the Effects of these on Communication and Decision Making; (IV) during Warning.
Level: Individual

Quarantelli, Enrico L. "A Note on the Protective Function of the Family in Disasters." Marriage and Family Living, 22: 263-264, 1960a. On the basis of a general review of disaster studies, it is concluded that aid seeking disaster victims first turn to extended family members and friends before seeking help from formal organizations. Often the extended family provides the major sheltering and housing in the emergency period.
Model Dimensions: (III) the Effects of Linkage and Climate on Coordination, Task and Decision Making; (IV) Decision Making in Shelter.
Level: Individual

Quarantelli, Enrico L. "Images of Withdrawal Behavior in Disasters: Some Basic Misconceptions." Social Problems 8: 68-79, 1960b. A theoretical synthesis of research studies up to 1960 concerning withdrawal behavior in disasters and other mass emergencies. It is shown that there are three wide-spread but incorrect images of withdrawal which often influence disaster planning and emergency organization responses to disasters. Victims almost never engage in panic flight. They do not passively wait for formal agencies to provide help, but instead actively participate in extensive patterns of informal mutual and self help. Emergency organizations cannot only not strictly control withdrawal behavior, but it is unnecessary and would be dysfunctional if they could.
Model Dimensions: (I) Linkages, Climate; (III) their Effects on Coordination and Task, and of Resources, Linkages and Definition on Decision Making; (IV) Coordination of Withdrawal and Shelter, Communication of Warning, and Decision Making in Withdrawal and Return; (V) with Climate consequences.
Level: Individual and Organizational

Quarantelli, Enrico L. and Russel R. Dynes. "Images of Disaster Behavior: Myths and Consequences." Preliminary Paper #5. Columbus, Ohio: The Disaster Research Center, The Ohio State University, 1973. An evaluation of popular images of disaster behavior focusing on themes of personal and social chaos. Images of panic, paralyzing shock, role conflict, social disorganization, and community morale are examined and the social consequences and policy implications which follow. Study offers several factors involved in the perpetuation of these common misconceptions.
Model Dimensions: (I) Resources; (II) Agent; (III) the Effects of Resources and Climate on Coordination, of Linkage, Climate, Situation and Definition on Tasks, of Definition on Communication, and of Resources, Climate and Definition on Decision Making; (IV) Tasks and Decision Making in Warning, Withdrawal and Shelter; (V) with Climate Consequences.
Level: Individual and Organizational

Stoddard, Ellwyn R. "Some Latent Consequences of Bureaucratic Efficiency in Disaster Relief." Human Organization 28: 177-189, 1969. An examination based on an examination of selected studies of two organizations involved in providing mass care and assistance in disasters, namely the American Red Cross and the Salvation Army. The two organizations are analyzed in terms of their: 1) selective participation and coordination of relief services; 2) expenditure procedures, 3) internal structures and victims reactions; and

4) fund-raising. The data suggests that public response to an organization arises from the manner in which aid is rendered, rather than its quality.
Model Dimensions: (I) Resources, Linkages; (III) the Effects of Resources, Linkages and Definition on Coordination, Task, Communication and Decision Making; (IV) Coordination of Warning Through Return; (V) with Climate consequences of Shelter.
Level: Primarily Organizational

Williams, Harry B. "Human Factors in Warning and Response Systems." p. 79-104 in Grossey, Wechsler, and Greenblatt (eds.), The Threat of Impending Disaster: Contributions to the Psychology of Stress. Cambridge, Mass: The MIT Press, 1964. Presents a model of warning and response as a communications system, involving a series of interrelated components and activities rather than one or more discrete tasks. Uses previous research findings on warning and response in natural hazards to all major aspects of the system.
Model Dimensions: (I) Resources; (II) Definition (III) Effects of Definition on Communications; (IV) Coordination, Communication, and Decision Making during Warning.
Level: Individual and Organizational

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The literature on evacuation behavior and problems is examined and ordered into an analytical model which posits a relationship between community context, threat conditions, social processes, patterns of withdrawal behavior and consequences for community disaster preparedness. Implications for disaster policies, planning, operations and research are noted. An annotated bibliography coded to the model is provided.

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