

Quick Response Report #97

PUBLIC RESPONSE TO THE 1997 NORTHERN CALIFORNIA FLOODS

Paul W. O'Brien, Ph.D.

James Payne, Ph.D.

California State University-Stanislaus

Department of Sociology and Criminal Justice

801 West Monta Vista Ave

Turlock, CA 95382

1997

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This material is based upon work supported by the National Science Foundation under Grant No. CMS-9632458. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

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INTRODUCTION

This final report details the investigation of flooding that occurred in northern California in January of 1997. Much of the area, known as the Central Valley, is prone to flooding. It is a predominately low-lying area between the Sierra Mountain range and the coast. Unique aspects of this flood were the amount and duration of rainfall and the widespread failure of the levee system.

What follows is the result of field interviews completed by California State University-Stanislaus Department of Sociology and Criminal Justice. The report details the event itself, the research methodology utilized, interview results from both emergency response agencies and citizen perspectives. The report concludes with lessons learned from the event.

This report is timely given all of the recent flooding in the United States. Flooding is not a new phenomena in the United States and has been widely researched (see White, 1945; Laska, 1986; Myers, 1996). However, it appears that

the same lessons about flooding must be learned over and over again by the general population and by some agencies responsible for flood control and emergency response. Part of this is due to the collective recollections of prior events, or lack of them, by a particular group of people. There are technological complications, such as a belief that levees always hold, which are compounded by an ever-expanding population that places more people, lives, and property at risk. It is hoped that this study might add to the knowledge base of what is known about flood behaviors and mitigation to better protect society from natural forces that will always be present.

This report was made possible through the Quick Response Research Program of the National Science Foundation administered by the Natural Hazards Research and Applications Information Center located at the University of Colorado at Boulder. This funding allowed for the collection of these perishable data in the immediate aftermath of the event.

THE EVENT

The beginning of 1997 witnessed major flooding in northern California. Major rain storms are not unique to northern California in the winter. Historically the major portion of annual rainfall occurs during this season. What was unique was the severity of the storm. Neither the duration nor the amount had been foreseen or forecasted by meteorologists.

The result of so much water accumulation over such a short period was widespread flooding. Much of the damage initially was due to flashflooding. After a week of rain, reservoirs were filled to capacity. Automatic emergency overflow gates began to add tremendous amounts of water to already swollen streams. Rivers could not handle the amounts of water being released and subsequently overflowed their banks. In addition, levees along the American, Feather, Tuolumne, San Joaquin, and Sacramento rivers began to fail. The reliance on levees systems in the United States has been widely investigated and shown to be problematic (see White, 1945; Myers, 1996; Humpreys and Abbott, 1861).

RESEARCH QUESTIONS

This research project was driven by a series of general research questions. Research questions included:

1. What were the initial impacts, loss estimates, and scope of damage experienced by citizens?
 2. What was the immediate public response to flooding?
 3. What was the immediate evacuation behavior and its scope?
 4. How were emergency messages being disseminated to the public?
 5. How effective were the warning messages?
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METHODS

Given the fluidity and immediacy of this research, a qualitative method was utilized. The use of qualitative face-to-face interviews allowed for immediate data collection in the field. Open-ended questions were used with respondents.

Geographic location had an impact on the severity of flooding. Three general areas were selected for sample inclusion. The first was the northern most part of the flooded area in the cities of Marysville and Yuba City. The second location was approximately sixty miles south in the cities of Mantecca, Stockton, and Tracy. The third location, lying approximately eighty miles to the south was the city of Modesto.

The three areas noted above formed the focus of this research project. The state of Nevada, however, also experienced flooding. Flooding there was due to major river runoff out of the Sierra Nevada mountains flowing east in the Truckee River. A brief investigation was completed in Reno, Nevada, to compare experiences with California.

A total of forty interviews were completed. The majority of interviews (N=30) were completed with citizens in one of the four sample areas noted above. Interviews were completed on the street, in shelters, and as cluster interviews in various residential areas. In addition, interviews (N=10) were completed with public officials, including: city planning, fire, police, national guard, and Red Cross.

