

WARNING -- A CALL TO ACTION

WARNING AND DISASTER RESPONSE A SOCIOLOGICAL BACKGROUND

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The text of this book was edited by Walter R. Anderson and Ernest G. Bice, Preparedness Meteorologists, National Weather Service Headquarters, Fort Worth, Texas. It also includes Mr. Warren E. Brown's paper on communicable writing. The book is an outgrowth of the National Weather Service's continuing interest in improving warning effectiveness and evolved from Dr. McLuckie's earlier work, The Warning System. In preparing Warning-A Call to Action, Dr. McLuckie consulted representatives of all facets of the warning system. Information and suggestion were garnered from discussions with Civil Defense and the news media and in probing interviews with National Weather Service employees.

FOREWORD

Dr. B. F. McLuckie, author of this book, is a recognized authority on sociological disaster study, having surveyed disasters in most of the 50 states as well as in Europe and Asia. Although Dr. McLuckie's permanent position is Sociologist with the University of Delaware, he spent the last two summers as Warning Procedures Consultant in the Southern Region Headquarters of the National Weather Service.

Sociologists have found that most people have many rather set patterns for coping with threats of storm and flood. Some of the behavior patterns are subtle and hard to identify and all show considerable variation from person to person and from time to time.

The purpose of this book is to specify these important behavior patterns and to describe ways of promoting protective patterns at time of warning. Its pages reveal important though rarely considered concepts. Those responsible for issuing warnings can use the individual activity section at the end of each chapter to try out the sociological approach.

Warning of tornado, flood and hurricane is the National Weather Service's most important job. Suburbia's growing sprawl and the continuing invasion of the coastal and flood plains increase the magnitude of this responsibility. To all those dedicated to minimizing storm related casualties by way of effective warning, I recommend the study of this report.



L. R. Mahar
Director, Southern Region
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CHAPTER I.

WHERE ARE WE GOING? WHY? AND HOW?: AN INTRODUCTION

INTRODUCTION

The High Plains of West Texas has miles and miles of open space but the big tornado the night of May 11, 1970 struck right through the middle of Lubbock, population over 150,000. And Lubbock has the only twenty-story building in the country that has been warped and twisted by a tornado's might. Twenty-six people died in Lubbock that night and 1500 were injured. Robert Snyder, Manager of KCBD-TV, said it was a miracle that 500 were not killed. But Lubbock has an effective total warning system: safety organizations, broadcast media, and National Weather Service. Yes, Lubbock was warned!

SEVERE THUNDERSTORM WARNING BULLETIN EANS REQUESTED --- IMMEDIATE
BROADCAST REQUESTED

WEATHER BUREAU LUBBOCK TEXAS

ISSUED 7/50 PM MAY 11 1970

A SEVERE THUNDERSTORM WARNING IS IN EFFECT UNTIL 9/00 PM FOR
PERSONS IN LUBBOCK --- CROSBY --- HALE --- AND FLOYD COUNTIES

A SEVERE THUNDERSTORM WAS INDICATED BY RADAR 10 MILES SOUTHEAST
OF LUBBOCK AIRPORT AT 7/50 PM. THE THUNDERSTORM IS MOVING TO THE
NORTHEAST ABOUT 25 MPH. PEA SIZE HAIL REPORTED WITH THIS THUNDER-
STORM BUT THUNDERSTORM IS INCREASING.

IF THREATENING CONDITIONS ARE SIGHTED --- BE PREPARED TO MOVE TO
A PLACE OF SAFETY. TO REPORT LARGE HAIL OR DAMAGING WINDS ---
PLACE AN EMERGENCY CALL COLLECT TO THE LUBBOCK WEATHER BUREAU ON
PO 2 5500 OR ASK THE NEAREST LAW ENFORCEMENT AGENCY TO RELAY YOUR
REPORT TO THE WEATHER BUREAU.

TORNADO WARNING BULLETIN
EANS REQUESTED

WEATHER BUREAU LUBBOCK TEXAS
ISSUED AT 8/15 PM

A TORNADO WARNING IS IN EFFECT UNTIL 9/00 PM CDT FOR PERSONS IN
LUBBOCK --- CROSBY --- HALE --- FLOYD COUNTIES.

A FUNNEL CLOUD WAS SIGHTED BY OFF DUTY POLICEMAN AT 8/10 PM AND
RADAR AT WEATHER BUREAU INDICATED HOOK FIGURATION ALSO AT THAT
TIME LOCATED AT 7 MILES SOUTH OF LUBBOCK AIRPORT AND MOVING NORTHEAST.

IF THREATENING CONDITIONS ARE SIGHTED --- BE PREPARED TO MOVE TO A PLACE OF SAFETY. TO REPORT A TORNADO OR OTHER SEVERE WEATHER --- PLACE AN EMERGENCY COLLECT CALL TO THE LUBBOCK TEXAS WEATHER BUREAU ON PO 2 5500 OR ASK THE NEAREST LAW ENFORCEMENT AGENCY TO RELAY YOUR REPORT TO THE WEATHER BUREAU.

"Early education and preparation were of excellent quality and scope. When the storm came, warnings were accurate, made quickly, and disseminated widely. Thus, the death toll was amazingly low." (Natural Disaster Survey Report 70-1)

"But there is no room for complacency." (Natural Disaster Survey Report 70-1) There were difficulties in the dissemination of the warning messages and some citizens did not take protective action. Approximately one-half of the deaths in Lubbock were to the Spanish-speaking population. The tornado passed over the Guadalupe section of the city where the majority of Spanish-speaking people live. The Spanish-language radio station signed off the air before the tornado struck. Other residents did not hear the messages and still others heard the messages but did not interpret them as warnings.

The National Weather Service warnings were clear and simple and they were reinforced by pleas from the broadcast media. Yet a number of citizens did not believe they were warned and did not take protective action.

Then, what is warning? When the system seemingly functions and the messages are clear, why don't people respond? That, to a large extent, is what this program is all about. It is an attempt to bring you information from the behavioral sciences and from the operational experience of Weather Service personnel that will help you develop more effective preparedness and warning systems.

Professional hydrologists and meteorologists are trained in the physical sciences, and the major part of your work is related to collecting, evaluating, predicting and disseminating weather information. Therefore, by training and workload, you are inclined to emphasize the physical sciences.

However, the collecting and disseminating of the most highly accurate weather information possible is only a part of the process of warning the population of danger. The content and language of the warning messages, the means by which they are disseminated, and the characteristics of the population to which they are sent must be taken into consideration also. These are the subjects with which behavioral scientists are trained to work and these are the areas in which they work daily.

It is an underlying thesis of this program that you need to be made aware of knowledge gathered by social scientists and others about human behavior in warnings and disasters. This overview of existing knowledge in the area has been put together by operational personnel from NWS and outside consultants. We are not presenting you with new and revolutionary findings, but we do hope you will gain some fresh insights and perspectives. We believe the reading ahead will be useful to you. You may even enjoy it.

CHARTING THE COURSE

We need to know who "we" are? Where are we going? How do we plan to get there? This section will outline the answers to those three questions.

(1) Who are "we"? The WSFO's, WSO's and RFC's are the front line of the warning system. The primary audience includes the personnel in these offices who are involved in issuing warnings. Where that line is drawn is somewhat flexible, but it would definitely include MIC's, OIC's, HIC's, PA's, Weather Service Specialists and Forecasters. At the present time, then, "we" means MIC's, OIC's, HIC's, PA's, Weather Service Specialists and Forecasters in the WSFO's, WSO's and RFC's of the National Weather Service Southern Region.

(2) Where are we going? The goal of this program is to make you aware of behavioral science information which will give new perspectives on preparedness and warning. You, then, are asked to incorporate this knowledge into planning for your county area of responsibility. The information is divided into the following six chapters:

I. WHERE ARE WE GOING? WHY? AND HOW?: AN INTRODUCTION

"Disaster" and "warning" are commonly used words. What we mean by these words is not always clear. The first chapter informs you about where we are going in this program and defines what is meant by "disaster" and "warning."

II. IT AIN'T NECESSARILY SO: COMMON STEREOTYPES OF HUMAN BEHAVIOR IN DISASTER

Warning and disaster preparedness is sometimes based on erroneous notions of human behavior. This chapter singles out some of the more common misconceptions about stress situations.

III. WHAT REALLY HAPPENS IN DISASTERS?

The third chapter brings together information about the following three questions:

- (1) How often do disasters occur?
- (2) What are some relevant dimensions of disaster agents for disaster and warning?
- (3) How are human organizations and communities affected and how do they respond to disasters?

If you are going to warn people effectively about the threat of disaster, you will want to have reliable information about what really happens in disasters.

IV. ONE GOOD ORGANIZATION IS NOT ENOUGH: THE WARNING SYSTEM

Chapter IV, looks at warning as a process and a system. The forecast, dissemination and response stages of the process are examined, along with the intraorganizational, interorganizational and public relationships that make up the system.

V. ONE GOOD MESSAGE IS NOT ENOUGH: THE WARNING MESSAGE

In this chapter we look at behavioral science generalizations that have applicability to the content, language, medium and source of warning messages.

VI. A CALL TO ACTION

The final chapter deals with the stimulation of people to action with warning and discusses ways A CALL TO ACTION might be incorporated into severe weather releases.

(3) How do we plan to reach our goals? We have just outlined the contents of a book which brings together relevant behavioral science information on disasters, preparedness and warning. In addition to asking you to read the material in this book, we are asking you to do some things. The purpose of these individual activities is to help you translate inert knowledge into the kind of understanding that will lead to appropriate action.

Each of the following chapters uses the following format:

1. The goals of the chapter are stated. You are told the general content to be covered and what we hope you will know when you complete the chapter.
2. Questions are listed. You are asked to keep these in mind as you study the contents.
3. The general body of material is elaborated. This is the substantive content that we believe is important for you to know.
4. Individual activities are listed for you to complete. The purpose of these tasks is to help you apply the information you are learning and to make it more useful to you.

KEEPING THINGS STRAIGHT: WORKING DEFINITIONS OF "DISASTER" AND "WARNING"

DISASTER: What is a disaster?

Disaster is one of the many "sponge" concepts within the English language. When the word is used, it often refers to different things.

Which of the following examples would you call disasters?

1. A tornado one-fourth mile wide stretches along a path of some thirty miles.
2. A hurricane with 90 mile per hour sustained winds and 110 mile per hour gusts is moving northeast from Bermuda at 10 miles per hour.
3. A flood washes through a rural settlement drowning three cows, flooding homes and doing a total damage of \$50,000.
4. A hurricane with gusts of at least 190 miles per hour left the Gulf coast with 139 dead, 76 persons missing and insured property losses of more than \$200 million.
5. Two mobile classrooms were totally destroyed, the gymnasium roof was blown away, thirty-eight students and teachers were injured, there were no deaths as the result of a tornado that recently skirted this small community.

Which of the cases did you consider disasters? What were your reasons for deciding that the particular examples were disasters?

In example one we were referring to a tornado that ran through a rural area of Georgia. It did no serious damage and caused no injury or loss of life.

In example two we referred to Hurricane Alice in the summer of 1973. It ran itself out at sea after leaving Bermuda, doing no harm to persons or property, but making a few sailors uncomfortable.

The third example refers to a small settlement in West Virginia which received heavy rains during the flooding that resulted from Hurricane Camille.

The fourth example referred to the death and destruction wrought by Hurricane Camille along the Gulf coast.

The final example is a tornado that struck Sumner, Mississippi in April 1973. It did one million dollars worth of damage, including serious damage to a school filled with pupils, but because of excellent preparedness and protective action there were no lives lost.

At least a part of the answer you gave for each of the occurrences cited depended on the definition of disaster you were using. There are at least three different current meanings for the word disaster.

1. Disaster often refers to the disaster agent. For example, a hurricane, a tornado or environmental pollution may be termed a disaster.

2. Disaster also refers to the physical impact which the agent has. An element of evaluation enters into the picture at this point. Evidences of physical damage are evaluated as being disastrous. The same event may be defined differently by different individuals and by different communities. The National Weather Service Operations Manual attempts to lessen the ambiguity related to the evaluation process by setting standards by which events are declared major or significant natural disasters. A major natural disaster is defined as one in which loss of life or of property is expected to be about 30 or more and/or \$100 million or more, respectively. A significant natural disaster is defined as one in which loss of life is five or more, but less than 30, and property damage is less than \$100 million. The Manual writers suggest that --- "it is not realistic to place a lower dollar limit on the property damage since other criteria, such as (1) the amount of and kind of publicity given the disaster, (2) the degree of disruption of National Weather Service facilities and services, and (3) indicated deficiencies in our warning services may indicate that a survey should be made."

3. Disasters can mean social disruption created by the physical event. Social organization at many different levels - family, neighborhood or community - may be disrupted.

In our discussions we are interested in disaster in more than one of its meanings. The major emphases will be on the first and third meanings, that is, disaster agent and disaster as social disruption. In order to avoid confusion, disaster in its first meaning will generally be referred to as "disaster agent." Social disruption can come from a number of sources, but we are concerned here with social disruption brought about by natural agents such as hurricanes, tornadoes and floods.

These distinctions in definition are more than analytical niceties. They are relevant to effective warning. National Weather Service personnel are concerned with weather hazards and that is where the bulk of your efforts are directed. These hazards, however, are not necessarily disasters. It is only when they strike an area and physical damage and social disruption result that we consider an agent to have become more than a threat. It is only then that we generally consider a disaster to have occurred.

If, then, our messages include information about the disaster agent only, are they really warnings?

WARNING: What is a warning?

BULLETIN 9 PM CDT SUNDAY AUGUST 17, 1969

---CAMILLE---EXTREMELY DANGEROUS---CENTER HAS PASSED MOUTH OF THE MISSISSIPPI RIVER---CONTINUES TOWARD THE MISSISSIPPI ALABAMA COAST---

HURRICANE WARNINGS ARE IN EFFECT FROM NEW ORLEANS AND GRAND ISLE LOUISIANA EASTWARD ACROSS THE MISSISSIPPI---ALABAMA---AND NORTHWEST FLORIDA COAST TO APALACHICOLA. GALE WARNINGS ARE IN EFFECT FROM MORGAN CITY TO GRAND ISLE. CONTINUE ALL PRECAUTIONS.

WINDS ARE INCREASING AND TIDES ARE RISING ALONG THE NORTHERN GULF COAST FROM GRAND ISLE EASTWARD. HURRICANE FORCE WINDS ARE NOW OCCURRING OVER MOST OF THE WARNING AREA OR WILL OCCUR WITHIN THE NEXT FEW HOURS.

THE FOLLOWING TIDES ARE EXPECTED TONIGHT AS CAMILLE MOVES INLAND. --- MISSISSIPPI COAST GULFPORT TO PASCAGOULA 15 TO 20 FEET---PASCAGOULA TO MOBILE 10 TO 15 FEET---EAST OF MOBILE TO PENSACOLA 6 TO 10 FEET. ELSEWHERE IN THE AREA OF HURRICANE WARNING EAST OF THE MISSISSIPPI RIVER 5 TO 8 FEET. IMMEDIATE EVACUATION OF AREAS THAT WILL BE AFFECTED BY THESE HIGH TIDES IS URGENTLY ADVISED.

THE CENTER OF CAMILLE IS EXPECTED TO MOVE INLAND ON THE MISSISSIPPI COAST NEAR GULFPORT BEFORE MIDNIGHT.

Would you consider the previous example a warning? What were the criteria by which you decided that it was or was not a warning?

Harry Williams (1964:80) defined warnings as "the transmission to individuals, groups, or populations of messages which provide them with information about (1) the existence of danger, and (2) what can be done to prevent, avoid or minimize the danger." A warning, then, is more than the notification of danger; IT IS A CALL TO ACTION. Horace Beach (1967) notes, "if it (warning) does not have this function (calling people to action), it might as well not have occurred."

Warning, as used in this booklet, emphasizes the alerting to danger and THE CALL TO ACTION.

Let's break this down even further. Using the previous case (Camille), what are the dangers to which people must be alerted?

Officials interviewed following the disaster said they were not fully aware of the potential destructiveness of a combination of wind and tide and wave action of the dimensions of Camille. Other people said they didn't realize that on top of the tide there would be even higher water caused by the wave action.

Can you begin to see the interrelationship between the meanings of disaster and the definition of warning? You are responsible for alerting people to danger. That alert includes information about wind and tide and wave action (disaster agent), plus information concerning the vulnerability of the threatened area (physical impact and social disruption).

You have alerted people to all the dangers discussed above. Is that a complete warning? I have heard and understood your message. What do I do now?

A second step in your warning is the call to action. If people do not take some kind of protective action, your warning has not been effective. What do you want these people to do? Should they evacuate? Seek shelter in housing on high ground? How much time do they have to take action?

Warning is a message that provides information about (1) the existence of danger and (2) what can be done to prevent, avoid or minimize the danger. We will see in later chapters that effective warning includes more than a clear message. Our goal in this chapter, however, has been to make clear that the warning message must include two essentials; ALERTING PEOPLE and CALLING THEM TO ACTION.

INDIVIDUAL ACTIVITIES

1. Enclose two warnings that your office issued. Critique them.
 - a. Do they fulfill the definition of warning used here? Why, or why not?
 - b. Are they clear about the dangers of the weather hazards you were covering?
 - c. Are they clear about what action you want people to take? Explain.
 - d. Which step is given greater emphasis?
 - e. If you were a public official would you know what the potential dangers are? Would you know what possible protective actions might be taken?
 - f. If you were a private citizen would you know what the potential dangers are? Would you know what possible protective actions might be taken?
2. Write a sample warning for (a) tornado, (b) flash flood, (c) hurricane using the principles in this chapter. Have you improved on the warnings you critiqued in question number 1? How?
3. Complete the following:
 - a. The three definitions of disaster are:
 - (1) Disaster _____.
 - (2) _____ impact.
 - (3) _____ disruption.
 - b. Warning according to the Williams definition is "the transmission to individuals, groups, or populations of messages which provide them with information about
 - (1) The _____ of danger, and
 - (2) What can be done to _____, _____, or _____ the danger."

CHAPTER II.

IT AIN'T NECESSARILY SO: COMMON STEREOTYPES OF HUMAN BEHAVIOR IN DISASTER

CHAPTER GOALS

At the end of the chapter, you should:

1. Be able to classify some of the common stereotypes about human behavior in warning and disaster.
2. Have a more realistic picture of general human behavior in these stress situations.
3. Have an increased insight about what are the real dangers in warning and disaster situations of which you, as storm warner, must be aware.
4. Have additional insights about how this more realistic picture of disasters will influence your warning procedures.

QUESTIONS

Keep these general questions in mind as you read the pages ahead:

1. Why have so many myths developed about human behavior in disasters?
2. How does each one of these stereotypes relate to preparedness and warning?
3. What contingencies does my Station Duty Manual plan for that might be reconsidered in light of a more accurate picture of warning and disaster behavior?
 - a. Are there contingencies for which we have planned that may be largely mythical?
 - b. Are there real contingencies for which we have neglected to plan?

