Quick Response Report #118 FLASH FLOODING IN KANSAS: A STUDY OF EMERGENCY RESPONSE AND VICTIMS' PERCEPTIONS

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FLASH FLOODING IN KANSAS: A STUDY OF

EMERGENCY RESPONSE AND VICTIMS' PERCEPTIONS

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SUMMARY

Several counties in south-central and south-east Kansas experienced flash floods in the first week of November 1998. The communities of Arkansas City and Augusta were among those most severely affected by these floods. Based on field work and a questionnaire survey administered among the residents of these two cities, this study analyzed the performance of emergency actions taken by local government in response to a major flash flood event. An attempt was also made to examine how victims recovered from this disaster. Four emergency response measures were considered in this study and overall respondent satisfaction with each was rated using a Likert Scale.

The analysis of the survey data shows that the emergency response efforts to the impending flash flood were rated poorly by the respondents. The support victims received from external sources was also evaluated in a similar way. Although respondents of the selected cities differ with respect to their experience with the magnitude of flooding, and several socio-economic and demographic characteristics, their overall satisfaction level does not vary significantly. The only exception found was with the flood watch alerts. The findings of this

study should prove useful to public officials in their efforts to effectively administer and manage emergency response measures and provide assistance for victims of future flash floods in small communities in Kansas and elsewhere.

INTRODUCTION

Thirteen counties of south-central and south-east Kansas experienced flash floods in the first week of November 1998. These floods forced hundreds from their homes and caused over $37.8 million in damage, mostly in Butler, Cowley, and Sedgwick counties. The flood damaged roads and other infrastructure and losses totaled an estimated $24 million. Two dozen rivers and streams of the flood-affected counties flowed out of their banks on the first four days of November as a result of heavy rains that began on October 30, 1998. All 13 flood-affected counties were declared disaster areas by the state and three of them (Butler, Cowley, and Sedgwick) were later declared federal disaster areas by the President.

Butler, Cowley, and Sedgwick counties suffered the most damage where more than 1,600 homes were flooded; over 800 homes, including 230 mobile homes were damaged in Butler county alone. Several cities suffered considerable damage, but Augusta in Butler county, Arkansas City in Cowley county, and Wichita in Sedgwick county were the hardest hit by the flood. Augusta, with 8,700 residents, was flooded by both the Whitewater and Walnut rivers, whose waters topped a 35-foot levee surrounding the town. More than 300 homes and 30 businesses were evacuated in Augusta, and flood-related damage is estimated at $2 million.

Arkansas City, population 12,000, also experienced flooding from two rivers; in this case the Walnut River and the Arkansas River. The flood forced more than 2,000 people from their homes. Wichita, the largest city of Kansas with a population of over one-quarter million residents, also suffered extensive damage from the flash flooding. The Arkansas

River also passes through this city and about 350 residents on the western side of the city had to evacuate because of high water.
While most hazard studies in the United States and elsewhere have concentrated on understanding individual response to extreme natural events, little is known about the adequacy of emergency response measures employed by local government during these disasters. The objectives of this study are to examine residents' perceptions regarding the emergency response measures implemented by local authorities in conjunction with other organizations before and during the November 1998 flash flooding and to explore and analyze how flood victims recovered from the destruction. Although both business and residential areas were affected by these floods, this study focuses on residential responses only.

RESEARCH DESIGN

Selection of the Study Area

Social science research on human response to flood events in the United States is mostly based on the experience of either the flood-affected residents of large cities or residents living within the floodplain of major rivers. Flood victims in small cities and flooding resulting from the overflow of small rivers and creeks have received little attention among hazard researchers. Considering this point, two smaller municipalities -- Arkansas City and Augusta -- were selected for this study.
Arkansas City has flooded three times in the 1990s. The first flood occurred in 1993 and another in 1995. But more areas were inundated in 1998 than the previous two floods of this decade. A number of respondents claimed that the city had never flooded to the extent and magnitude experienced in the 1998 flooding because of the dike along the Walnut River built on the east side of the city in 1949-50. This dike was raised two inches in 1952. A new by-pass cum levee was built last year to replace the old dike and divert traffic from the city's main street. Because of the by-pass, many residents of the city thought that they were safe from flooding. Several respondents were so confident in the by-pass that they dropped flood insurance after its completion in early 1998.

The Arkansas River on the western side of Arkansas City crested at a record level of 28.89 feet and the Walnut River at a record level of 32.45 feet above river bottom on November 3, 1998, but at two different times. These levels represent almost double their flood stages. Before reaching the record level, Arkansas City received 6 inches of rainfall and areas north of the city experienced a foot or more of precipitation.

The November 1998 flash flood inundated several parts of Arkansas City. Flood water from the Walnut River entered the east-central part of the city through a large open culvert under the new by-pass. There was no flood gate under the by-pass and the city unsuccessfully tried to block water passing through the culvert. Flood water also poured into the city through the area proposed for a tie-back levee, which was going to connect existing old dikes that lie under the Santa Fe-Burlington Northern railroad tracks and US 77 by-pass northeast of the city. The levee was not built because construction would endanger 500-600 year old Indian burial site that is part of the largest archeological study site in Kansas.