FINDINGS

Emergency Response

Emergency response was uneven in this event. Initially it was felt that the current dam system (primarily Shasta Dam), and levee system could contain the winter runoff. As noted previously, rainfall during this time of year is expected. What changed the typical pattern was the so-called "Pineapple Express" - a situation in which heavy rainfall occurs in California from warm sub-tropical moisture. This pattern usually happens later in the year.

The effect of the warm sub-tropical moisture hitting California in the winter time was rapid melting of the snowpack in the Sierra Mountains. The snowmelt, combined with the Pineapple Express moisture and the typical rainfall, brought much more water than anticipated. Thus several factors compounded to create flooding conditions.

This situation caught some emergency professionals off guard. This, however, quickly changed. Media coverage of the event was massive. Notably KVOR, a network affiliate in Sacramento, began almost immediate round-the-clock coverage from the onset of the disaster. They reported on the rising rivers, provided weather reports, recounted levee conditions, and provided constant coverage of the flooded area, via their helicopter camera crew. This proved invaluable to both emergency professionals and the general public. Other radio and television stations quickly followed KVOR's lead.

At the same time, this intensive media coverage had some unanticipated consequences. For example, the town of Marysville came under a mandatory evacuation order from the sheriff's department. Throughout the evening officers were going door to door having people leave the city. That evening, as the sheriff's department was still working to evacuate the city, a spokesperson for the California Department of Water Resources (DWR) was interviewed on the 11:00 pm news and stated that there was no immediate flood danger.

This situation reflects one of the major lessons of the flood, as seen by these researchers: that there is an urgent need to coordinate information. This is an extremely difficult task in our media rich society. It also raises ethical issues of who gets to control the information. However, much credibility is lost with the general public when different government officials order completely different actions for the public. The notion of a consistent message in risk communication has been widely researched and shown to be extremely important (Mileti and Sorensen, 1990).

Another major problem that occurred related to the procurement of necessary supplies and equipment - particularly large earthmoving equipment. We interviewed officials who stated that authorization for equipment needed to be given by the State Office of Emergency Services (OES). Once authorized, the local government received requested equipment and/or reimbursement for their costs. This authorization process is very important to local government with limited resources.

The State Office of Emergency Services did not always act with the speed necessary for the given situation, for example to save a levee. Thus an informal network came into being of local agencies requesting equipment from each other and releasing it in emergency situations, without having official authorization. When asked what would have happened if the authorization had not ultimately been given or a piece of equipment might have been damaged, one respondent answered: "Then you would currently be interviewing my replacement." Many people took on great personal risk to make equipment and supplies available, hoping that they would be authorized with time.

This interagency coordination, or lack of it, needs careful scrutiny. Whereas some sort of accountability must be in place for state equipment, nature does not always wait for official authorization. Perhaps some streamlining of the

system could take place.

Finally, emergency professionals talked about their need for increased information. They were inundated by the general public with questions regarding how high the waters would go, if the dams would hold, how much the levees could carry, and what might ultimately get flooded. They expressed concern that they did not know many of those answers. They had outdated Federal Emergency Management Agency (FEMA) flood maps, and the California Department of Water Resources was less than forthcoming with pertinent information. Many expressed anger, since these were also their homes being flooded.

Public Response

Public response to the flooding varied widely. Some residents had made elaborate mitigation plans for this eventuality, while others were totally unprepared. Similar results have been found in other flooding situations, where homeowners are reluctant to spend much money or take little action for flood mitigation (see Laska, 1986; Kunreuther, 1974).

Many of the unprepared found themselves in temporary shelters. In the three Red Cross shelters visited, the majority of residents appeared to be from lower income categories, but not exclusively. The Red Cross did an outstanding job of having shelters ready. Shelters provided dry accommodations and warm meals for both evacuated residents and some emergency workers. Our research team was offered a warm meal at each site visited. The Red Cross offered help to all those impacted by the event, regardless of social status.

As has been found in prior research, the majority of impacted residents found accommodations with other family members outside the stricken area (Mileti, Sorensen, and O'Brien, 1992). Those going to shelters were persons that had no family or only needed temporary shelter until family could be contacted. The Red Cross brought in help from across the country, and many of their volunteers had come directly from other events. This gave them a high level of compassion for locally impacted residents. This was mentioned by many shelter residents - that being in a shelter was a horrible temporary experience, but that it was made bearable by the wonderful Red Cross staff. Finally, the shelters were inundated by supplies from local businesses. Goods - from food, to coffee, to diapers - were provided by local businesses and distributed by the Red Cross.