COMMON STEREOTYPES¹

Disasters have always been of tremendous interest to those who told stories and to those who listened to them and read them. How accurate are these dramatic accounts? Not very! Yet our preconceived notions, many of them really stereotypes, are the basis on which we make our decisions about how to prepare for disasters. What are generally believed to be the problems are not the real ones in most disaster situations. What, then, are some of these stereotypes?

1. Panic and Evacuation

Probably the most widespread myth about disasters is the belief that people will panic in the face of great danger. This is a stereotype that is particularly relevant for those involved in the warning process. As a result of this belief, officials may be extremely cautious about the language they use in warning and about the number of warnings they put out. Civil Defense directors are worried about mass panic and broadcasters are concerned about unduly alarming people.

Panic, which we define as irrational behavior resulting from fright, almost never occurs on a large scale in disaster situations. Yet stories about this kind of behavior are common. A well known incident is related in the following account:

"On October 30, 1938, the Mercury Radio Theatre gave America a Halloween thrill by broadcasting a drama about a Martian invasion. The trouble was, it didn't sound like a drama. The skillful use of news bulletins, on the scene reporting, and other documentary techniques, made it sound like the real thing. Thousands of people listening in their living rooms believed that Martians had landed, had ravaged Paris and New York, and that the human race had only a few hours or days to live. Some people became hysterical, fainted, planned suicide, ran blindly into the streets. Others sat limp in their living rooms waiting for the end. Some jumped into their cars and raced off to anywhere. A few grabbed what supplies they could and headed for the hills. Finally, people at the radio station discovered what was happening and started trying to calm the public." (Your Chance to Live, 1972:101)

¹This section concerning stereotypes uses very extensive quotations from E. L. Quarantelli and Russell R. Dynes, "When Disaster Strikes (It Isn't Much Like What You've Heard and Read About)", Psychology Today, Volume 5, Number 9 (February 1972), pp. 66-70. These researchers have summarized research from their own studies and those of others to an overview of what really happens in disasters.

So goes one account of a now famous radio broadcast. Upon closer examination, the stories of mass panic appeared to be quite exaggerated. One study of the public reaction to the program found that 84 percent of the listening audience were not even disturbed by the broadcast.

Descriptions of the Coconut Grove Nightclub fire in 1942 have suggested that there was panic there, too. Evidence after the fire, however, suggests that most persons did not panic. Many were asphyxiated before the danger was evident. The majority calmly found alternate escape routes with friends.

Other reports have told of whole communities fleeing in panic on hearing of the approach of a flood or hurricane. Systematic studies show these kinds of stories to be inaccurate. A MORE REAL PROBLEM IN MOST WARNINGS IS TO GET PEOPLE TO RESPOND. Residents have often refused to evacuate even when told directly by authorities that they should.

The largest evacuation in recent American history occurred in 1961 in the face of Hurricane Carla. More than half a million people left the coastal areas of Texas and Louisiana. However, despite a clearly recognized threat, the fact that more than half the population had at least four days warning, the majority of the residents never left their own areas. A study by H. E. Moore (1964) and colleagues showed that about 35 percent remained in their own homes and another 22 percent stayed in the homes of friends and relatives.

It appears, then, that the major problem in an emergency is not wild panic or disorderly flight, but simply getting people to take action.

If systematic investigation shows that panic is such an unlikely occurrence, why do stories about such behavior persist? One reason may be that people confuse fear and panic. A panic-stricken individual flees without consideration for others. He does not fully assess the danger. But to be afraid and flee is not necessarily panic. Running may be a very rational reaction to danger, and fear may be the stimulus that moves a person to take protective action.

The person issuing warnings need not worry about causing panic. A more realistic problem about which you need to be concerned is whether your warning is forceful enough to move people to action. Another real concern is that we lessen people's sensitivity to danger by overwarning, and that problem is discussed in Chapter V. of this booklet.

2. Shock

A second stereotype suggests that persons who experience disaster are left dazed and disoriented, in shock, unable to cope with the immediate task of recovery.

"Only in a minority of cases do victims exhibit a shock reaction. This usually takes the form of apathy accompanied by a regression in cognitive processes. But this disaster syndrome, as it has sometimes been called, generally doesn't last long, and it seems to occur only in the aftermath of sudden, violent disaster. One study of tornado victims found that only 14 percent of the population may have experienced some initial elements of the syndrome.

In general, disaster victims react immediately to their plight. Individuals first seek help from family and friends, then from large groups such as churches. If these groups are unresponsive or unavailable, victims will look to more impersonal official organizations--the police and welfare departments. Only as a last resort will they turn to the special disaster agencies like the Red Cross or Civil Defense organizations."
(Quarantelli and Dynes, 1972:68)

During the aftermath of the earthquake that struck Alaska in 1964, the news media carried pictures of inhabitants of native villages wrapped in blankets and dazed. Television accounts suggested these people were unable to talk about their experiences. That part was true, they were unable to talk to newsmen about their experiences; but it was not because of shock, it was due to cultural reasons and because they did not speak English.

F. L. Bates (1962) and his colleagues studied the social and psychological consequences of Hurricane Audrey on the affected population. During this unusually destructive hurricane one Louisiana parish suffered 528 fatalities, which was 8.4 percent of its population. It was found that, while victims were more sensitive to weather cues and generally more nervous, there was no evidence either in children or adults of serious emotional disorders that could be associated with the disaster. Another study after Hurricane Carla disclosed a drop in the number of persons being admitted to outpatient and inpatient clinics for neurological or psychiatric reasons, and a decline in the number of symptoms displayed by patients who already were neurotic or psychotic.

Similar kinds of findings have been shown in studies of long-term response to disasters. In a survey supported by the National Weather Service, Wilkinson and Ross (1970) gave the following summary:

"The data reflect a very positive outlook and a high level of consensus among both leavers and stayers. There was bitterness on the part of some respondents and skepticism toward the future, but this was not widespread. Most respondents felt that cooperation among communities would prevail to rebuild the area. Few thought that disaster had brought out the worst in people."

What has been said about the behavior of the general population applies, too, for individuals working in emergency organizations. It is sometimes thought that local organizations will be overwhelmed with shocked and helpless disaster victims, and that key individuals may abandon their posts out of concern for their own families. The Disaster Research Center of the Ohio State University in more than 3,000 interviews with agency personnel in more than 100 disasters has yet to find an instance of an official abandoning a key post during an emergency.

People are not paralyzed during emergencies and shock is uncommon. A more accurate picture of human behavior at such times is one of resourcefulness and mutual help.

3. Anti-Social Behavior (Crime and Looting)

Thousands of man hours are devoted to preventing looting in disasters. Images of looters swarming into the unguarded, unoccupied homes lead to public officials allocating a great deal of manpower to the task of preventing looting.

The Disaster Research Studies have found that:

"Disaster victims are anxious about possible looting and that they tend to believe and to spread reports that confirm their fears. If there is no looting, persons tend to interpret this as evidence of effective security, rather than as evidence that it would not have occurred anyway. How prevalent is looting and how strong do countermeasures have to be?

The National Opinion Research Center of the University of Chicago investigated reports of looting in White County, Arkansas, after it was ravaged by a tornado in 1952. A research team asked persons in the disaster area whether they had lost property by looting. Only nine percent reported that they, or members of their immediate households, had lost property that they even felt had been taken by looters. And fully one third of these persons were uncertain whether the loss was really due to looters or whether the missing items had been blown away or buried in debris. Finally, most of the articles were of little value.

In contrast, 58 percent of the persons questioned said they had heard of others' property being stolen. In fact, nine percent claimed that they had even seen looting in progress or had seen looters being arrested. The study team that was on the scene, however, could verify the theft of only two major items--a cash register and a piano."

It is true that large numbers of people often converge on an area for the purpose of satisfying their curiosity about a disaster and for the purpose of volunteering aid. It is also true that victims who have

evacuated often return to examine their property for loss. People often misplace items or items were blown away or floated away during a disaster. All of these things together--large numbers of curiosity seekers and property owners looking through damaged property, and the loss of goods through the disaster--may lead the public, newsmen and officials to think looting is taking place. Upon closer examination, however, extremely few rumored instances of looting have been verified. Large-scale looting in disasters has not been heard of in any of the natural disasters with which we are familiar.

Another image of anti-social behavior is that of crime increasing because the police are preoccupied with other concerns. "In the month in which Hurricane Betsy struck New Orleans, major crimes in the city fell 26.6 percent below the rate for the corresponding month of the previous year. Burglaries reported to the police fell from 617 to 425. Thefts of over \$50 dropped from 303 to 264, and those under \$50 fell from 516 to 366." (Quarantelli and Dynes, 1972:69)

Still another common belief is that martial law is often declared in disasters within the United States. Large numbers of the National Guard are usually on hand during an emergency because the military provides a great source of disciplined manpower. These personnel work under civilian control. "Press reports of martial law inevitably turn out to be entirely false or incorrect descriptions of limited emergency power usually given to local police by mayors or city councils--usually to bar sightseers. In no way do such actions imply or involve cessation of regular civilian authority in the area. No one has ever declared martial law in a disaster area in the United States." (Quarantelli and Dynes, 1972:69)

4. Morale

"The problems created by a disaster are immediate and imperative--rescue, finding shelter, etc.--and the actions necessary to solve them are readily apparent. People put aside their own suffering and turn to these tasks. As we noted before, amateurs do a major part of the recovery work in the first few hours of the disaster, long before outside agencies can participate. Leadership is informal but effective. The efforts of each individual are easy to evaluate and each person can measure his own.

Heightened morale within the community has unanticipated consequences. It supports and motivates the inhabitants, and it creates a wall that excludes outsiders, many of whom have skills and resources that are needed. Townspeople often see Red Cross and Government rescue teams as impersonal, unsympathetic, cold and insensitive to local problems and issues. The victims feel that it is their disaster and they do not want outsiders coming in to take credit for the work done during the emergency period. And they are optimistic. Tornado victims in two Texas towns were asked by H. E. Moore (1955) how they felt about the future. In

Waco, 52 percent of the victims thought their neighborhoods would be better off in the long run and 74 percent said the same in San Angelo. Only two percent said the future would be worse in Waco, and 10 percent in San Angelo. Asked about the town as a whole, residents were even more optimistic. Sixty-six percent said Waco could be better off in the long run; only 3.4 percent said San Angelo would be worse off as a result of its tornado.

A disaster is a major event in the life of any community and frequently it becomes a major reference point by which other events are compared and rated. Townspeople draw together, feeling a sense of something unique and historic. The differences of class, race, rank and age dissolve as they work side by side to clear debris and rescue the injured. Contrary to popular belief, morale is high in the aftermath of disaster.

Suffering in a disaster is not an isolated experience, and therefore it does not become an isolating experience. A victim must appraise his condition in terms of what happened to others: unless you're dead, there are always others who are worse off. A study of the Arkansas towns hit by a series of tornadoes in 1952 showed that victims compared their losses to what might have been as well as to the losses that others suffered. Even though in one of the towns more than 80 percent of the victims were left homeless, only three percent felt that the disaster was as bad as it could have been. Ninety-two percent of the victims thought that they had lost less than others." (Quarantelli and Dynes, 1972:69-70)

5. Toll and Resources

We view the victims of disasters with great sympathy. Certainly that is an appropriate attitude to have toward humans in distress. It leads us, however, to exaggerate the amount of death and destruction in proportion to the total population and resources of an area. If we take a more analytic viewpoint, a different picture emerges.

"In every disaster in recent American history, the ratio of casualties to the total number of persons involved has been quite low. The largest death toll in any American disaster was in Galveston, Texas, in 1900, when more than 5,000 persons perished in a hurricane. Aside from maritime catastrophes, only three other American disasters have resulted in more than 1,000 fatalities. In fact, Red Cross figures show that in the four-year period from mid-1966 through mid-1970, major American disasters claimed only 779 lives. We cite these figures not to minimize the suffering of victims, but to emphasize that, unlike disasters in such countries as Pakistan or Peru, American disasters primarily damage property rather than people." (Quarantelli and Dynes, 1972:68)

Data from American disasters since the early 1900's show that there has been a steady decrease in the number of deaths from such occurrences, but a steady increase in the dollar value of property losses. This increase in destruction appears to be due to the tremendous building that has taken place in the United States.

If, however, we compare the amount of destruction in comparison to the total resources of an area, the destruction normally accounts for a rather small percentage of the total resources.

"At the time of the 1964 Alaskan earthquake, Anchorage had a population of 50,000 and another 50,000 persons lived in the surrounding area. There was extensive property damage, but only one hospital had to be evacuated. Rescuers found and removed practically all victims before dark. Although there were five hospitals in Anchorage, rescuers took nearly all of the casualties to one hospital. On the first day, doctors attended 21 casualties: three were dead on arrival, seven were admitted, and the rest were sent home. In the next two days, the hospital handled 89 emergency cases. Of these, 18 clearly were earthquake victims while the rest were ordinary emergency cases or persons injured working in debris.

In almost every disaster, outside agencies underestimate the basic resources still available in communities. Food supplies in households, retail groceries, and in wholesale warehouses usually are sufficient to maintain a community for several weeks. Clothing generally is not needed on any scale--it would be a rare disaster indeed that caught everyone in a community walking around naked. Medical supplies usually are available at hospitals or wholesale warehouses in or near the community. During an emergency, persons do not eat more than they usually do. But sometimes they eat better--power failures thaw frozen food and it has to be eaten soon. Relief agencies tend to flood a disaster area with unneeded supplies. Police and fire departments and hospitals routinely operate 24 hours a day, so they have from two to three times the number of personnel who are on duty at a given time. In a disaster, an individual will stay on the job after his shift is finished or will report to duty, either on his own or in response to a call. One 400-bed hospital in a Chicago suburb assembled some 75 physicians and 20 interns to treat 187 victims when a tornado struck. The ratio was one highly trained doctor for every two casualties." (Quarantelli and Dynes, 1972:68-69)

In addition to the tremendous resources available from area organizations there are other factors that help communities react to emergencies. Volunteers are generally in such supply that officials often find it difficult to use them effectively. After the flood that struck Florence, Italy, the city was so filled with volunteers that the cry went up, "Who will save us from our saviours?"

Self-help is another factor that must be considered in estimating the amount of resources available in an area.

"The pattern of self-reliance and informal mutual help covers all forms of disaster behavior. When more than 80,000 persons had to evacuate their homes below weakened dams in the 1971 San Fernando, California, earthquake, fewer than seven percent sought housing aid from public agencies. In the massive evacuation preceding Hurricane Carla, more than three-quarters of the persons went to other-than-public shelters (58 percent went to the homes of friends or relatives). In a California flood in Yuba City and Marysville, only 9,260 out of more than 50,000 evacuees registered in the 38 Red Cross shelters available in 13 towns in the disaster area."

(Studies from the Disaster Research Center of the Ohio State University have shown)

"that disaster victims have been able to cope with all immediate disaster problems, except those that require special equipment or advanced medical skills. In a study of the 1953 tornado in Flint-Beecher, Michigan, W. H. Form and Sigmund Nosow revealed that persons in the disaster area were able to rescue and take to hospitals two-thirds to three-fourths of the 927 casualties within three to four hours of the tornado and with almost no aid from formal organizations.

In fact, fewer than 20 percent of the persons in the disaster area had contact of any kind with official disaster agencies. Even in the most massive disasters, outside agencies apparently contact only a small minority of the victims. In one of the three greatest relief undertakings in the history of the American National Red Cross, rescuers assisted 34,476 families out of 178,548 who had suffered some degree of loss in Hurricane Betsy in 1965. In that same disaster (Betsy) more than 2,000 small boat owners joined in rescue efforts after the hurricane had passed." (Quarantelli and Dynes, 1972:68-69)

The National Weather Service is among the organizations that demand a level of technical skill that rules out the use of untrained volunteers. Trained volunteers such as members of the SKYWARN program, cooperative observers and RACES may be used; and/or work shifts may be extended, personnel from other shifts may be used and Weather Service employees from outside areas may be brought in to lend help.

6. Images of Reality

How do people get these common, but mistaken, images of human behavior in disasters?

Quarantelli and Dynes (1972:70) summarize what they believe to be the major reasons for such mistaken impressions:

"The major impressions of how people behave in a disaster come from accounts in the mass media. Reporters have images of what should happen in disaster, and in the absence of contrary evidence they report these images. During the massive evacuation in Hurricane Carla more than a half million persons left their homes. Fewer than one percent of the evacuees reported being involved in traffic accidents along the escape route. No fatalities resulted from the evacuation. Based on a wire-service story that apparently assumed that all flights are disorderly; several newspapers ran a headline reporting: 'More than 100,000 Persons Flee In Near Panic.'

Reporters sometimes compound errors while checking facts. For example, one reporter approached a sheriff and asked him what he was doing to prevent looting. He quoted the sheriff as saying that he was calling out the entire force to prevent looting. The sheriff, realizing that it would be politically naive to say that he was doing nothing, said what he had to say, despite the fact that there was no evidence of looting. Community agencies seldom keep accurate records during an emergency. Officials answer questions with estimates and guesses. The reporter's story inevitably suggests confusion. The unknowns will be known sooner or later, but not on a news deadline.

Officials tend to overestimate losses of life and property-- later they can explain that effective emergency procedures and local heroism are responsible for the lower loss figures. A low initial estimate is likely to result in later accusations of incompetence and inefficiency. We have developed an informal law suggesting that a casualty estimate varies inversely with distance. In the Alaskan earthquake, the initial estimates circulating in Columbus, Ohio, were 1,000 killed in Anchorage alone; the Chicago papers estimated 500 killed; in Seattle it was down to 300; and in Anchorage, 100. The actual number of deaths in Anchorage was seven.

Media accounts center on the extent of physical damage and on incidents that illustrate the human condition. A disaster is a dramatic event and editors think it should be reported as drama. The camera lens focuses on destruction and despair. What was destroyed is interesting; what was left is not. One of the most widely used photos of the Alaskan earthquake showed the wreckage of a department store. The destruction was undeniable, yet the large plate-glass windows of the stores across the street were still intact.

Human-interest stories focus on the unusually heroic or unusually tragic aspects of the disaster--the anxiety of a mother whose child is hurt or missing, or the superhuman efforts of a particular person in a rescue operation. While the stories may be factually correct, they are not representative. A very large mass-circulation magazine, reporting on an earthquake, presented a full-page picture of an old man asleep in a chair holding a dog. The picture conveyed a notion of the weak clinging on to their possessions in the face of tremendous adversity. Skid Row had been one of the most severely damaged areas in the city. Those who knew the old man suggested that he had been warmer, more comfortable, better fed and drier in a YMCA shelter than he had in years. The dog probably was not his. It is doubtful that the photographer or the picture editor knew this, and certainly the millions who saw the photograph did not.