The southwestern part of Arkansas City was flooded because the Arkansas River overflowed the dike and an old levee near the river broke as a result of prolonged exposure to high water. There were several breaches and two sinkholes in the levee on the south side of the city. Under the new flood-protection plan, a new levee around the south side of Arkansas City is to be completed by 2004. Had it been completed before the 1998 flooding, it is likely no areas in the southeast and southwestern parts of the city would have been inundated.

The Whitewater River from the West and the Walnut River from the East converge immediately south of Augusta. A 35-foot levee was constructed to protect the city against flooding from these two rivers. A dam was also built on the northwestern part of the city to prevent flooding from the Whitewater River. Unfortunately, the dam was not able to save the city from the flooding that occurred when both rivers crested at 39 feet above flood stage on November 2, 1998.

Flood water entered Augusta from several places. The water of the Walnut River surged through the broken levee South of Highway 54 and flooded downtown Augusta, which is located in the southeastern part of

the city. Additionally, water from both rivers topped the levee and flooded western part of Augusta. Many respondents blamed the city for failure of the levee and claimed that if the levee was properly maintained there would not have been any flooding in Augusta. The city also experienced flooding in 1993.

Data Sources

The data for this study was collected through field observations and interviews with the residents of flood-affected areas of Arkansas City and Augusta through a mail questionnaire survey. Several visits were made to these two communities to experience the destruction caused by the 1998 flash flood and to converse with flood victims at both study sites. These visits also allowed this researcher to observe the activities of the various agencies involved in mitigating the effects of flooding, and to collect relevant information from key personnel.

Opinions regarding the emergency response measures and the recovery activities of the affected households were collected from flood victims through the questionnaire survey. In addition to questions regarding respondents (overall) satisfaction level with the emergency measures and support received, the questionnaire also requested information about the extent of damage incurred by the flood, the amount of emergency assistance provided by various organizations, and any adjustments made at the household level. Respondents were also asked to provide other information such as flood insurance status as well as selected household and individual characteristics.

Respondents were randomly selected from a complete listing of the addresses of each household in the flood-affected areas which was provided by the city officials of Arkansas City and Augusta. Distribution of the questionnaire through the mail began the last week of January, 1999 and the survey ended in the last week of March, 1999. Based on the number of people affected by the flood, 200 questionnaires were sent to Arkansas City and 180 to Augusta. Within a week of the initial mailing, about 25% of the questionnaires were returned uncompleted, because no one now lived at the specified addresses and no forwarding

addresses were available to the postal service. Additionally, the lists provided by city officials contained several errors.
The return rate of uncompleted questionnaires was much higher among mobile home residents relative to occupants of single family dwellings, duplexes, and multi-family apartment complexes. Since more mobile homes were affected by flash flooding in Augusta than Arkansas City, the return rate of uncompleted questionnaires was also higher in Augusta than Arkansas City. A second mailing of the questionnaire was directed to those respondents who did not return their questionnaire on the specified date and was needed in order to obtain a reasonable number of samples for this study. The analysis in this study is based on 128 completed questionnaires and the overall response rate was 45%. It is important to note that the response rate is calculated excluding the number of uncompleted returned questionnaires. As expected, the response rate was somewhat higher in Arkansas City.
Four activities were considered under the category of emergency response measures: issuing of flash flood watch and flood warning, evacuation, and other related emergency measures such as sandbagging. These measures were undertaken before and/or during the flooding. Respondent satisfaction with each of these activities was measured using a 1-5 Likert Scale, where 1 reflects highly dissatisfied and 5 indicates highly satisfied. A score of 3 infers that the respondent was neither particularly dissatisfied nor satisfied. The scale was also used to record the overall satisfaction level of the respondents with external support. In order to determine whether levels of satisfaction differ between the two study sites, chi-square tests were performed.

Characteristics of the Respondents

Table 1 presents selected socio-economic and demographic characteristics of the respondents. Note that not all respondents provided all personal information asked in the questionnaire and thus the number of responses differ from one selected characteristic to another. The table shows that a majority (54.76%) of the respondents were female and nearly 67% were married at the time of the survey. The age of the

respondents ranged from 21 to 86, with median age of 44. Forty-four percent of the respondents belonged to the 30-44 age group. The age group labeled under 30 accounted for nearly 25% of all respondents. Nearly half of the respondents had earned a high school degree and nearly one-fourth had an undergraduate degree; one-sixth of all respondents had a graduate degree. Only 5% of all respondents reported any post-graduate education.