Better information is needed to help prepare the public for future events. Although most of the stricken area was in a known floodplain, many respondents expressed disbelief that a flood could happen in their neighborhood. There appeared to be a positive relationship between socioeconomic status (SES) and belief that a flood might occur. That is, as SES increased, so did flood mitigation activities. It must be noted, however, that this is based on a small nonscientific sample.

The wrong public information, however, can clearly have a negative effect. The Central Valley has an extensive dam and levee flood control system, which was sold to the public, at great expense, with the justification that it would control flooding, thus saving lives and property. The public witnessed these systems being built and believed the experts. This public information campaign might have been too successful. It has translated into an attitude that the levee system would save local residents and that they need not concern themselves with the problem. Levees provide a rationale that the flooding problem is no longer present and allow for risk to be shifted to government. What many residents found out is that earthen levees are not a guarantee against flooding.

Experience with past flooding appeared to be one of the best predictors of those residents who would take some protective action. This has also been found in California with the earthquake hazard (Mileti and Sorensen, 1990). The city of Modesto, for example, experienced its last flood in 1956, and it was primarily retired people who drew parallels to that prior flood and the flood of 1997. Most other residents were oblivious to the major flooding of the area forty years ago.

California has an earthquake awareness month - a time that is spent reacquainting the public with the earthquake risk around them. It is used, in part to create an earthquake "culture" that is familiar with the threat (Mileti, Hutton, and Sorensen, 1981). Perhaps something similar could be done with flooding, which occurs more often than earthquakes. Attempts need to be made to make the risk of flooding salient to the general public.

LESSONS LEARNED

Emergency response was uneven in this event. Initially it was felt that the current dam and levee system could contain the winter runoff. This was not the case. Some emergency professionals were caught off guard. Better information designed for emergency professionals is necessary.

Better interagency coordination is also necessary. It appeared that many state and federal agencies were not in direct contact with each other on the local level. They were unaware of what the other was doing, particularly at the start of the event. This problem needs considerable analysis so that a system can be put in place that enhances communication, and not the opposite, in stressful, critical situations. This is especially true in situations where critical information is being disseminated to the public. Complete, updated, state-of-the-art information needs to be given or made available to emergency professionals.

Finally, considerable thought needs to be given to the procurement procedures of the California Office of Emergency Services and how the agency deals with local governments. This is especially true in granting authorization for reimbursement of critical equipment and supplies.

Public response to the flooding varied widely. Many residents had made elaborate mitigation plans for this eventuality, while others were totally unprepared. Better information is needed to help prepare the public for future events. That information, however, should be realistic. It should not promise more than a technology or mitigation strategy can actually provide, so that people are not lulled into thinking that nothing can negatively impact them.

Experience with past flooding appeared to be one of the best predictors of those residents who had taken some protective action. Perhaps a flood awareness month or a general hazards month would be beneficial in keeping the risk of flooding in the public consciousness.

Reliance on levees needs to be re-evaluated. These structures have inherent flaws, especially when built of dirt. They seem to lull the public into thinking that there is no danger, when in fact, these structures have limits.

Land-use issues also need to be addressed. What parts of these flooded areas should not be used again, and which ones could be rebuilt? These are land-use questions that need to be addressed before rebuilding begins. Much of the flooded area was agricultural farm land. This area would be ideally suited to be left to farming activities, with restrictions on how many structures can be placed on them. There are already discussions about land buyouts by FEMA, but the public is loathe to move away from areas that they have known, in many cases for generations. Some sort of compromise must be found.

AFTERMATH

The clean up continues months after the flooding. Thousands of homes and businesses were damaged or lost. They will take years to rebuild. State aid has been slow to arrive to the Central Valley, which has less population than the coastal region, and also less political power. Many interviewed felt that the response was slow, uncoordinated, and inadequate. Lawsuits against DWR have already been filed, and the legal battle of assessing blame will continue far into the future as the area slowly recovers.

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October 1, 1997

hazctr@colorado.edu