Ironically, the victims of disasters are usually the first to believe dramatic accounts of their suffering. Ernie Pyle once commented that war was that which was five feet on one side of you and five feet on the other. We found, for example, that doctors were unable to describe how a hospital functions during an emergency. They focus on specific patients rather than on a number of patients, their distribution around the hospital, the total demand on the facilities, etc.

In addition, disaster victims like to pass off their own experiences as atypical and heroic. If a person believes that panic is a common reaction, he will take pride in his self-control. Stories of looting and exploitation reinforce his own sense of decency. The various myths about disaster act as a necessary counterpoint to the reality of the event. The reality suggests that human beings are amazingly resilient in the face of adversity. Perhaps heroism is not the wrong word to describe disaster behavior."

7. Summary

A number of myths about disaster behavior have arisen over the years. We have tried to correct some of these, and paint a more accurate picture of what really occurs in periods of warning and disaster. It may seem to you that we have come close to making disasters seem like "good" occurrences that no community should miss. It may appear also that we have played down human suffering and been callous toward it.

No community wants a disaster, and no one should treat lightly the human suffering that is a part of disasters. What we have tried to do is to show you a more accurate picture of reality. Natural disasters provide a threat from outside the community, and people tend to unite against that common enemy. Political, social, religious and ethnic differences are temporarily forgotten as communities rise to meet the challenge.

It is essential that our planning be on the basis of what is most likely to occur in disasters, and not based on misapprehensions. We have looked in a very general way at what really happens in emergencies. This should give you a more realistic view of what you face. In the next chapter we will look in greater depth at some of the specific stresses and human responses in disasters.

INDIVIDUAL ACTIVITIES

1. Make a list of any material you have read recently that is subject to any of the misconceptions about disasters covered in this chapter.
2. List the six stereotypes associated with disasters.
3. In light of the six stereotypes discussed in this chapter, list what you consider to be the most important concerns for warning and for disasters.

CHAPTER III.

WHAT REALLY HAPPENS IN DISASTERS?

CHAPTER GOALS

At the end of this chapter you should:

1. Have a perspective on disasters according to type, frequency and damage on a world-wide and a national scale.
2. Be able to classify disaster agents according to seven key dimensions and be able to indicate some of the ways in which these characteristics relate to warning.
3. Be able to discuss the importance of convergence, uncoordinated activity and role conflict in disasters.

QUESTIONS

Please keep the following questions in mind as you read the pages ahead.

1. What are some of the biases in the data concerning the occurrence of disasters globally?
 - (1) How does the USA compare to other nations according to number and types of disasters and loss of life in disasters?
 - (2) What are some of the trends related to property damage and loss of life in disasters in the USA since 1900? Is it fair to assume these trends will continue? Will they necessarily be true for the next disaster?
2. We have attempted to point out some relationships between disaster agent characteristics and warning.
 - (1) What are some additional relationships between these characteristics, either singly or in combination, and warning?
 - (2) What are some additional problems during periods of secondary threat?
3. What are some of the problems your WSFO, WSO or RFC might encounter in carrying out warnings because of convergence, uncoordinated activity and role conflicts?

WHAT REALLY HAPPENS IN DISASTERS?

1. The Occurrence of Disasters.

From a long-term perspective on a world-wide scale disasters are regular phenomena. Hewitt and Leehan (1969) have assembled the following data about "major disasters" from 1947-1967. "Major disasters" are those in which at least one of the following characteristics is met:

- (1) At least \$1,000,000 damage;
- (2) At least 100 persons dead;
- (3) At least 100 persons injured.

There are biases in the data. One of the major biases that concerns us in particular is that North American disasters are over-represented in comparison to most other areas. This is because information from this part of the world is more complete. Another bias is that the United Soviet Socialist Republics is not included in these figures because disaster information from that nation is not reported.

A World Perspective

The total number of major disasters (excluding drought) for the twenty year period from 1947-1967 was 661, giving an average of 31.4 per year. Floods accounted for the greatest number of disasters. The distribution by type of agent was as follows:

TABLE III - 1

Number of Disasters by Type of Agent
1947-1967

<u>Agent</u>	<u>Number of Disasters</u>
(1) Floods	209
(2) Typhoons, Hurricanes, Cyclones	148
(3) Earthquakes	86
(4) Tornadoes (incl. suites of contemporaneous ones)	66
(5) Gales and Thunderstorms	32
(6) Snowstorms	27
(7) Heat Waves	16
(8a) Cold Waves	13
(8b) Volcanic Eruptions	13
(8c) Landslides	13
(9) Rainstorms	10
(10) Avalanches	9
(11) Tidal waves (alone)	5
(12) Fogs	3
(13a) Frost	2
(13b) Sand and Dust Storms	2

(Hewitt and Leehan, 1969: 5)

It should be noted that Hewitt and Leehan use the typology given in the reporting of disasters. We might include other agents such as typhoons and hurricanes under flooding in that the major damage from these agents is generally from flooding. If that procedure were followed, floods would account for more disasters than all other agents combined.

The number of disasters in any given year seems to be fairly consistent:

TABLE III - 2

Number of Disasters by Year
1947-1967

1947 (30), 1948 (45), 1949 (31), 1950 (35), 1951 (33), 1952 (28), 1953 (45), 1954 (35), 1955 (33), 1956 (28), 1957 (34), 1958 (25), 1959 (31), 1960 (34), 1961 (25), 1962 (24), 1963 (32), 1964 (28), 1965 (26), 1966 (29), 1967 (30). (Hewitt and Leehan, 1969: 5)

Disasters, then, are unusual occurrences from the perspective of a particular community; but from a global perspective, or even a national perspective, they are quite regular occurrences.

The total loss of life from major disasters over the period was 441,855, giving an average of 22,093 persons a year. The percentage of the total loss of life accounted for by each disaster type are listed below.

TABLE III - 3

Percentage of Total Loss of Life for Each Disaster Type
1947-1967

<u>Disaster Types</u>	<u>Number of Lives Lost</u>	<u>Percentage of Total Loss of Life</u>
Floods	173,170	39.2
Typhoons, Hurricanes, Cyclones and Tidal Waves	155,065	35.1
Earthquakes	56,100	12.7
Gale and Thunderstorms	20,940	4.7
Volcanoes	7,220	1.6
Heat Waves	4,675	1.1
Avalanches	3,680	0.8
Fog	3,550	0.8
Blizzards and Snowstorms	3,520	0.8
Tornado Groups	3,395	0.8
Cold Waves	3,370	0.8
Tidal Waves (alone)	3,180	0.7
Landslides	2,880	0.7
Rain	1,100	0.2
Sand and Dust Storms	10	-
Hailstorms	-	-
TOTAL	441,855	100.0

(Hewitt and Leehan, 1969:18)

If we combine disaster agents that bring about flooding as the major source of destruction (floods, rain, gale and thunderstorms, cyclone and tidal waves, tidal waves (alone), hurricanes, and typhoons), we may account for approximately 80.0% of the deaths.

Comparing Continents and Nations

Another way to view the data on disasters is to examine the number of disaster impacts, the number of lives lost and the average loss of life per disaster impact by continent and by nation. If we view the comparative rankings of world continents and nations on these criteria, we see a great deal of discrepancy.

TABLE III - 4

Average Loss of Life Per Disaster Impact by Continents
1947-1967

<u>Continents</u>	<u>Number of Lives Lost (Rank)</u>	<u>Number of Disaster Impacts (Rank)</u>	<u>Average Loss of Life Per Disaster Impact (Rank)</u>
Asia (excl. USSR)	361,410 (1)	297 (1)	1,216 (1)
Europe (excl. USSR)	19,575 (2)	85 (3)	230 (5)
Africa	18,105 (3)	17 (6)	1,065 (2)
South America	15,670 (4)	45 (5)	348 (3)
Central America and Caribbean	14,820 (5)	49 (4)	302 (4)
North America	7,965 (6)	210 (2)	37 (6)
TOTALS	441,855	716	618

(Hewitt and Leehan, 1969:17)

TABLE III - 5

Loss of Life and Number of Disaster Impacts by Nation State
1947-1967
(not including droughts)

<u>Nation</u>	<u>Number of Lives Lost (Rank)</u>	<u>Number of Disaster Impacts (Rank)</u>	<u>Average Loss of Life Per Disaster Impact (Rank)</u>
Afghanistan	2,210 (24)	3 (18)	737 (14)
Albania	15 (70)	1 (20)	15 (64)
Algeria	1,865 (28)	2 (19)	933 (11)

TABLE III - 5 (Continued)

Nation	Number of Lives Lost (Rank)	Number of Disaster Impacts (Rank)	Average Loss of Life Per Disaster Impact (Rank)
Argentina	450 (47)	5 (16)	90 (54)
Assam	690 (41)	2 (19)	345 (29)
Australia	70 (62)	10 (12)	7 (68)
Austria	320 (49)	8 (14)	40 (57)
Belgium	20 (69)	2 (19)	10 (66)
Brazil	5,650 (15)	12 (12)	471 (23)
Burma	4,400 (17)	7 (15)	629 (18)
Canada	290 (52)	9 (13)	32 (60)
Canary Islands	-	1 (20)	-
Caribbean Islands (Leeward & Windward)	240 (55)	3 (18)	80 (55)
Ceylon	1,625 (29)	4 (17)	406 (25)
Chile	6,445 (13)	8 (14)	806 (12)
China	129,520 (1)	28 (3)	4,626 (2)
Columbia	900 (37)	7 (15)	129 (48)
Cuba	1,370 (31)	7 (15)	196 (41)
Costa Rica	34 (66)	3 (18)	11 (65)
Cyprus	40 (65)	1 (20)	40 (51)
Czechoslovakia	10 (71)	3 (18)	3 (70)
Denmark	25 (68)	1 (20)	25 (62)
Ecuador	8,050 (9)	2 (19)	4,025 (3)
El Salvador	430 (48)	3 (18)	143 (45)
Eire	-	1 (20)	-
France	1,020 (35)	8 (14)	128 (49)
Germany, East	2,160 (25)	5 (16)	432 (24)
Germany, West	590 (43)	11 (11)	54 (56)
Great Britain	4,930 (16)	17 (8)	290 (32)
Greece	140 (60)	8 (14)	18 (62)
Guatemala	800 (38)	2 (19)	400 (26)
Haiti	6,870 (12)	7 (15)	981 (10)
Honduras, British	280 (53)	2 (19)	140 (46)
Hong Kong	3,320 (21)	5 (16)	664 (16)
Hungary	15 (70)	2 (19)	8 (67)
India	70,350 (3)	44 (2)	1,599 (8)
Indonesia	2,720 (23)	10 (12)	272 (33)
Iran	21,320 (5)	18 (7)	1,184 (9)
Iraq	225 (56)	1 (20)	225 (37)
Israel	10 (71)	2 (19)	5 (69)
Italy	3,840 (19)	21 (6)	183 (42)
Jamaica	260 (54)	1 (20)	260 (34)
Japan	31,630 (4)	44 (2)	719 (15)
Jordan	220 (57)	1 (20)	220 (38)

TABLE III - 5 (Continued)

Nation	Number of Lives Lost (Rank)	Number of Disaster Impacts (Rank)	Average Loss of Life Per Disaster Impact (Rank)
Kenya	170 (59)	1 (20)	170 (43)
Lebanon	490 (45)	4 (17)	123 (50)
Libya	260 (54)	1 (20)	260 (34)
Madagascar	750 (39)	2 (19)	375 (28)
Mexico	3,740 (20)	16 (9)	234 (36)
Morocco	12,100 (7)	2 (19)	6,050 (1)
Mozambique	110 (61)	1 (20)	110 (52)
Mauritius	40 (65)	1 (20)	40 (57)
Netherlands	1,870 (27)	3 (18)	623 (19)
Nepal	1,600 (30)	4 (17)	400 (26)
Nicaragua	475 (46)	2 (19)	238 (35)
New Guinea (Territ. of)	4,000 (18)	1 (20)	4,000 (4)
New Hebrides	240 (55)	2 (19)	120 (51)
Pakistan	89,060 (2)	26 (4)	3,425 (5)
Peru	920 (36)	7 (15)	131 (47)
Philippines	7,240 (11)	23 (5)	315 (31)
Poland	45 (64)	4 (17)	11 (65)
Portugal	630 (42)	3 (18)	210 (39)
Puerto Rico	310 (50)	3 (18)	103 (53)
Reunion Islands	300 (51)	2 (19)	150 (44)
Ryukyus	490 (45)	4 (17)	123 (50)
Saudi Arabia	500 (44)	1 (20)	500 (22)
Somalia	200 (58)	1 (20)	200 (40)
South Africa, Union of	35 (67)	1 (20)	35 (59)
South Korea	6,400 (14)	11 (11)	582 (20)
South Vietnam	15,910 (6)	8 (14)	1,989 (7)
Spain	730 (40)	4 (17)	183 (42)
Sudan	2,030 (26)	1 (20)	2,030 (6)
Switzerland	55 (63)	2 (19)	28 (61)
Taiwan	3,020 (22)	9 (13)	336 (30)
Thailand	1,310 (32)	2 (19)	655 (17)
Tibet	1,190 (33)	3 (18)	397 (27)
Turkey	9,350 (8)	12 (10)	779 (13)
Uruguay	40 (65)	1 (20)	40 (57)
U. S. A.	7,620 (10)	201 (1)	38 (58)
Venezuela	430 (48)	3 (18)	143 (45)
Yugoslavia	1,030 (34)	2 (19)	515 (21)

(Hewitt and Leehan, 1969: 14-15)

The United States of America

It becomes clear from a quick comparison of the United States with other nations (See Table III - 5) that the U. S. A. ranks quite differently in the various categories listed.

Number of Disasters	Rank 1 of 20
Loss of Life	Rank 10 of 71
Average Loss of Life per Disaster	Rank 58 of 70

Roth (1970: 442) developed a "Disaster - Death Index" in which he examined the number of disaster-related deaths from 1900-1967 in ten nations with the 1960 population of the same ten nations. Among the nations listed the United States had the lowest "Disaster - Death Index."

	<u>Disaster-Death Index</u>	<u>Rank</u>
Chile	8.40	1
India	.34	9
U. S. A.	.17	10

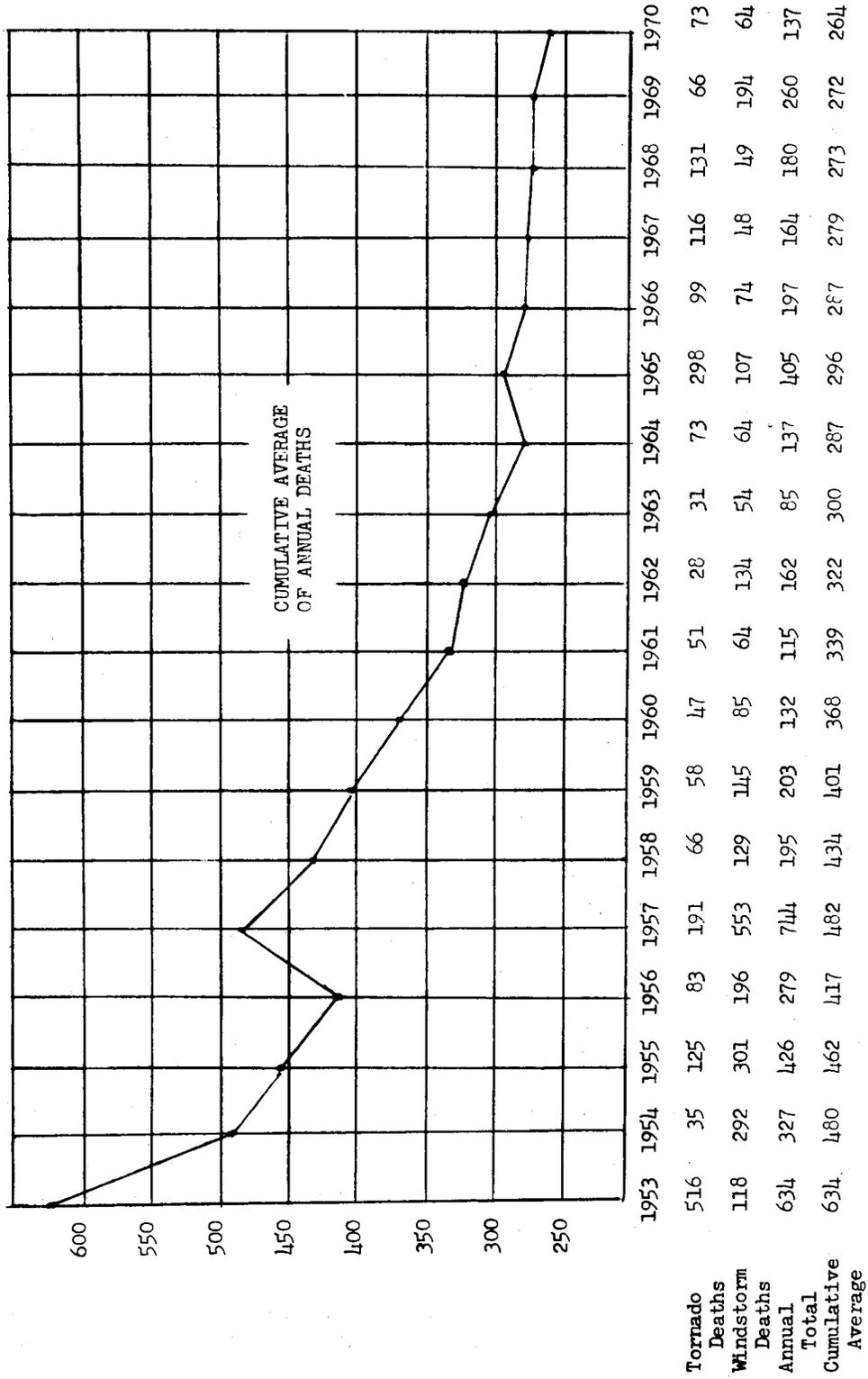
All of the previous data support the conclusion that the U. S. A. is a nation that experiences a large number of disasters, but the loss of life from those disasters is quite low relative to the number of disasters and to other nations with comparable populations.

The vast resources and advanced technology of the United States enable communities and regions to prepare for disaster threats. Sophisticated communications systems, better constructed buildings, resources for prevention and control programs and rapid evacuation and rescue may be among the reasons for the relatively low loss of life. These advances have led to a decrease in the number of deaths from tornadoes and windstorms over the years. The trend appears to be more pronounced for disasters brought about by agents with longer possible forewarning (windstorms) than for disasters associated with agents with shorter possible forewarning (tornadoes). (See Table III - 6).

The physical development that we have suggested may be among the reasons for the relatively low loss of life in the U. S. A. This physical development has also been responsible for spiraling damage costs from disasters. Rapid growth simply means there is more property to be damaged. Where seashore once met isolated beaches, it now meets resorts and residential housing.

The general trend in the U. S. A. in recent years, then, has been for a gradual decrease in loss of life and an increase in damage costs. (See Tables III - 7 and 8).

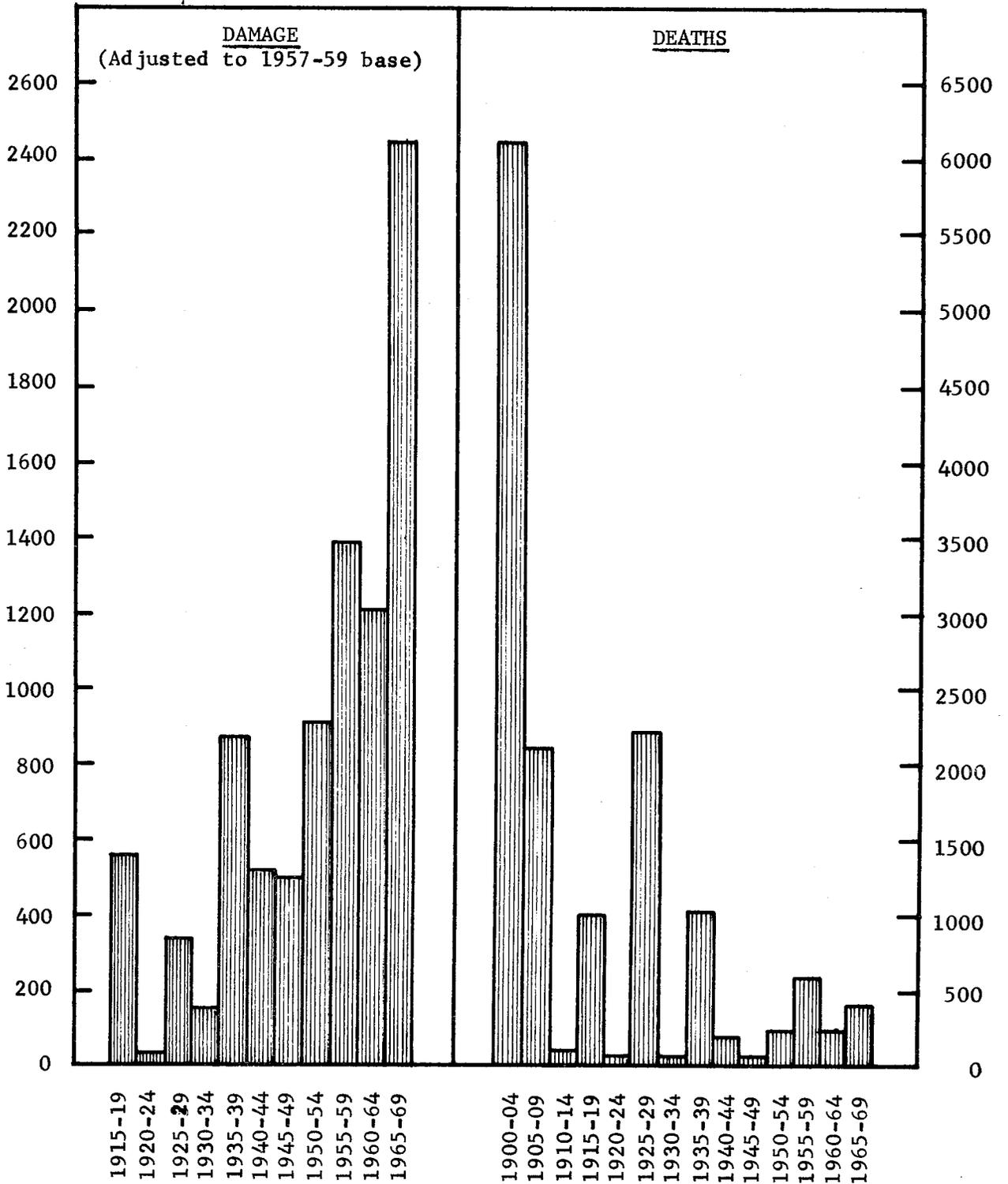
TABLE III. - 6
 CUMULATIVE AVERAGE OF ANNUAL DEATHS FROM TORNADOES AND WINDSTORMS 1953 - 1970



(Report to Congress: Disaster Preparedness, Vol. 1, 1972: 36)

TABLE III - 7

TRENDS OF LOSSES FROM HURRICANES IN THE UNITED STATES



(Project Storm Fury, 1970)

TABLE III - 8

NUMBER OF TORNADOES AND RESULTING LOSSES BY YEARS, 1921-1970							WINDSTORM LOSSES FOR PAST 50 YEARS (OTHER THAN TORNADOES)	
Year	Number of Tornadoes	Total Deaths	Total Property Losses+	Number of Tornadoes Causing Losses in +			Total Loss Of Life	Total Property Loss (Category)*
				Category 5	Category 6	Category 7 & Over		
1921	105	202	7	22	3	0	65	7
1922	108	135	7	27	5	0	133	7
1923	102	109	6	21	1	0	68	7
1924	130	376	7	26	11	1	78	7
1925	119	794	7	34	2	1	88	7
1926	111	144	6	28	0	0	357	8
1927	163	540	7	42	9	1	64	7
1928	203	92	7	40	7	0	1947	8
1929	197	274	7	48	4	0	46	7
1930	192	179	7	38	6	0	49	7
1931	94	36	6	14	1	1	17	7
1932	151	394	7	23	1	1	306	7
1933	258	362	7	46	9	0	156	8
1934	147	47	6	10	3	0	109	7
1935	180	70	6	29	0	0	461	7
1936	151	552	7	17	5	1	121	7
1937	147	29	6	24	0	0	43	7
1938	213	183	7	29	6	0	630	8
1939	152	87	7	21	3	0	60	6
1940	124	65	7	13	2	0	251	7
1941	118	53	6	24	1	0	43	7
1942	167	364	7	42	10	0	68	7
1943	152	58	7	28	8	0	61	7
1944	169	275	7	50	9	0	448	8
1945	121	210	7	21	10	1	85	7
1946	106	78	7	29	7	0	70	7
1947	165	313	7	46	7	1	117	8
1948	183	140	7	62	11	2	52	8
1949	249	212	7	54	13	0	102	8
1950	199	70	7	47	9	0	210	8
1951	272	34	7	35	11	2	289	8
1952	236	230	7	63	18	7	137	8
1953	437	516	8	63	18	7	118	8
1954	549	35	7	63	8	1	292	9
1955	593	125	7	74	13	1	301	8

TABLE III - 8 (Continued)

NUMBER OF TORNADOES AND RESULTING LOSSES BY YEARS, 1921-1970							WINDSTORM LOSSES FOR PAST 50 YEARS (OTHER THAN TORNADOES)	
Year	Number of Tornadoes	Total Deaths	Total Property Losses+	Number of Tornadoes Causing Losses in +			Total Loss Of Life	Total Property Loss (Category)*
				Category 5	Category 6	Category 7 & Over		
1956	532	83	7	83	24	1	190	8
1957	864	191	8	129	26	3	553	8
1958	565	66	7	70	8	1	129	8
1959	589	58	7	70	4	1	145	7
1960	618	47	7	65	11	1	85	8
1961	682	51	7	103	21	1	64	8
1962	658	26	7	51	10	0	134	9
1963	461	31	7	77	15	1	54	9
1964	713	73	7	113	17	5	64	9
1965	899	298	8	126	30	11	107	9
1966	570	99	8	79	13	4	74	8
1967	912	116	8	125	33	8	48	8
1968	661	131	8	82	26	6	49	8
1969	604	66	8	98	16	3	194	9
1970	649	73	8	97	24	6	64	8
MEAN	642	116		87	18	3 TOTAL	9402	

NOTE: The above estimated losses are based on values at time of occurrence.

+Storm damages in categories:
 5. \$50,000 to \$500,000
 6. \$500,000 to \$5,000,000
 7. \$5,000,000 to \$50,000,000
 8. \$50,000,000 and over

*Storm damages are placed in categories varying from 1 to 9 as follows:
 1 - Less than \$50
 2 - \$50 to \$500
 3 - \$500 to \$5,000
 4 - \$5,000 to \$50,000
 5 - \$50,000 to \$500,000
 6 - \$500,000 to \$5 million
 7 - \$5 million to \$50 million
 8 - \$50 million to \$500 million
 9 - \$500 million to \$5 billion

Summary

We have given you information about the occurrences of disasters and the loss of life on a world-wide basis. We have also looked at trends in the number of disasters, loss of life and damage in the U.S.A. This information is meant to do more than provide ammunition for party conversations. It is intended to give you a perspective on the occurrences of disasters globally and trends within the United States.

We may summarize the material presented as follows:

- (1) From a world-wide, and even a nation-wide, perspective, disasters are rather regular occurrences. We may not know exactly when an area will be threatened, or what area may be impacted; but we can be rather certain that an area as small as a WSO area of responsibility will be threatened.
- (2) Disasters associated with flooding and water damage account for almost 80 percent of the disaster-related loss of life in the world.
- (3) The trend in the U.S.A. since 1900 has been toward a decrease in loss of life and an increase in damage from disaster impacts. These trends in loss of life should not lull us into complacency. First, there is no guarantee that what has been a trend in the past will be true for the next disaster. Secondly, there are large numbers of people moving into vulnerable areas. Thirdly, we are better prepared through flood control and other measures for most disasters, but we are not prepared for the once in a century occurrence. The spiraling increases in property losses should give ample evidence of the economic advisability of investing in disaster preparedness.
- (4) The figures we have cited should help support our thesis that disaster preparedness is necessary, and that the likelihood of its use is rather high.

2. Disaster Agent Characteristics.

Since the kind of disaster agent that poses a threat is of crucial importance to the disaster impact and response and to the warning processes, disaster agent characteristics are discussed here. Our aim is to list the key dimensions of disaster agents and to indicate briefly how they may have a bearing on warning.

As has been detailed elsewhere, there are at least seven major characteristics or dimensions along which disaster agents may differ. These are: frequency, physical consequences, speed of onset, length of possible forewarning, duration, scope of impact, and destructive potential. Their implications for warning range from very important to relatively minor.

(1) Frequency

The importance of frequency in relation to warning is that the number of times an area has been impacted, or at least threatened, affects whether people and organizations become sensitive to threat cues, the warning systems that organizations develop, and the general response that might be anticipated to a warning of danger. In general, the frequency with which a disaster agent strikes or threatens a particular community affects the way that community responds. Thus, hurricane-prone cities such as Miami or New Orleans are especially alert to cues of such a potential threat; have elaborate warning procedures to alert their residents; and have developed a complex organizational structure to collect and collate threat cues, to disseminate warning messages, and to evoke public community responses to warnings of hurricane danger.

(2) Physical Consequences

Disaster agents inherently differ in their physical consequences. Water involved in a flood creates a different kind of task problem than the wind of a tornado. There are some implications for warning in the inherent physical consequences of a disaster agent if warning is thought of as involving an indication of the course of action to be followed.

Sometimes, the physical consequences of even a relatively familiar disaster agent may not be fully understood with unfortunate results. When Hurricane Audrey struck lower Louisiana, over 400 lives were lost. A great number of the dead seem to have been the inhabitants of one parish in the state who thought the rising waters accompanying the hurricane would not reach the ridges on which they were located. That the warning messages issued failed to make absolutely clear that one physical consequence of such a storm would be such very high waters, contributed in part to the heavy loss of life.

(3) Speed of Onset

The speed of onset is an extremely important dimension in relation to warning. When the speed of onset is rapid, the warning period is necessarily short, and there is a probability that fewer people will receive the message about the danger. Even for those who do receive the message, there is less time to take protective action. Consequently, some protective actions that might have been possible given a longer period of time, as in situations of gradual onset, are not possible when onset is rapid, e.g., pre-impact evacuation.

However, it should not be assumed that the slower the speed of onset, the more effective will be the warning. Too long a period of forewarning without any immediate danger is more likely to create an apathetic reaction on the part of both individuals and groups, rather than an active response to a warning of threat.

(4) Length of Possible Forewarning

There is a difference, not always recognized, between the speed of onset and the length of forewarning of a given disaster agent. The two are not necessarily related; it is possible to have either a long period of forewarning or no forewarning associated with each of the three modes of onset we discussed -- rapid, gradual, and repetitive.

The length of forewarning is, of course, important because it allows the opportunity for protective action. The degree of community disorganization may be inversely proportional to the length of forewarning in disasters with rapid onset.

(5) Duration

Disaster agents may be grossly conceptualized as being of limited duration or of prolonged duration. Limited duration would be illustrated by an explosion. On the other hand, certain disaster agents, such as floods or forest fires, may extend over several days or weeks, or in something like an epidemic possibly several months.

The duration is related to warning in at least two ways. Warning information about how to protect oneself from a disaster agent of long duration will obviously be different from that concerning preparations necessary for a short duration agent. Some of the difficulties that occurred in New Orleans as a result of Hurricane Betsy were the result of the fact that people had been warned about, prepared for, and responded to a hurricane; however, what they actually were faced with was a disaster agent of a much longer duration -- a flood. In other words, the content of warning messages and the protective actions taken as a result will necessarily be affected by the duration of disaster agents.

(6) Scope of Impact

The area that a disaster agent strikes may be localized or diffuse. A disaster whose scope is more diffuse throughout the total community tends to be more serious than one which is localized within the community. A localized disaster, such as an explosion or tornado, may leave the rest of the area around a neighborhood or segment of a community almost totally unaffected.

A diffuse disaster would tend to be more disruptive. When Hurricane Beulah hit southern Texas in late 1967 it affected thousands of square miles and hundreds of communities in varying degrees.

Here again there are some possible consequences for warning, especially of secondary threats. In a localized disaster, communication equipment and manpower might be almost all intact, and since relatively few persons might be directly involved, additional warnings might be easy to disseminate. In contrast, in the Easter Sunday tornadoes that cut across Illinois, Indiana, Michigan, and Ohio, the diffuseness of the impacted area (among other reasons) made it difficult for the earlier struck localities in the west to warn the eastern areas hit later.

(7) Destructive Potential

Disaster agents differ as to their destructive potential, an obvious fact that is often forgotten by many within and outside the impacted area. This potential has two aspects to it. One, there is no necessary correlation between personal loss and property damage. A disaster agent may have tremendous potential for killing or incapacitating people, but it may have no consequence for damaging or destroying property. An epidemic is an obvious example of this. The converse of course can also be true -- that is, there may be considerable property damage and yet the disaster agent may have little direct consequence for persons, as in the instance of crop diseases or sudden freezing spells in Florida or California citrus fruit areas.

The destructive potential of a disaster agent is important to warning in several ways. Prior to impact, it is not always easy to gauge the potential impact of a disaster agent and thus to evaluate the kind of warning that should be issued. Many factors may affect the potential destructiveness of a tornado or hurricane, for example, even if they do hit a particular locality. In part, because of the particular way Hurricane Betsy hit New Orleans, it was far more destructive than otherwise would have been the case. In some kinds of natural disasters such as hurricanes, the nature of the secondary threats that may be associated with it, such as the lines of tornadoes that are frequently spawned, are all but impossible to ascertain prior to impact.

In a highly truncated fashion we have tried to indicate what dimensions of disaster agents are likely to be most salient in warning. We have treated each of the characteristics of disaster agents separately and individually. However, it is necessary to note that they may have different effects when taken cumulatively or in conjunction with one another. Insofar as warning is concerned, certain aspects may be magnified when they occur together, or in some cases they may actually neutralize one another. For example, it might be hypothesized for reasons implied in the last few pages that warning would be most difficult and ineffective if the disaster agent were infrequent, had non-obvious physical consequences, was rapid in onset, involved a short period of forewarning, was of lengthy duration, had very wide scope of impact and extremely high destructive potential.

Secondary Threat

A very important corollary to the discussion of disaster agents is the discussion of secondary threats. Unfortunately, disaster agents sometimes come in pairs. These "secondary" threats may be second only in that they generally come after the initial impact. Often they are more dangerous than the initial disaster agent.

Secondary threats may be anticipated or unexpected. Following the Alaskan earthquake, communities in California and Hawaii anticipated and prepared for tsunami waves. New Orleans, however, was struck by an unanticipated secondary disaster agent when Hurricane Betsy was followed by a flood. In both the illustration of the Alaskan earthquake and Hurricane Betsy, the secondary agents were responsible for more deaths than the initial agent.

Secondary threats may come from damage to the community as well as other disaster agents. For example, water and sewage lines may be broken and pose grave health threats.

Warning of secondary threats often pose problems even beyond those of ordinary warning. People may concentrate on response to the initial impact and be totally unprepared for the secondary threat. Preparation for the first threat may work in the other direction also, that is, aid the community in its preparedness for the secondary threat. For example, organizations may all be on station at the EOC (Emergency Operations Center) because of the initial disaster impact and, thus, be ready for rapid interorganizational coordination and communication.

3. Three Important Disaster Behavioral Patterns.

There are three areas of disaster related behavior that are important enough to warrant separate treatment in this section. These behavioral patterns are discussed by Fritz (1961), and his material is quoted here.

(1) Convergence Behavior

One of the most common and difficult "problems" in disasters is the phenomenon known as "convergence behavior." Rather than people fleeing from an area there are large numbers of people, information and material flowing into the disaster area. This convergence phenomenon reaches proportions that create some severe problems. The material used here is from Fritz (1961) and a number of the cases to which he refers are "classics." His illustrations and discussion refer to the time period following disaster impact. The kinds of behavior Fritz discusses is still common and it sometimes begins even before impact. For example, the police in one major city had to take strong measures in order to remove people from an endangered bridge less than an hour before the flood crest struck. They had gathered "to watch the flood."

We use Fritz's (1961:678-82) own words to describe the convergence phenomenon.

"Contrary to the popular image of behavior in disasters, movement toward the disaster area is usually both quantitatively and qualitatively more significant than flight or evacuation from it. Within minutes after most domestic disasters, thousands of persons begin to converge on the disaster area and on first aid stations, hospitals, relief centers, and communication centers near the area. Along with this physical movement of persons, incoming messages of anxious inquiry and offers of help from all parts of the nation and from foreign countries begin to overload existing telephone, telegraph, and other communication and information facilities. Shortly afterward, tons of unsolicited equipment and supplies of clothing, food, bedding, and other material begin arriving in the disaster area or in nearby relief centers. Although the initial convergence derives from areas near the disaster site, the process continues for days and weeks following the disaster, as wave upon wave of people from successively distant points travel to the disaster area or send messages and supplies."

The following case material illustrates the scope of this convergence of people, information and materials:

PERSONAL CONVERGENCE

The White County, Arkansas, tornado, March 21, 1952:

Within about an hour after the tornado struck White County, hundreds of autos began moving along Highway 67 and into the disaster-struck communities....This flow of traffic continued for over one week. On Sunday, two days after the tornado, an estimated 1700 cars an hour took to the highway leading into the Judsonia-Bald Knob area, and, according to one of the top Patrol officials, by 10:00 a.m. Sunday morning cars were lined bumper to bumper for 10 miles on either side of Judsonia. Eighty per cent of the total personnel of the State Patrol was used in an attempt to unsnarl the massive traffic jam. Emergency vehicles were frequently completely blocked from entrance or exit to the area. The initial external convergence came from immediately surrounding areas and communities. A second wave began later in the evening with persons from more distant parts of Arkansas and surrounding states. Beginning the morning following the tornado, a third wave of outsiders began converging from more distant states. (Marks and Fritz, Vol. I:237-40)

INFORMATIONAL CONVERGENCE

The Waco, Texas, tornado, May 11, 1953:

...the long distance dial system in Waco was set up to handle 100 telephone calls simultaneously, but two to three hours after the tornado the incoming calls were so numerous that outgoing calls had to be delayed as much as six hours. So great was the jam, the manager of the Waco office phoned the National Broadcasting Company in New York to broadcast an appeal to the nation asking that calls into Waco be restricted to real emergency messages. In the twenty-four hour period immediately following the disaster, the telephone company handled 22,420 long distance calls (both incoming and outgoing). The normal load for a similar period was approximately 45 percent less than this. Likewise, so many messages flowed through the local telegraph office that five additional substations had to be opened. A total of nearly 37,000 messages were handled on the day following the tornado, compared with a normal daily average of about 1,000 messages. A similar heavy flow of messages is noted for the post office, the commercial radio stations, the "Ham" radio operators, and MARS (Military Affiliate Radio System). (Moore, 1955)

MATERIEL CONVERGENCE

From an interview with a local Red Cross representative in the White County, Arkansas, tornado:

By Saturday afternoon (the day following the tornado) all this clothing and food and all this vast store of supplies started moving into Searcy for distribution to the tornado areas....But that created an enormous problem. There was no place to put it at Judsonia (the most devastated town). No buildings to put it in. No buildings had been made available at Bald Knob for it. So we had to warehouse it and sort it and handle it here. That created a big problem. We had quite a few headaches. So much that was worthless rags. They had some pretty good ones. Somebody sent an old doggone big carton of falsies. We got a tuxedo, a nice one; it was in good condition. High button shoes to derby hats. No work clothes to speak of. We had some brand new stuff - some suits that I would have liked to have had...but there was this vast accumulation of stuff that wasn't worth the transportation and maybe it came from Pennsylvania or Kansas or from a long distance at great expense....It was coming by Railway Express, by truck, by plane, by freight car. We used this large auditorium there at the Legion Hut where we had our offices. They thought that would take care of it. It couldn't. Enormous amount of floor space, but that was

filled in two hours -- filled ceiling high. One other big building - a used auto parts building out at the edge of town - probably a hundred feet long and sixty feet wide, with 14 foot ceiling. That was filled in 12 hours. And at the end of the night we had to open another building that covered half a city block. By the next day at noon it was impossible to get anything in it. In the meantime, we had directed as much as possible past Searcy to the nearby town of Kensett. They opened up the church and received them; opened up their fire station and received them. We had tents set up in Judsonia in the meantime and had some directed to those big tent warehouses. We got open the gymnasium in Bald Knob - you can imagine the size of that building - and had some sent there. After that we had to open a huge warehouse building - it has an enormous amount of space - and it was filled wham! - just like that....

(What proportion of this clothing that arrived would you say was up to the standard you would really want?) Forty percent maybe; sixty percent of it was not good; it shouldn't have come into the area at all. It should have been held and sorted and the worthless stuff discarded and not transported. It's too much wasted motion. It took up the time of I'd say, 500 volunteer workers for two weeks. Maybe more than 500. Women and men as far as Little Rock, Newport, and Conway, beside the folks from Searcy that worked on that proposition alone. They could have been rendering assistance in another form. (Marks and Fritz, Vol. I:259-60)

As these case materials show, the population affected by a disaster is not confined to the immediate geographical area of destruction, death, and injury, but includes all persons who are related to or who identify themselves with persons and organizations in the stricken community. Even in isolated, single-community disasters, the converging people, messages, and supplies originate in many parts of the nation and in foreign countries. Convergence data graphically demonstrate the complex interdependencies and interrelationships of modern societies. They show that the effective use of disaster management is usually national in scope, even when the primary sufferers are in a single community.

Effective control of the convergence process requires not only a broadening of the unit of disaster management but also recognition of the different motives of the convergers. The problem of controlling convergence is often too narrowly conceived as one of blocking or restraining "sightseers," "looters," and other "unauthorized personnel." This type of thinking derives from the mistaken notion that most people who converge on a disaster area from outside have exploitative motives. The incidence of looting and other forms of exploitation actually found in disasters, however, is slight when compared with actions motivated by anxiety over missing kin and friends, sympathy for the stricken population and the desire to help it, and interest in an unusual or unfamiliar event. For these needs to be satisfied, the disaster management must provide adequate information, positive direction, and guidance, rather than indiscriminate restraint.

As far as the Weather Service is concerned, the type of convergence that has the greatest affect on our operation is in the area of communications. Telephone lines often choke up during the warning phase, people calling here and there to see if the warning is real. This phenomena places great importance on adequate backup communications with mass news media and safety agencies.

(2) Uncoordinated Activity

People are quick to organize self-help groups and small emergency organizations quickly develop to meet needs. Fritz (1961:674-76) describes these activities.

Emergent, small-group organizations are often overlooked by the outside observer who enters the disaster area in the first few hours following impact. As he looks over the scene, the behavior of the survivors in the area seems completely irrational, chaotic, and confused. In the physical devastation surrounding him, he sees what appears to be aimless, random, uncontrolled, or conflicting activity on the part of survivors. People are running or driving vehicles in opposite directions, often passing each other without acknowledgement or seeming awareness. Some persons are moving out of the impact area, many others are moving into it. Others are standing around, apparently just looking or talking with each other. Here and there small groups of people are digging in debris, comforting the injured, or attempting to retrieve their scattered belongings. Behavior is so mixed and conflicting that it appears to have no rational pattern.

This lack of familiar pattern and uniformity in action often leads the outside observer to the erroneous conclusion that the population has "panicked." What he is witnessing is not panic, but social disorganization--that is, uncoordinated activity on a general, community-wide or societal level. It is important to recognize that this social disorganization need not indicate personal or small-group disorganization. On the contrary, many individuals and small groups are acting with purpose and considerable control to cope with the problems they face; however, their attention is apt to be focused on the immediate tasks at hand and so they appear oblivious to the more general needs that have arisen as a result of the disaster.

(3) Role Conflict

Another important dimension of human behavior in disasters that is relevant for us to understand is "role conflict." It is important to note that while this conflict causes anxiety, it does not lead to personnel deserting their posts. Once again we use Fritz's (1961:676-78) description of the phenomenon.

As Killian has pointed out, such separation anxiety is also one of the major sources of "role conflict" in disasters:

When catastrophe strikes a community, many individuals find that the latent conflict between ordinarily non-conflicting group loyalties suddenly becomes apparent and that they are faced with the dilemma of making an immediate choice between various roles....

People who had been present in the explosion port of Texas City and in three Oklahoma tornado towns during disasters were asked, among other questions, "What was the first thing you thought of after the disaster struck?" and "What was the first thing you did?"....

The choice required of the greatest number of individuals was the one between the family and other groups, principally the employment group or the community. Especially in Texas City, many men were at work away from their families when disaster struck and presented a threat to both "the plant" and "the home." In all the communities there were individuals, such as policemen, firemen, and public utilities workers, whose loved ones were threatened by the same disasters that demanded their services as "trouble-shooters." Even persons who had no such definite roles to play in time of catastrophe were confronted with the alternatives of seeing after only their own primary groups or of assisting in the rescue and relief of any of the large number of injured persons, regardless of identity. Indeed, only unattached persons in the community were likely to be free of such a conflict. (Killian, 1952:309-14)

Most people quickly resolve this conflict in favor of loyalty first to the family or other intimates, and only then turn their attention to larger and more impersonal social group loyalties. For people who have clearly defined responsibilities in the disaster, however, the conflict often persists and causes profound psychological disturbances.

Most people in disasters do not experience equally urgent or intense conflicts between family loyalties and other responsibilities. Moreover, the common initial choice in favor of family loyalties does not preclude a quick shift back to larger, community-oriented activities or roles once the safety or condition of one's family has been established. S. H. Prince's observation in the Halifax, Nova Scotia, explosion of 1917 that "the earliest leadership that could be called social, arising from the public itself, was that on the part of those who had no family ties" is not generally substantiated by more recent disaster studies. In fact, the weight of evidence suggests the reverse: that the earliest, most active, and most persistent leadership, at least in small groups, arises from disaster survivors who have the heaviest family role responsibilities.

In the White County, Arkansas, tornado, for example, males who were heads of households containing dependent members (children under 15 years of age or dependent adults aged 65 or over) played the most active role in community rescue and relief activities. They were more highly oriented to the general community and its needs than were people in other household roles (for example, male household heads without dependents) or males who came from outside the impact area. Their greater stake in the community and its restabilization may help explain why these men are more likely than those without dependents to take an immediate, community-oriented rescue or relief role.

Role conflict has never been a factor during a warning period in the Weather Service and this is a personal tribute to personnel who continue to man their posts, come what may. Weather Service personnel have tracked tornadoes by radar to within a mile or less of their home but kept on with their important job of warning the public of the impending danger. This happened at both Centreville, Alabama, and Athens, Georgia, the spring of 1973 and has happened at other offices with previous storms.

SUMMARY

In the course of chapters two and three we have discussed what really happens during disasters. We are still, however, on a very general level.

You should keep in mind that our intention has not been to give you any kind of exhaustive knowledge about disasters. Our goals are to give you an overview, a perspective, and some specific knowledge about the area. If you have captured that substantive knowledge and an "appreciation" for what kind of behavior really goes on during disasters, we believe the presentation has been successful.

INDIVIDUAL ACTIVITIES

1. Which nation received the greatest number of disaster impacts in the period between 1947-67?
2. Give three reasons why you should show some caution in accepting some of these comparative figures as more than approximations.
3. Give three reasons for the inconsistent ranking of nations on categories of number of impacts, loss of life and average loss of life.
4. Has the trend in loss of life from disasters in the USA generally been upward or downward since 1900? What about the trend in property damage? Why are these trends going in the directions they are?
5. Suppose you were trying to sell your local city council on the idea of preparedness for disaster. Write a brief outline of a speech you might deliver. Make sure you write one sentence summarizing each of your key points.

6. Select three disaster agent characteristics. Define each and discuss how it relates to warning.
7. Make a list of the three types of disaster agents that are most common to your area, and discuss the kinds of secondary threats for which you need to be most alert in each case.
8. Choose one of the "three important disaster behavioral patterns" and write a paragraph about what specific problem your WSFO, WSO or RFC may face because of it. What contingency plans would you make to meet the problem?

CHAPTER IV.

ONE GOOD ORGANIZATION IS NOT ENOUGH: THE WARNING SYSTEM

CHAPTER GOALS

At the end of this chapter you should:

1. Have a perspective on warning as a system;
2. Understand some of the principles involved in each stage of the process and the components that make up the system;
3. Be able to view your WSFO, WSO or RFC as a component in a larger system.

QUESTIONS

1. What are the three key stages in the warning process?
2. What are the key organizations involved in the warning process?
 - (1) At which stages do particular organizations become most prominent? For example, in which stage would the mass media probably become most heavily involved?
 - (2) Are there organizations in your community which are overlooked in the warning system?
3. What problems in each stage of warning might have an affect on your WSFO, WSO or RFC?

THE WARNING SYSTEM

The last two chapters have dealt with disasters in general, with some specific references to warning of disaster threat. In this section we will concentrate on warning, an area of disaster response in which the NWS plays a major role.

The definition of warning that we have been using is "the transmission to individuals, groups, or populations of messages which provide them with information about (1) the existence of danger, and (2) what can be done to prevent, avoid or minimize the danger. Warning, then, is an alert to danger and the call to action.

It becomes clear to anyone who has studied warnings that the best worded message possible will not be effective unless it is supported by an effective warning system. Our intention here is to discuss that system and its parts.

An Overview of the System

Warning, in this work, is conceptualized from a systems perspective. Warning is viewed as a process that is the product of a system. The process has certain stages, for example, detection, prediction and dissemination. The system has certain components, for example, police departments and civil defense organizations. These stages and components are singled out for analysis, but it should be kept in mind that we are discussing ongoing processes rather than accomplished acts and inter-related parts of a system rather than discrete entities.

Disaster warning conceived in such a manner helps to explain the interdependence of various activities which comprise it. Thus, we become aware of the possibility that an inadequacy, or breakdown, in a certain part of the disaster warning process may result in the failure of the system as a whole. Similarly, a modification in one aspect of a warning system may result in change in another part of it.

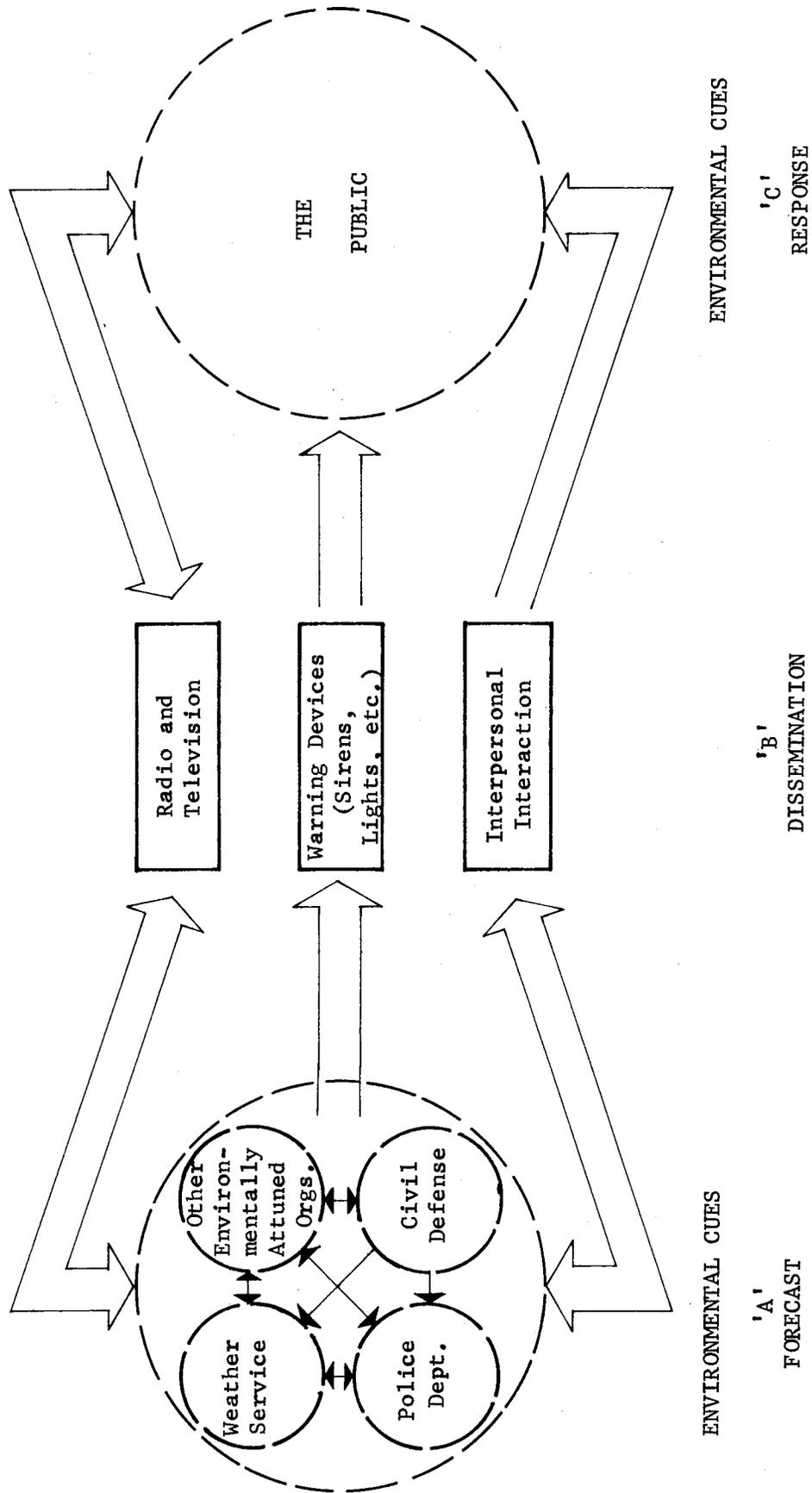
The desired consequence of a warning system is, of course, a successful public response -- a response which, given the maximum preparatory, protective behavior on the part of those who reside in the target area, may limit the devastating effect of the agent. Such a response occurs only to the degree that each of the parts of a warning system makes an adequate contribution to the process.

In order that "problem" areas may be identified, some of the more important aspects of the warning system are presented here in outline form. There are a number of references in the literature that treat this subject rather thoroughly. Therefore, we will use only enough detail to give the reader some sense of the systems' approach.

In its simplest form, the warning process may be conceptualized as consisting of three parts: (1) forecast, (2) dissemination and (3) response. Figure IV - 1 presents a diagram of the warning system.

The forecast stage of warning is that stage in which "environmentally attuned" organizations are involved in the collection, collation and evaluation of threat data. The input at this stage may be from the local organization or from some external organization, for example, the Weather Service Office (WSO) may receive word from Severe Local Storms (SELS) or from National Hurricane Center (NHC), depending on the type of disaster agent. The output is a warning message sent to disseminating agents, for example, mass media, warning devices, schools, etc.

FIGURE IV - 1



THE WARNING SYSTEM
 (Adapted from Wenger and Parr, 1969:32)

The dissemination stage of warning involves the passing of warning on to those individuals and groups who need to be informed. Of the many aspects involved in this stage, the following three appear to be particularly salient: the decision to warn, the dissemination of warning and the warning message.

The response stage of warning includes such phases as reception, interpretation or evaluation, reinforcement, action and feedback. Those receiving the message may be thought of in community, group or individual contexts.

Figure IV - 1 presents a diagram of the warning system. Subsystem "A" includes those organizations that as a part of their day-to-day functioning are "environmentally attuned" and are usually involved in forecasting and deciding to disseminate warning messages. These organizations form an "open system," are interrelated both through reciprocal functions and communication channels, and have external ties outside of the community to state, regional and national organizations. Initial warning cues often enter the warning system as inputs at this point. Inputs come from (1) information received by these organizations from external community organizations (e.g., SELS and local weather service) or (2) from directly perceived environmental cues. The channels along which the warning message is communicated from "A" to the public "C" is labeled "B". These channels of dissemination are (1) radio and television, (2) warning devices and (3) interpersonal interaction. It should be noted that the public, "C", also may receive warning cues directly from the environment by direct observation. The three main warning stages of forecast, dissemination and response roughly correspond to the system elements "A", "B", and "C".

The forecast, dissemination and response stages may each be thought of as subsystems of the larger warning system. Each has its inputs, outputs, controls, filters, etc. Because of law, history, appropriations and expertise, organizations hold responsibility and become involved in particular parts of the system. For example, the NWS is involved to a greater extent with forecast than response, and Defense Civil Preparedness Agency (DCPA) and Federal Disaster Assistance Administration (FDAA) are involved with response rather than forecast. It should become clear, then, that one of the central problem areas in warning is that of linkages, or interfacing, between the organizations specializing in particular subsystems. In other words, one of the central problems in warning is making a total system from a number of subsystems. There are legal, traditional, appropriational, expertise, personality and contextual (environmental) concerns to be considered in bringing these subsystems into an efficient warning system.

Summary and Implications

The idea of a systems approach to warning is used throughout this program. We have spent some time clarifying what we mean by these terms in order that we may have a common base of understanding.

A general thesis that we want to emphasize again is that warning is a complex system. One organization is not enough to make a system. Indeed, any number of organizations may not be effective in warning unless they are linked as a system.

An Analysis of the Warning System

A detailed elaboration of the warning system could fill volumes. What we are attempting in this section is to highlight a number of particularly important aspects of the system. Our analysis will be divided into sections concerning forecast, dissemination, response and feedback.

FORECAST

This is the part of the warning system in which the NWS becomes most involved. It is also the part of the system that appears to be the most efficient.

We begin the discussion of the forecast acknowledging that we are having to warn people using information that is not exact. The science of forecasting places certain limitations on information inputs at this and later stages of the system.

(1) Balanced Forecasting

The constant goal of the forecaster is to reach the place where he neither overwarns nor underwarns. Of course this is a goal that can only be approximated. There are penalties to be paid for erring in either direction. The penalty for overwarning is the insensitizing of the population. The consequences of underwarning are loss of life and property. There are, then, consequences for erring in either direction, but the more serious of these would seem to be the consequences of underwarning.

(2) The Ranking of Disasters

There has been some tentative exploration of the feasibility of ranking disasters. One of the problems that appear in the literature is that of deciding on the seriousness of a disaster threat. The ranking of hurricane threats in forecasts to the mass media is currently being tried on an experimental basis. The intent is to see if a ranking system will help mass media

recipients separate the really important warnings from the less important ones. There are a number of possible difficulties with this system, but it may prove to be of benefit. The possibility of applying a similar approach to the public at some future time should not be ruled out.

(3) The Decision to Warn

At several stages in the warning process there is a decision to pass the warning along to others. During this stage, the decision to warn means forecasters must pass along information that may not be consistent, complete or unambiguous. Given the present development of the science, it becomes necessary to pass warning along before the NWS can be certain about all the dimensions of the disaster agent or its possible effects. This interferes with accurate and balanced forecasting, but it has even more serious consequences for the later stages of warning. Those consequences will be discussed in the section on dissemination.

(4) Feedback

The importance of feedback at each stage in the warning process cannot be overemphasized. Feedback may be thought of as short term and long term.

Short term feedback is that which comes back from the field immediately prior to disaster impact, and gives information about the interpretations and actions of the recipients. This is the basis on which new warnings, corrected in terms of responses to the first warning messages, may be issued. This is easier to do in certain types of disasters than in others. For example, feedback prior to a hurricane threat would be easier to establish than feedback prior to a tornado threat.

Long term feedback provides similar kinds of information about the interpretations and responses given to forecasts by the recipients. In this case, however, it is used for long term evaluation and planning for the future.

While this is an important function, it often appears to be on an unplanned and ad hoc basis. It would be helpful to have a planned program for feedback on both the short term and long term basis. Some of the groups that might be included in this are news media, public safety agencies, departments of public works, and the general public. It is only through planned and reliable feedback that one can evaluate the warning system in order to make it more efficient.

(5) Summary

Forecasting is the process in which the NWS is most heavily involved and, yet, it is not discussed at great length in this chapter. There are a number of reasons for this: (1) it is one of the more efficiently functioning processes within warning, (2) to examine the intricacies of the process would demand much fuller treatment than this chapter can permit, and (3) the emphasis of this program remains on the total system. The relative brevity of the discussion does not mean that the forecast stage is not viewed as essential. It is the foundation on which the system rests.

DISSEMINATION

The dissemination stage of warning involves the passing of warning on to those individuals and groups who need to be informed. The discussion of dissemination is divided into sections on (1) the decision to warn, (2) communication models, (3) normalcy bias, (4) limited perspective, (5) sensitization, (6) other general principles of dissemination, (7) mass media and dissemination, and (8) problems of dissemination.

(1) The Decision to Warn

At each stage in the warning process there is the decision to pass information along to the next stage. Nowhere is this more crucial than in the dissemination stage. This is where the information moves from the forecast unit to other units within the organization and to the public.

As discussed in an earlier section of this chapter, there is a danger in overwarning and underwarning. If responsible officials, after receiving information concerning an emergency, however ambiguous it may be, fail to call for evacuation, they may be held publicly responsible for loss of life and property. If, on the other hand, they call for evacuation too frequently, and there is a long period when disasters fail to materialize, they may be held up to public criticism and ridicule with a resultant loss of effectiveness. Such a problem is well documented in the literature; Fritz's (1961:664) comment is typical:

When people have had no recent experience with disaster or cannot actually perceive the danger in their immediate surroundings, successful public warning is much more difficult. The difficulties often start with the persons or agencies who are responsible for detecting the danger and issuing the warnings. These agents are usually reluctant to issue a specific warning until they are reasonably certain that the danger will actually materialize. In many cases, waiting for this degree of urgency only delays the warning until it is too late.

Nowhere in the warning process is the problem of error in forecast information more crucial than at this juncture. The fact is that those responsible for passing information along must work with information that is of a probabilistic nature. The place a disaster agent will strike, the exact time it will strike and the force with which it will impact must all be stated in probabilistic language. This means that local officials, those ultimately responsible for warning the public, often must operate with information that is incomplete, when time is of the essence, and when their decisions may have life or death consequences. It is no wonder, then, that local officials sometime hesitate, and that hesitation may make the difference between a successful and an unsuccessful response to disaster threat.

A number of considerations affect whether local officials will decide to alert the general public and call for protective action; among them are: (1) the nature of the information received from sources outside the community, e.g., the NWS, (2) changes in the community's environment that can be observed locally and can indicate impending disaster, e.g., increasingly high winds and water levels, (3) the past experience of officials, and (4) the anticipated reaction of the public, particularly in the event of a false alarm.

One of the latent functions of community education programs concerning disasters may be that they make the public more aware of the importance of warning and, therefore, more understanding of miscues by officials. While a number of studies have shown that education programs do not have the effect that officials would wish, it certainly seems plausible that they would at least create a certain preconditioning for the possibility of disaster. Thus, they should make the decision to warn somewhat easier.

(2) Communication Models

It would appear that "warning disseminators too often assume a simple stimulus-response (S-R) type of communication to be adequate." (Brovillette, 1966:36) A more satisfactory communications model is a stimulus-actor-response (S-A-R) model. In this model, a stimulus (for example, a radio broadcast) is sent to and received by an actor who brings his present situation and past experiences to bear in deciding whether danger exists and the proper response to take.

The S-A-R model has greater utility than the S-R model, but it is also more difficult to apply. Charles Fritz (1961:66-67) outlines the kinds of considerations used by an actor in deciding whether danger exists and the proper response to it.

Many of the difficulties in obtaining the desired response to warning stem from an oversimplified conception held by persons issuing warning information. They often conceive of warning as a direct stimulus-response type of communication, in which the person issuing the warning gives the signal "danger" and people automatically respond as though danger were imminent. This view ignores the many social and personal influences that enter into people's interpretation of danger and their response to it. In deciding whether danger exists, people use their past experience ("the tide never got higher than that before"); their present direct perceptions of the physical environment ("it looks like just another bad storm"); their perceptions of how others are responding ("Nobody else seems to be doing anything about it"); and their comparison of their own information and perceptions with people who are significant to them in their daily lives ("Tom says he thinks we had better pack up and leave right now").

In deciding how to respond to a danger signal or warning message, people also take into account the nature and strength of the threat ("Will it strike here or elsewhere? Is our life in danger or just our property?"); the time before onset ("How long do we have before it strikes?"); the effectiveness of available countermeasures ("What can we do to protect ourselves and how much good will it do in reducing or preventing our losses?"); and the cost ("How much will it cost--in time, effort, personal sacrifice, or money--to take the available countermeasures?"). In an inexperienced or untrained population, the outcome of this complex process may or may not result in the public responses intended by the warning agent.

The considerations listed above represent only a partial list of the kinds of questions the sender of the message must consider. Their relevance has been shown time and again, and there is evidence to support the claim that warnings have been made less effective because they were not given adequate consideration. This, then, raises the issue of whose responsibility it is to address these kinds of questions.

Obviously, a list of questions such as those cited above cannot be answered on the spur of the moment. Such a list is difficult to address during normal time operations, and nearly impossible with the increased workload that a disaster threat brings. There is, then, the need for prior planning so that these important considerations will not be on an ad hoc basis. In that planning, an S-A-R model of communication would seem to be far more satisfactory than an S-R model.

(3) Normalcy Bias

Among the many considerations the disaster planner and disseminator of warnings must take account of is what we have termed the "normalcy bias." By normalcy bias we mean the tendency of people to err on the side of normalcy. People interpret signals of warning within a framework that suggests conditions are all right until proven otherwise. Williams says that "the burden of proof seems to be on the warning system." Fritz (1961:665) says: "Even where the existence, nature, and time of the danger can be adequately forecast, it is difficult to secure public acceptance of warning messages. People tend to seize on the vagueness, ambiguity or incompatibility in the warning message that enables them to interpret the situation optimistically. They search for more information that will confirm, deny, or clarify the warning message, and often they continue to interpret signs of danger as familiar, normal events until it is too late to take effective precautions. In brief, most people would rather believe they are safe than in danger; and the burden of proof that danger is imminent rests on the people, agencies, or systems that disseminate the warning."

Even when the warning message is as free of ambiguity as possible, there are difficulties presented by the normalcy bias. The recipients will seek further confirmation of the credibility and urgency of the message. This is done in a number of ways, only one of which is the issuance of further messages. People who are at home will often check to see what action their neighbors are taking, and people who are in a work or school setting will generally wait for some cues from the organization. In the absence of these cues the tendency is to interpret the situation as normal.

(4) Limited Perspective

Ernie Pyle once commented that war was that which was five feet on one side of you and five feet on the other. This same type of perspective problem often takes place in disasters. For example, one of the communications problems encountered in disasters is that messages may not be sent because the increased demands within organizations put strains on personnel so that they have little time left for thinking beyond their own duties. This may occur within organizations, e.g., one division does not let another division know about the emergency, or between organizations, e.g., the ambulance service personnel are so busy preparing for possible calls that they do not think to notify hospitals in the area or assume they have been warned by other organizations.

There is an increased workload within the organization in times of emergency. Added to this are the convergence of outside inquiries and calls following the issuance of the initial watch or warning message. This is particularly true in the case of disaster agents that allow for a lengthy warning period, e.g., hurricanes. Extra demands put a strain on essential duties such as interorganizational liaison, and the maintenance of a broad perspective that includes more than the most immediate tasks to be performed. A special effort must be made to maintain an appreciation for the total system and the kinds of duties that are performed there.

An example of a program addition that met the kind of problem discussed in this section is one describing the public information and operations during Hurricanes Fern and Edith in 1971.

During the two recent hurricanes, Fern and Edith, a very effective link was added. Mr. Bice, Regional Preparedness Meteorologist, came down to assist us. We found the ideal place for him was in the civil defense headquarters. He remained throughout most of the storm intervals at the headquarters. He was continuously and immediately available to respond to questions regarding meteorological questions and of course stayed in close touch with us regarding locally unique problems utilizing the civil defense communications. He appeared on television in innumerable two or three minute spots, sometimes there were several in an hour. Often he appeared with the civil defense director or with some other official.

The entire area response was one of appreciation to the NWS for this man's services. We have always had additional help from the Southern Regional Headquarters when we needed it, but this is the first time the people were aware of it. Public officials, the news media, industry and the general public were impressed by this direct and continuous availability.

On the basis of this recent experience, especially, I would recommend a similar public information help from the Southern Region Headquarters. The fact that a station has a small staff does not necessarily indicate that a small population or few news media need service. The effectiveness of a continuously functioning public information officer that could be free to serve as Mr. Bice did cannot be minimized. There are some problems because the "imported" man may not be aware of local problems and people. However, by getting briefed first and often by the local staff, and by using the kind of judgment exercised by Mr. Bice, the end result is a great gain in public relations and a more effective warning system. (Weather Service Office, Port Arthur, Texas, 1971)

The use of outside personnel, the use of noncritical personnel within the organization, or similar type planning may help meet this common communications problem. Specific ways of handling these difficulties may vary with the structure and staffing of the particular weather office and the type of emergency, e.g., tornadoes and hurricanes, but the principle is the same. In order to assure proper intraorganizational, interorganizational and public communications and program linkages, it is good to have particular personnel, free from other duties, concentrating on this aspect of warning.

(5) Sensitization

Riley (1971:55-56) summarizes the concept of sensitization in the following sentences. "If an individual goes through a storm disaster, either hurricane or tornado, he will be more sensitive to warnings than if he did not have this firsthand experience. Also, if during a warning event an individual receives information that makes him think his exposure to danger has increased, he will become more sensitive to subsequent statements."

He goes on to elaborate on the concept:

I. L. Janis (1962) proposed the term sensitization to include both the long term effects of personal experience and the short term effect of convincing warning.

As examples of long range sensitization he cited the increase in the number of storm cellars noted by Moore in San Angelo following the 1953 tornado. The evacuation of Cameron Parish during tropical storm Ella in 1958 and Hurricane Carla in 1961 following the devastation of Audrey in 1957 is a classic example of the long range influence of sensitized warning behavior.

Near misses also produce a sensitizing effect. Hurricane Florence was expected to hit Panama City, Florida, in September 1953 and 10,000 people followed the advisories and evacuated. Fortunately for Panama City, Florence hit with main force about 100 miles away and residents experienced only a mild windstorm. Those who had ignored the evacuation warning lost nothing and were much less inconvenienced than those who did.

L. M. Killian (1954) conducted a series of interviews and found that the "wolf calling story" does not always apply to unverified warnings. The vast majority of those that evacuated said they would do so again under similar conditions. Killian found the same reaction with individuals who did not evacuate. Forty percent stated

unequivocally that they would evacuate if a similar threat occurred again, even though they did not evacuate during Florence. The fact that news media showed the hazardous conditions that did occur nearby was the sensitizing factor. As noted in the first chapter, R. P. Mozeney, in charge of the Corpus Christi Weather Service Office, found the same reaction following Beulah in 1967. There are no comprehensive surveys of tornado warning when no storm materialized but the negative aspect of this type of a situation no doubt does follow the "wolf calling story."

The term sensitization has not been widely adopted in connection with short term behavior; however, Janis (1962) has stated a hypothesis which seems consistent with survey evidence: "when preliminary warnings provide information that heightens awareness of potential vulnerability to an impending disaster, the recipients will become more sensitized to new warnings, as manifested by a general increase in their fear reactions to all relevant threat cues and a corresponding increase in vigilance reactions to subsequent emergency warnings about the imminent onset of danger."

(6) Other General Principles of Dissemination

- (a) Those responsible for disseminating warning have been criticized in the literature for placing too much emphasis on the technical and mechanical aspects of the system. The criticisms do not appear to be against the use of the most up-to-date engineering practices, but rather they are concerned about an overdependency on mechanical systems. The best of equipment is only effective when it is handled by efficient personnel. Excellent engineering may help to take up some of the slack of an inefficient organization and an excellent human organization may make up for shortcomings in the mechanical system, but the studies of warnings in disasters indicate that it is a rare instance when either the mechanical system or the human system can do it alone. Each system is a necessary condition for effective warning, but neither is a sufficient condition for effective warning.
- (b) There should be more than one medium of dissemination. Not everyone, for example, watches television and relatively few are watching after certain hours of the evening. Sirens, bells, and door-to-door canvassing are additional means that have been used.
- (c) It is unwise to assume a mass appeal stimulus without organizational support will result in the desired response. In order to increase the chances of the desired response occurring it is important that a number of supporting organizations be a part of the warning system.

(7) Mass Media and Dissemination

The single category of organizations that is most central to warning is the mass media. There are a number of "unknowns" concerning the best means of working with the mass media, but there are also a number of clues to effective use of this medium that may be culled from the existing literature.

- (a) The mass media is an intermediary organization, that is, the disseminator of information that is given to it. Thus, the upgrading of the end product, organizational and public understanding and compliance to warning, is a cooperative venture. This section emphasizes the improvements that may help the mass media perform its task more effectively. Among these inputs are the following:
- (1) Commercially produced radio and TV spot announcements depicting the threat and recommended protective actions, to be aired both on a year around basis and at the time of impending disaster;
 - (2) Topographical maps showing areas vulnerable to various storm-surge levels;
 - (3) Kits of coded, standby messages from civil defense, police, and voluntary agencies, pre-positioned in radio and TV stations for selective use when the official source gives the "go" signal;
 - (4) NWS meteorological teams trained in broadcasting techniques -- and freed from operational responsibilities -- who can go on the air when requested to do so by the broadcast media; and
 - (5) Arrangements for broadcasters and the press to operate out of National Weather Service facilities when the situation becomes critical. Many of these actions are being taken presently, particularly in hurricane prone areas. Perhaps these actions can be expanded. (E. L. Quarantelli, 1972a:13)
- (b) The effectiveness of the media as a disseminator may be helped by certain actions being taken by the media itself. Among these actions are the following:
- (1) The capability to broadcast warning messages in languages other than English if the local population contains a large non-English speaking minority;

- (2) The publication, both at the start of the annual hurricane season and at the time a definite threat is perceived, of special newspaper sections devoted to the threat and recommended protective actions;
 - (3) Balancing information to the public to avoid crying "wolf" while insuring that if a hurricane threatens to exceed in violence previous storms experienced in the past in the same area, this fact will be emphasized in all public advisories; and
 - (4) Recognizing that there are -- particularly in metropolitan areas -- transients and newcomers to the community who need special attention because they may not have previously lived in a hurricane-prone area and cannot, therefore, be expected to have even the most basic knowledge of hurricane effects or how to protect against them.
(E. L. Quarantelli, 1972a:14)
 - (5) Other matters that may be considered from the perspective of mass media disseminators themselves are such things as the ability to change their broadcasting format. It has been suggested in other sections of the report that change in format emphasizes the importance of a particular warning as much or more than the content of the warning itself. If the threat is important enough to go to special format, then, it is certainly an emergency. Where possible broadcast media ought to take this into consideration. Past experience has shown that it is much easier for a radio station to be flexible in changing format than for a television station, but a number of television stations have also made provision for this change of format, e.g., broadcasting directly from NWS headquarters.
 - (6) The use of authorities may reinforce the importance of warning. For example, popular television personalities might explain how they have interpreted the warning and what protective action they are taking. People such as government officials or National Weather Service personnel might be brought on to the air to add credibility to the message.
- (8) Problems of Dissemination
- (a) The effectiveness of the dissemination process can only be determined through an effective system of feedback.

- (b) Interorganizational linkages are important as forecast leads to response through disseminating organizations. Some of the systems that appear to work most effectively are those where personnel have had long years of experience in working together. In these kinds of situations smooth working relationships have been developed.
- (c) There is not always a consistent set of shared boundaries between WSO's and WSFO's and the mass media. It may be, too, that citizens in a particular threatened area may be listening to broadcasts from a city outside the threat area. In the case of Hurricane Camille, for example, a number of people along the Gulf Coast were listening to a popular New Orleans station. This station was far enough away from the threatening eye of the hurricane that it did not handle some of the emergency warning with the same urgency that the stations located farther east did. Attention should be paid to this kind of difficulty in planning the warning system.
- (d) Listening publics and the staffing of mass media organizations vary according to the season of the year and the time of the day. It is rather easy for NWS personnel, who work on an all day and every day schedule, to assume that other organizations do the same. There have been instances when teletyped warnings were not read until after the disaster agent struck because the one or two personnel working on late night shifts for a broadcast station were busy with other tasks.
- (e) There are certain aspects of rural/urban differences that are relevant for planning for the disseminating of warning. The differences listed here are in terms of generalities; there may be idiosyncratic situations in particular communities. Difficulties encountered in rural areas are that there are greater distances between people and this may make for some difficulties in warning. Mass media access is not always as good in these areas particularly television access, although cable television and other mechanical improvements are cutting down this difference. The number of organizations in some rural areas is not great and so there is a greater dependency on one or two organizations. If these organizations do not function, warnings may not go out. For example, if there is one rural sheriff that is responsible for warning and he does not do his job, or cannot be contacted, then the whole warning system may fail to function efficiently.

There are also particular difficulties that tend to arise in urban areas. The greater differentiation in the organizational structure of a community means that there are more organizations that need to respond in concert. This makes for greater problems of coordination and cooperation. There is generally speaking a greater heterogeneity of population and this means that there are differences in population sub-groups that need to be given some attention. For example, there may be foreign language groups, and there may be minorities that are alienated from the more traditional authority structure of the community. There may also be a dulled sense perception in that urban populations receive a number of stimuli daily. And finally, there is the question of sheer population size and the problems that it causes for such things as evacuation. There may need to be more alternatives made available to the public.

RESPONSE

Warning is A CALL TO ACTION. If forecast and dissemination are not followed by response, they have not accomplished their purpose. This section discusses (1) the desired response, (2) patterns of response to threat and warnings, (3) group orientation and individual orientation, (4) the problem of rumor, (5) hindrances to response, and (6) suggestions for improving response.

(1) The Desired Response

The desired public response may be broken down into two major headings:

- (a) accurately understanding the existence of danger;
- (b) responding in a manner that will prevent, avoid or minimize the danger.

On occasion it is not clear what is the desired public response. In a number of situations there may be more than one possible response to disaster threats. Evacuation, and/or seeking immediate shelter, and/or cutting down the impact of the disaster agent (e.g., building dikes) may be desired responses. These responses and the means of making them possible for the general public should be worked out with key organizations and the general public. In any number of disasters alternative responses have not been planned and the individual citizen has had to fend for himself.

(2) Patterns of Response to Threat and Warning

Williams (1964) suggests, "The way an individual responds to warning is apparently a function of the way he defines the situation. This definition seems to include the following factors: strength (how likely is the danger to materialize, and how serious will be the loss if it does?), the time element (how long will it be before one has to decide, and how long will it require to take effective protective action?), the cost of protective action (economic, psychological, social), the presumed effectiveness of available counter measures (will they do any good against the threat?)." Many reports suggest that this pattern of reasoning is followed in an informal way. Unconscious and irrational factors enter the process and it is rare that any formal evaluation of the four points is actually made. If there is time, most warning recipients try to gain additional information on the threat situation and they nearly always try to secure a confirmation of the original warning. Williams suggests that any serious warning needs to have a second message that merely says: Yes, this really is a threat.

In his later article Withey (1964) traces the social evolution generated by increasing threat. "Many threats create an initial feeling of camaraderie in exposure to a common fate. Increased seriousness of the threat leads to a recruitment of allies and a mobilization of resources, duties, and commitments on the part of others. Continued threat leads to greater organization and a tolerance of central authority. If this is ineffective, scape-goating may occur; and if it is inadequate, social disorganization sets in and is replaced by social organizations of units, cliques, gangs, and so forth, at a smaller level. If these are inadequate, a state of every-man-for-himself signifies complete disorganization and extreme threat."

Among several models of behavior in the face of a threat, that proposed by I. L. Janis presents an easily understood pattern. Warning information and environment cues give rise to a reflective, or a thoughtful, fear in the individual. This fear gives rise to two needs: need for vigilance and need for reassurance. These two opposing needs lead to a range of behavior extending from indiscriminate vigilance to blanket reassurance. A compromise formation is the mid-point between the extremes and is suggested by Janis as normal behavior to an adequate warning. In every warning situation, however, there will be individuals at the vigilant or the blanket reassurance extremes. Although there is no way to moderate these extreme individual behavior patterns, Janis proposes four situation factors that influence behavior of the entire population toward either increased vigilance or increased reassurance:

1. Anticipated inaccessibility of existing escape routes. Vigilance increases if warning or physical signs suggest that a currently available route will be cut off when the threat materializes.
2. Anticipated needs for self-initiated action. Vigilance increases if the individual thinks adequate protection for himself and his family depends on self-initiated action; it decreases if he thinks he can rely on others to initiate the action.
3. Anticipated restriction of activity. Under any threat condition, even those where a person does not expect his own activity to play a significant role in reducing his chances of being victimized, vigilance increases if the individual thinks his own activity will be restricted at the time of the hazard.
4. Anticipated restriction of social contacts. Vigilance increases if the individual thinks he will be out of contact with authority figures, members of his primary group, or other significant persons upon whom he is emotionally dependent.

Official warning messages seldom touch upon any of these situational factors except escape routes. Informal comments by mass media often slip into the personal relation areas indicated in the last three points and consideration of Janis' points clearly suggests the emotional confusion that can be stirred up in those individuals who are naturally prone to excessive vigilance.

(3) Group Orientation and Individual Orientation

A third general concern is the question of the kind of audience to be reached by those concerned with warning. Should appeals be addressed via mass media asking for individual action or should there be greater effort at group actions.

Fritz (1972) suggests at least two basic reasons for "non-compliance to hurricane warnings and advisories." First, there is non-compliance because "the information, perspectives, value systems and definitions of the situation of the intended recipients of the warning messages differ from those possessed by the persons responsible for detecting the danger and disseminating the warning." This, of course, is a large part of what this overall program is all about, that is, calling to the attention of people responsible for warning some of the key social variables to be considered in warning. Some attention has been called to these variables earlier in the booklet and they will be referred to in later sections.

The second reason for non-compliance "is the error assuming that disaster preparedness and warning programs should be based on appeals to people in the mass to undertake self-protective actions." It is this second reason that is discussed in the next few paragraphs.

Programs designed to prepare people for uncertain future threat must compete in the market place of immediate and pressing human concerns--the day-to-day problems of earning a livelihood, protecting oneself and family members from the daily dangers to life and health, and securing recognition, response, and status in relations with members of one's personal community. This competition is adherently unfavorable to communications that are oriented to the future rather than the present. This is especially true when the future conditions referred to are unpleasant or painful to contemplate, when there are no present societal rewards for the personal costs and sacrifices involved in making preparations, when there is no way of realistically testing whether preparedness measures are effective, when there seems to be additional time before one has to make a decision, and when there is no apparent way to come to grips with the problem in terms of present resources or manageable units of activity.

Both the studies of natural disaster and the public opinion surveys on civil defense readiness have consistently shown that less than ten percent of the population will build shelters or take other realistic preparatory measures for future disasters when the program of preparation rests primarily on individual initiative. Follow-up studies of both public and industrial accident-prevention programs have produced similar results. (Fritz, 1972)

If Fritz and others are correct, and the evidence seems to indicate that they are, there are a number of implications that may be drawn from their position. Any amount of warning that relies too heavily on mass appeal in an attempt to secure individually-motivated self-protective action is bound to fall far short of its goal. That is not to say that the individual has no responsibility, nor does it imply that there is no effective action an individual or family can take to protect itself. It does speak, however, to the ordering of priorities. More attention needs to be paid to a number of means of communication in addition to mass media. It suggests also the importance of developing community plans and organizational support. And it brings us back, once again, to the importance of system planning.

(4) The Problem of Rumor

Riley (1971:22-23) considers the problem of rumor development.

When a warning is disseminated in a fairly convincing manner, recipients develop a need to do something, even if it is just to talk about what they are going to do. The need to release this tension, as well as the more practical need to set up an action plan, creates a potential for rumor. And rumor is an important factor in warning reaction.

Rumor can impede protective action, thus increasing storm loss, or rumor can encourage premature or overly protective action, thus conditioning recipients to laxity in subsequent warning periods. Regardless of the direction of the rumor force, the degree of rumor activity seems to be proportional to: severity of the threat, relative ambiguity of information defining the threat, and the lead time preceding the impending threat.

Behavioral sciences have directed many studies of the rumor process to their area of primary interest: psychologists -- accuracy of perception and recall; psychiatrists -- venting repressed impulses; sociologists -- social problem solving. The different perspectives lead to different and sometimes contradictory conclusions.

Viewed through psychological studies, rumor is considered a distortion of serial transmission. A story told in relay fashion by a number of people seldom remains unchanged, thus promoting rumor. Perception and recall ability vary among people as do interests and vocabularies; consequently repetition leads to inaccuracy.

The comprehensive study by Allport and Postman (1947), and validated by many later psychological studies, lists three sources of distortion of serial transmission:

1. Leveling -- tendency of accounts to become shorter, more concise and more easily grasped.
2. Sharpening -- tendency toward selective perception, retention and reporting of a limited number of details.
3. Assimilation -- tendency of reports to become more coherent and more consistent with presuppositions and interests of the subjects.

They also framed the widely quoted formula for rumor intensity ($R \sim ixa$), "the amount of rumor in circulation will vary with the importance of the subject to the concerned individuals times the ambiguity of the evidence pertaining to the topic at issue." In a later study Chorus (1953) divided the right side by (c) standing for critical ability. He intended this to be a measure of "rumor wise," and rumors decrease when people understand the phenomena. For the storm warning problem, training in preparedness coupled with some understanding of the warning process, could be substituted for "rumor wise" with the same desirable end.

Psychiatric studies of rumor have emphasized the importance of personal desire and interest, wish fulfillment, and frustration in the face of an uncontrollable threat. Many of these studies point out that a person who repeats, or modifies a rumor, claims he is only passing on what he has heard and thus disclaims responsibility for the facts. Rumor provides an outlet for releasing repressed impulses; and the contribution of each individual to the formation of a rumor depends upon personal needs. Rumor from this standpoint is something pathological and a rumor-monger is a person with poor adjustments to reality.

Improvised News: A Sociological Study of Rumor by Shibutani (1966) defines rumor from the sociological viewpoint as "a recurrent form of communication through which men caught together in an ambiguous situation attempt to construct a meaningful interpretation of it by pooling their intellectual resources." He distinguishes rumor from other types of collective transactions which occur at times of ambiguous situations as occurring at a lower degree of normalization. This viewpoint rejects a commonly conceived attribute of rumor, that it is based on error. It also rejects the position that rumor is a pathological phenomenon.

For the storm warning process Shibutani states a useful axiom: "If the demand for news in a public exceeds the supply made available through institutional channels, rumor construction is likely to occur." Credibility of the institutional channel is a necessary prerequisite and is implied in the axiom.

(5) Hindrances to Response

- (a) Fritz's (1972) generalization that programs that are dependent on individual response fall far short of their goals is well taken. It appears that recommended protective

measures are not always matched with the available social settings, e.g., "go to a nearby shelter" assumes the existence of such a facility.

- (b) It seems rather clear that one of the major difficulties in warning is the lack of coordination between subsystems that comprise the total system. In many instances particular units and individuals have performed their particular tasks extraordinarily well only to have their efforts frustrated by non-coordination with other parts of the system.
- (c) The matter of legal authority arises in some disasters. In a number of cases officials reported difficulty in convincing people to evacuate. In at least two disaster situations, authorities resorted to ruses to evacuate people. In most areas public safety officials do not have the legal authority to order people to evacuate.
- (d) Other general factors that stand in the way of adequate response are discussed below.
 1. Sociocultural factors are those which develop over time and are "peculiar" to a specific group, organization, community or society. They include such dimensions as past experience with disasters, social class, ethnicity, and religion.
 2. The historical setting is another general factor because disaster agents occur in time. Just such matters as time of the day and day of the week can have profound influence on warning. What is an acceptable warning medium in the early evening may be much less effective late at night, e.g., television. A weekend disaster threat would find large numbers of people in the family setting and many organizations reduced in personnel.
 3. The social situations in which people find themselves during warning vary greatly. For example, an employee at work may need little understanding of the threat if his company has an effective plan for preventive action. He may be instructed to take shelter and do so without fully comprehending why. The same employee, when by himself outside the work situation may be in grave danger because of his lack of understanding.

(6) Suggestions for Improving Response

(a) The use of existing organizations in planning should be given one of the top priorities. For example, businesses, hotels, and churches are accustomed to dealing with groups on a day-to-day basis. These organizations have functioning authority structures, they interact with other organizations on a daily basis, and they are experienced with dealing with the public. It may be good to co-opt such groups into the business of disaster warning. In a similar manner to that in which airlines make safety announcements before each flight, hotels might hand out safety brochures or inform their clientele in some other way about safety factors. This goes counter to the image that some communities are trying to create as havens for sun and sea and undisturbed rest, but these difficulties may not be insurmountable.

(b) The response stage of disaster warning needs both short term feedback and long term feedback. Short term feedback should be able to answer such questions as how well organizations are performing and how well the general public is responding. Long term feedback concentrates on general evaluation of the community response. Such matters as interorganizational cooperation, coordination of efforts and the general public response should be evaluated. Recommendations should be developed from long term feedback for the improving of future community response. A good time for change and improvement in community structures is after the appearance of a disaster. At this time the community is sensitive to the need and outside authorities may be brought in to reinforce and build upon that sensitivity. At a point like this these demands seem immediate and communities are generally more willing to expend the energy and cost involved in adequate preparation. An example of this kind of community improvement is the case of Hilo in Hawaii where following one tidal surge the community made improvements in its warning system that were very effective when a second tidal surge struck. These improvements included the following:

1. Improvements of the civil defense emergency communication system
2. Added staff provided for civil defense
3. Improvement in radio broadcasting was made
4. Remote control tidal gauges were set up

5. Delineation of areas or zones to be evacuated were drawn on charts for public dissemination
6. There was designation of additional shelters for time of emergency
7. There was the publication of warning and evacuation plans on a regular basis so that the community would be aware of these. (Anderson, 1967)

FEEDBACK

A few key general issues related to feedback are discussed in this segment. The impression this writer gets from an examination of materials on disasters is that so much energy is placed on the process of forecast, dissemination and response that relatively little planning and few resources are given over to feedback.

Feedback may be of an immediate nature or a long term nature. The increased tasks placed on warning agencies appears to be among the chief obstacles to immediate feedback. People are preoccupied with other duties. There is also a lack of appreciation for the model of warning that views the process as one that has constant feedback loops. The tendency is to view the total process as a chain of events that develops in a straight line fashion from beginning to end.

One of the major difficulties with long term feedback is that it takes on the characteristics of evaluation. Indeed, this is a large part of what it is. Evaluation can be threatening to personnel of an organization. It can even threaten self confidence to the point where individuals are fearful of taking too much responsibility under pressure. That willingness to remain flexible during disaster threats is crucial to effective warning.

Some specific areas for long term evaluation feedback might include the following:

- (1) Evaluation of VHF radio warning network;
- (2) Evaluation of NWS teletypewriter usage by mass media and other sources;
- (3) Questionnaires to OIC's, MIC's and HIC's about time commitments, priorities, and special problems occurring under emergency conditions;
- (4) Evaluation of how much general information concerning behavior in disasters is known by personnel within the NWS;
- (5) Questionnaires to news media personnel about how they use NWS information and what suggestions they would have for improvement of that information input into their organizations;

- (6) A look at material from other societies for comparison with that in the United States;
- (7) A look at some particularly successful warning systems to see not only what went wrong, which seems to be emphasized in a great deal of the literature, but to see what went right and what positive things contribute to effective warning.

CONCLUSION

We have reviewed the materials pertaining to warning under the headings of forecast, dissemination, response and feedback. A few suggestions have been made in the course of the materials presented, but these have been kept to a minimum because the chapter emphasizes the examination of the system rather than the making of many recommendations. We believe you may want to think about the implications of this overview for your WSFO, WSO or RFC.

INDIVIDUAL ACTIVITIES

1. What are the three key stages in the warning process?
 - a. At which stage is the NWS most prominent at the present time?
 - b. What other key organizations are heavily involved in the same stage as the Weather Service?
2. What are the consequences of (a) overwarning and (b) underwarning? Is it better to overwarn or underwarn?
3. What are some possible reasons for delay in the decision to warn? (List at least three.)
4. What are some dimensions you need to consider in using an S-A-R model in your county area of responsibility? (List at least three.)
5. Write a short essay discussing how you would use the concept of sensitization to make your warnings more effective.
6. List three steps you could take to make media-Weather Service cooperation more effective in your area.
7. What are three means by which you might minimize the likelihood of rumor in warning?
8. Write a short essay on how you might plan to build organized feedback into your warning system.

CHAPTER V.

ONE GOOD MESSAGE IS NOT ENOUGH: THE WARNING MESSAGE

CHAPTER GOALS

At the end of this chapter you should:

1. Have a general appreciation for the importance of content, language, medium, format and source of a warning message;
2. Be able to use the eight "general rules" to make your warning message more effective;
3. Be able to use some basic techniques for good broadcast writing.

QUESTIONS

1. What two basic objectives should a warning message seek to fulfill?
2. How do each of the various dimensions and rules for warning messages help the message to achieve its two basic objectives?

THE WARNING MESSAGE

In the previous chapter we looked at the system which carries the warning message. This chapter examines the message itself.

Warren E. Brown, WSO, Victoria, Texas, recently wrote an excellent paper on the problem of communicating weather information to the public. He said:

"The process of communication, the transfer of a thought-picture or thought-idea from one person to another, presents problems that are difficult if not impossible to overcome. One obvious problem is that of language.

"Our responsibility is to give information about weather and other related matters to the general public and, at times, to special users. By education and environment we primarily focus on the field of weather and other related physical sciences. The general public does not. We are accustomed to the words and phrases of our profession. They are not. In this respect, we have what has become fashionable to call a 'communication gap'. If we can't bridge this gap, we are not doing what we're paid to do. We are not meeting our responsibility. We are not giving the public the

information they want or need. It is clearly our responsibility to learn to communicate, to learn to write in the best way possible, so that our thought-pictures and thought-ideas become their thought-pictures and thought-ideas."

We have included Mr. Brown's paper about writing techniques as an addendum to this chapter.

1. Content and Language

The content of a message is something that needs continual attention. There is a constant danger of assuming too much knowledge on the listener's part. The content should be as specific and complete as possible. For example, following Hurricane Camille, the criticism was made on the Gulf coast that many of the listeners did not comprehend what wind velocity and tide levels in combination can do. It was suggested, after the fact, that it would have been helpful if the general public had been made to understand that the predicted tide level, in combination with the high velocity winds, would produce waves of a higher and more destructive magnitude than any storm ever experienced by the present population. To those familiar with the subject it was obvious what this combination could do, but to the layman it was not so obvious.

The matter of consistency is a primary concern in relating to the message. The information should be consistent and free from ambiguity and contradiction.

Where possible, an effort should be made to tie the message to known landmarks, phenomena and experiences of the population being warned. For example, rather than giving abstract heights of tides and wave action, it might be helpful to tie these into specific landmarks. The people living in a specific community may be told that water may reach the second story of the downtown post office. It was suggested in a panel at the Hurricane Preparedness Conference in Miami in 1972 "that if a hurricane threatens to exceed in violence previous storms experienced in the past in the same area, this fact should be emphasized in all public advisories."

Layman's language should be used. In some reports on warning, particularly with tornadoes, there has been some questioning of the number of terms used in the overall warning process. For example, there is some evidence that the distinction between tornado WATCH and tornado WARNING is not understood by the majority of the population. More than one report has suggested that still another category is needed to convey a sense of urgency about the potential threat. The essential point being made here is not whether these specific examples are to be answered one way or another, but that language must be kept clear and nontechnical.

2. Medium and Format

The NWS has made great strides in automating the transmission of forecasts. Teletypewriters and VHF beam weather information almost instantaneously. There are automatic transmission systems that have the advantage of being continuous, rapid and immediate. These systems seem to have the disadvantage of giving a certain unwarranted sense of security about forecasts being received and acted upon. There is evidence that forecast warnings have run from teletypewriters into wastebaskets unheeded by radio and television personnel. This is a particular danger where small stations are working with limited personnel. Automatic systems can only be as effective as the personnel who use them.

The format with which the message is sent is also of great importance. In some cases the format is seemingly more important than the actual content of the message. For example, in one study of a series of tornadoes it was found that a number of stations made spot announcements of warnings and then went back to their regular broadcast format. Stations that broadcast warnings and also went to special broadcast format reinforced the importance and urgency of those warnings. A normal time format of broadcasting seems to deny the urgency of the situation.

3. Source

The source of information should be official and authoritative. Appropriate steps are needed to increase cooperation between media personnel and weather forecasters. It appears to be helpful to have broadcast media establish direct feeds from Weather Service Offices and/or other official sources of emergency information within the relevant areas or communities.

4. Summary Rules for the Warning Message

- (1) Speed. The speed with which the message is sent is a critical factor. Messages received too late, even though they may meet all the other criteria of a good message, do not allow time for necessary decisions and preparations by community leaders. Therefore, it is often necessary for the message to be sent even though it does not rank well on the suggested criteria that follow.
- (2) Clarity. The message must be as clear and unambiguous as possible. This is particularly true in light of what has been said earlier about the "normalcy bias," that is, people will interpret ambiguous information in the best possible light, thus, tending to take less protective action than recommended.

- (3) **Completeness.** The message should be as complete as possible. The warning should include information about the kind of agent and its characteristics, its estimated time and place of impact, the physical and social damages that are possible and the kind of protective actions that are possible.
- (4) **Source.** The source of the message should be official and well known to the community. Well known newsmen, public officials and NWS personnel have all served in this capacity. There have been difficulties develop in putting NWS personnel on direct broadcasts, but it appears to have merit nevertheless. These kinds of programs have the benefit of reinforcing the message that the situation is serious and urgent.
- (5) **Consistency.** There are a number of messages that go out during a warning. These messages sometime seem contradictory, or at least inconsistent. The series of messages should be consistent so that they add to each other and reinforce each other. They are all a part of one total and, hopefully, consistent warning message.
- (6) **Balanced.** The message should be neither exaggerated nor underplayed. There is a cost for going in either direction.
- (7) **Broad Based.** The message should be written in language that is understandable to a wide range of the population. The audience to which the warning is addressed is quite probably a heterogeneous population. People vary as to demographic characteristics, language, knowledge and understanding of the threat and situational factors. It is a challenge to word a message that will reach all people, indeed, it probably cannot be done. For example, there may be a need for foreign language broadcasts and there may be a need for special messages for groups that are socially or geographically isolated.
- (8) **Explicit and Specific.** Messages should be as specific as possible. When talking about tide levels, for example, it may be helpful to refer to the possibility of floods reaching certain well known landmarks rather than talking about flooding in general. A number of the survivors of Hurricane Camille said they had no real comprehension of what the scope and intensity of such a hurricane really meant when translated into concrete occurrences.

5. Some Unanswered Questions

How can "official" messages be made personal and persuasive?

How can the somewhat technical language of forecasting be made more understandable to the layman?

What is the optimum point of effectiveness in educating the public to technical weather language and translating technical language to lay language?

What language is most effective with which subgroups within the population?

How can warning concerning the possibility of a disaster threat which may strike a particular community only once in ten years be made a solvent, high priority and credible concern?

How can warnings be made locality relevant and specific?

What is the ideal balance of content related to the disaster agent, possible physical and social consequences and preventive and protective actions to be taken?

What are the best content and format of messages for different media, e.g., radio, television and newspapers?

Are there workable mechanisms for feedback that will provide information for corrected warnings?

There are no clear-cut answer to each of these questions, but they are listed here to draw your attention to some concerns about the warning message.

ADDENDUM

WRITING TECHNIQUES FOR BROADCAST

by

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COMMUNICABLE WRITING

The title "communicable writing" is intended to mean writing that is able to communicate. If we are to write in a way that is understood by the people we are trying to reach, we should first ask ourselves a few questions. Who is going to read it? Why will they read it? Will they read anything we send them?

It is not the purpose here to deal with statistical information such as climate data summaries. This type of information may be used in many ways for many purposes by many users. Its presentation becomes a matter of convenience, and is usually put into a form agreeable to originator and user alike.

The first question, "Who is going to read it?", deserves some thought. Some writing is "addressed" to the newspapers to be printed in their next edition, but most newspapers have more or less standard ways of handling this type of information, so we are not overly concerned except that the data be clear and factual.

The writing "addressed" to the public deserves much more attention. If we read all the statements and summaries on the NOAA Weather Wire, we might easily come to the conclusion that much of the writing is intended for the use of fellow employees at other weather offices. Yet, the NOAA Weather Wire is primarily for the public. Let's make the effort to write for them. If we can write for the public, then, the weather men down the line will also know what we are saying.

So, again, "Who will read it?". Obviously, it would be ridiculous to consider writing or sending telegrams to all the people in the area. The answer, then, is the radio announcer, the TV weather man and the disc jockey. These are the people who will read the statements and summaries to the largest number of people that can be reached. They are the ones whose attention we must attract, and the odds highly favor that they will be busy and operating on a very tight schedule. Chances are that they will "rip and read", without taking the time to edit the material.

Will the announcer be able to read your statement or summary without stumbling over difficult words or unmanageable sentences without hesitating at just the wrong place to mentally edit what follows? Hesitation is an oral form of punctuation and may very well change the entire meaning of the text. He is accustomed to reading professional newswriting from the news wires, and it is up to us to adapt our writing to his style.

Newswriting should be clear, concise, easy to read and, so far as is possible in our work, factual. Simple words with clear meanings should be used. If the listening public does not understand what is being said, they will mentally turn off the set and all that will come through is just so much irritating noise.

Short and medium length sentences should be used and mixed to accent the more important thoughts you are trying to express. As a general guide, sentences should average about 15 to 18 words and seldom exceed 30 words. Paragraphs should be short. On teletype copy, it is very easy to lose your place when trying to read long single-spaced paragraphs. It has been found best not to exceed six lines in any one paragraph, even though the data is related and would normally be written in a single paragraph.

Continuity of thought is also important. Don't jump from one bit of information to another, and then back to something relating to the first. Finish each topic before going on to the next.

An important newswriting "gimmick" is the Lead Line. This is a single sentence, short as possible, that will clearly headline the most important information that is to follow. It is the attention "grabber." It is also the clue to the announcer of what may follow, and gives him the recognition to accent and punctuate. Unless the nature of your text forbids it, always start off the body of your statement or summary with a lead line. It may also be used with good effect in local forecasts. If you can develop interest with your lead line, then a far greater percentage of the public will listen and understand the rest of what you have to say.

Suppose you are at home listening to some good music on the radio. At the end of a song, the announcer says "Here is a special weather statement just issued by the National Weather Service Office at Victoria. Thunderstorms have developed in central Texas and are increasing rapidly." That grabs your attention. You want to hear more. You are interested, and will now listen to every word that follows...Maybe!

Even after a good lead sentence, the "Ho Hums" can set in. "Thunderstorms are occurring in an area enclosed by a line from this little town to that little town to this little town to that little town and back to this little town." Now WHERE was that? Somewhere along the way, you lost track. It sounded a little like dum de dum de dum. And besides, you don't have a map. Even if you remembered all those little towns, you would have a hard time trying to figure out where the thunderstorms were.

Think about that for a while. Do you write your summaries that way? It is much better to mention only well known cities, or references to them, and general areas, using as few as possible to give a good report. Keep the public informed, not confused!

Finally, as a last test, read the statement or summary ALoud. If there are other people in the office and it might be embarrassing, try to find a secluded spot, but DO read it aloud. If it seems clumsy and difficult for you to read, imagine how difficult it will be for the "rip and read" announcer to handle.

Never make the assumption that the announcer is a professional and will therefore edit your material before broadcasting. Even if he had the time, he could completely destroy the original, intended meaning.

So, when we write, let's first give a thought to the man that will read it, and then a thought to the people listening. Make it interesting by improving your technique, in other words, communicate!

LET'S WRITE MORE STATEMENTS

In the form of "Special Weather Statements," we have been given a wonderful tool. We can give our public any kind of information that might be of interest or useful. By telling them what is going on in our area, we will be showing them that we are "on top of the situation" and in control.

We could just sit back and say that "we're covered on this event, it's in the forecast." But timewise, a forecast can be rather vague and often misleading if the sequence of events is misunderstood. And, heaven forbid, we may even miss it.

A Special Weather Statement, on the other hand, can produce valuable information in real time. It can let people know what is happening right now. If we give them this "now" service, maybe they will forgive us a few of our "misses." It's worth a try, anyway.

A Radar Weather Summary is a specialized type of statement. And we know that these are favored and well used by the public. But why limit our statements to radar weather? A fog bank may be of interest. Or a dust storm aloft. Or even an increase, possibly unexpected, in the winds. Hot temperatures and cold temperatures are of interest as are exceptionally dry or moist humidity values.

Statements can be used to locate and identify almost any weather phenomena in real time, and are usually well received by the public. So, let's write a few more "statements" and pass on what we know about "the weather."

INDIVIDUAL ACTIVITIES

1. Enclose a recent "Warning" or "Special Weather Statement" and critique the message using each of the eight "summary rules." What do you consider to be the message's weakest and strongest points?
2. Select two topics and write "Special Weather Statements" about them using the "techniques" suggested by Warren Brown.

CHAPTER VI.

A CALL TO ACTION

CHAPTER GOALS

At the end of this chapter you should:

1. Have a strong appreciation for the fact that warnings should contain a "call to action."
2. Be able to incorporate a "call to action" portion in (a) Hurricane Local Action Statements, (b) Flash Flood Warnings and (c) Tornado Warnings and/or Severe Weather Statements when a Tornado Watch is in effect.

L. R. Mahar, Director of the National Weather Service's Southern Region, put Weather Service warnings in perspective when he said:

"The goal of the National Weather Service warning system is to reduce loss of life from natural disaster -- we have no greater responsibility. This is and will continue to be our primary task and takes top priority, if necessary at the expense of other duties. In the past we may have mistakenly believed that 'issuing' a warning was enough. Now we know that an effective warning must produce an appropriate individual response. This knowledge places an extra burden on the National Weather Service and we must become more involved in the total warning system."

Good warnings must stimulate people to action. A warning is more than a notification of danger; it is a CALL TO ACTION. National Weather Service warnings do very well at notification of danger but are weak at stimulating action. National Weather Service personnel, then, should concentrate more on giving details that stimulate people to take the action necessary to save their lives.

To do this, the expected effects of a storm must be translated into terms that relate to the comprehension and experiences of people.

The Hurricane

In the case of a hurricane the Local Action Statement is ideally suited for this purpose. Here are a few examples:

1. Three feet of tide will close Farm Road 13, the only escape route from Bayview, by 5 PM today. Hence, residents of Bayview should leave within the next two hours.

2. Eight feet of tide will flood the downtown area of Red Fish with 2 to 3 feet of water by 9 o'clock tonight. It is necessary that action for the protection of merchandise on the lower floor of buildings be completed before dark today.
3. Ten feet of tide will flood for 3 miles inland in places along the southwest coast of Louisiana before daybreak tomorrow (Sunday). Hence, all people in this area should move several miles inland before dark today.
4. Hurricane Zelda is fully as intense as Hurricane Camille in 1969, which produced a maximum water level in excess of 20 feet. Since Zelda is expected to go inland near New Town tonight, and all of New Town is below 20 feet mean sea level, New Town should be totally evacuated before nightfall today.
5. In addition to tide levels of 10 feet above normal the expected winds of 150 - 175 mph will cause waves of 8 to 15 feet high which will make the momentary water elevations up to 25 feet above normal. Most buildings along Ocean Drive will suffer severe to total damage with this expected water and wind combination. No one should attempt to "ride out" this severe hurricane tonight in Ocean City.
6. As Hurricane Mona approaches the coastline, damaging winds will begin well in advance of the EYE. Gale winds are expected by 9 o'clock tonight from Catfish Point to Frog Bay and hurricane winds from Low Island to Fisherman's Wharf by midnight. All preparedness efforts from Catfish Point to Frog Bay should be completed today. The coast from Low Island to Fisherman's Wharf should be evacuated before dark.

Further suggestions:

1. As the storm gets closer to landfall you should direct advice more to those who possibly may not be in safe places, giving alternatives that may be used at such a late hour.
2. The sense of emergency conveyed should relate to the storm's potential.
3. Be as specific as possible as to time and place and to the recommended actions.

Flash Floods

It is necessary that Flash Flood Warnings contain a "call to action". Here is an example:

Within the last 3 hours, rainfall amounts of 5 to 10 inches have been reported over the watershed of Deer Creek, which is about 25 miles northwest of Oil Town. The runoff from this excessive rain will enter Little River below Devil's Dam and produce virtually a wall of water as it passes through Oil Town in about 2 to 3 hours. Persons in Oil Town should be alerted and those on the east bank who are within 500 yards of the river should be evacuated immediately. The River View addition in the bend of the river in the south part of Oil Town will be flooded with 3 to 8 feet of water and the people in River View should be evacuated within the next 2 hours.

Tornado Warnings

The need for "call to action" in tornado situations is just as great, if not more so, than in the cases of flash floods and hurricanes. Yet, the ability to incorporate it into the tornado warning is much less and many times impossible because of the short-fuse nature of tornadoes. In every case it must be brief and commanding.

A classic example is that of newsman Bill Kurtis of WIBW-TV, Topeka, Kansas as reported by Riley (1971) following Sandstrom. As the Topeka Tornado of June 8, 1966 bore down on Station WIBW, Mr. Kurtis shouted these words over the air: "For God's sake take cover!" These five words were attributed later, in no small way, to the low death toll in Topeka (17 killed), although the tornado roared directly across the city from southwest to northeast. Because of the unavailability of immediate access to the air waves, most NWS personnel will not be able to be as effective as was Mr. Kurtis. But, with thought and speed much can be done. As an example:

".... this tornado will hit the community of Woodburg in 10 minutes, TAKE COVER!"

Something such as the above could be inserted in the REMARKS section of WS Form C-6, Tornado Warning.

Severe Weather Statements

A more fertile area for the "call to action" principle of warnings is in Severe Weather Statements during the period and in the area of a Tornado Watch. If a different tornado safety action is incorporated into each Severe Weather Statement during a Tornado Watch much sensitization of the public to the seriousness of the situation can be accomplished. For example:

1. ".... however, be prepared to put into operation your personal or family emergency actions plan if it becomes necessary."

2. ".... however, (at night) during stormy conditions pay particular attention to wind (whether increasing and with stronger gusts). Be prepared to dive under something or even just to the floor if you feel your house is about to be wrecked."
3. ".... however, remember -- ACT -- seconds may save your life."

The skillful use of tornado safety actions in Severe Weather Statements during a Tornado Watch will constitute a strong "call to action" under tornado conditions.

Final Thoughts

Some of the examples in this chapter are admittedly idealized but providing specific motivating information must be the goal. You may correctly say that with perfect forecasts it would be easy to write messages full of specifics but the day of perfect forecasts and warnings lies far in the future. Even so, improvement in the warning system can be made now - through preparedness, and by improving the warning message.

Preparedness plans must not remain in the paper state but must be rehearsed and honed in simulated exercises. Otherwise gaps in the plans and ineffective aspects in disaster preparations remain undetected. Plans must be subjected to regular review. In a mobile society, conditions and personnel change with great rapidity. For the Weather Service this means preparedness is a continuing function, it never ends!

To improve the warning message will require an increased familiarity with the area to be warned and an awareness of what makes people respond to warning. This book has given a new insight into how people react to warning. Many questions have been raised and problem areas identified. It is hoped that the answers to many of these problems will come from you.

INDIVIDUAL ACTIVITIES

1. Assume that a Tornado Watch involves your county warning area:
 - a. Write three Severe Weather Statements in which you utilize different tornado safety rules as a "call to action."
 - b. Write two Tornado Warnings in which you do the same.
2. Can you suggest other ways Weather Service messages might incorporate a "call to action?"

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ABBREVIATIONS

DCPA - Defense Civil Preparedness Agency
FDAA - Federal Disaster Assistance Administration
HIC - Hydrologist in Charge
MIC - Meteorologist in Charge
NHC - National Hurricane Center
NWS - National Weather Service
OIC - Official in Charge
PA - Principal Assistant
RACES - Radio Amateur Civil Emergency Service
RFC - River Forecast Center
SELS - Severe Local Storms
WSFO - Weather Service Forecast Office
WSO - Weather Service Office