Nearly 44% of the respondents were employed full-time at the time of questionnaire survey. Another 12% reported part-time employment. Some 27% of all respondents were retired and 17% were grouped under the others category, which included the unemployed, students, the disabled, and house wives. The unemployment rate was very low in the study area. The modal gross family income was between $20,000 and $39,999 per year. Only 10% of the respondent households had a yearly income higher than $59,999 and 31% earned less than $20,000 annually. Table 1 further shows that among all the respondents, 92 (71.88%) experienced flooding in the sense that their homes were flooded, and damage was sustained to their property and belongings. The houses of the remaining 36 respondents (28.13%) were not flooded, but many of them reported that flood water came very close to their homes. Only 17% of the respondents had flood insurance at the time of this flash flood event. Most of those that did reside in the 100-year floodplain and thus were required to have flood insurance.

Among the eight socio-economic and demographic characteristics reported in Table 1, four of them differ statistically between the two selected municipalities. While a majority of the respondents of Arkansas City were male, female respondents outnumbered males in Augusta. Arkansas City respondents were younger in general and more had only an elementary education relative to those from Augusta. The number of respondents who experienced flooding also differs between the two study sites (Table 1). Slightly over 83% of the Augusta respondents reported flood experience compared with 62% for the respondents of Arkansas City. This suggests Augusta was more severely affected by flash flooding than Arkansas City.

RESULTS

Eighty-two (89.13%) of the 92 respondents who experienced flash flooding supplied a list of items damaged by the flood. These lists included items such as cars, major and minor appliances and electric goods, furniture, carpets, freezers, water heaters, clothes, clocks, books, toys, food, and tools. Loss of all these items was mentioned by at least 10 respondents. Other items damaged included a swimming pool, a garage door, sheet rock, cabinets, siding, a deck, a sump pump, a piano, shoes, phones, mirrors, and antiques. Several respondents experienced complete damage to their houses or mobile homes.

According to the estimates provided by 77 respondents, damages incurred amounted to about $2.24 million; this figure represents an average loss of $29,000 per flood victim. This amount can be considered substantial and it provides an indication of the severity of the 1998 flooding. One reason for this substantial loss was that most flood victims did not expect the flood and therefore were not prepared for it. Table 2 clearly shows that the extent of damage caused by the flood differs remarkably between the two study communities. Average flood damages, in monetary terms, was much higher for the respondents of Augusta compared to those in Arkansas City.

Emergency Response Measures

As mentioned earlier, the four emergency response measures considered in this study are: the issuance of flash flood watches, the issuance of flash flood warnings, flood evacuation, and other emergency measures such as sandbagging. Respondent satisfaction with each of these response measures is examined with the aid of a Likert Scale.

Emergency response measures were initiated by the city officials of Arkansas City and Augusta and were supplemented by many volunteer organizations, churches, the business community, and other organizations. Since the duration of flash flooding is usually short, the Presidential declaration of Arkansas City and Augusta as disaster areas

came after the occurrence of the event. Without such a declaration no federal agencies can take part in the emergency response -- including the distribution of disaster relief. Federal declaration entitles hazard victims to receive special support and funding through federal disaster relief agencies which participated actively in the post-hazard recovery process.
Flash Flood Watch: The issuance of a flash flood watch/forecast means flash flooding is possible in the area. Flash floods can take a few minutes to a few hours to develop, however a flash flood watch usually permits time for remedial activities. When a flood watch is issued, the residents of the concerned area should move furniture and valuables to higher floors of the home and prepare vehicles in case an evacuation order is issued. Watches are important because evacuation needs to be completed immediately, allowing little time to secure belongings or retrieve valuables (NDSU Extension Service 1999).
As mentioned earlier, a Likert Scale was used to record overall level of respondent satisfaction with flood watch alerts. The value of the scale ranges from 1 through 5; 1 indicates the respondent was very dissatisfied and 5 signify the respondent was very satisfied. The average score is 2.4, suggesting that most respondents were somewhat displeased with the flood watch component of the emergency response measures considered in this study (Table 3). In addition to local television and radio stations, local churches and voluntary organizations, and civic entities such as the Police, Fire, and Civil Defense agencies of both cities were involved in issuing flood watch alerts.
The survey reveals that 122 (95.31%) of the 128 respondents expressed their level of satisfaction with flood watch. Sixty-two (50.82%) of them were very dissatisfied, while only six (4.92%) respondents were very satisfied with the flood watch alerts (Table 3). This high level of dissatisfaction represents belief by 88 (72.13%) of the 122 respondents that either there was no flood watch issued in their neighborhoods or one was not issued in a timely manner.
It is important to note that all respondents, irrespective of their flood experience, were asked to rate their overall satisfaction level with the flood watches. This study suggests that the intensity of flooding was negatively related with the satisfaction level of the respondents.

Satisfaction is lower for the respondents of Augusta compared to the respondents from Arkansas City (Table 3). The chi- square test demonstrated a highly significant difference between respondents of these two cities with respect to the overall satisfaction level with the flood watch alert. The data from the survey further indicates that satisfaction level varies between the respondents who experienced flooding and those who did not.

Flash Flood Warning: A flash flood warning is issued when a flash flood is occurring or will occur very soon in the concerned area. Loss of life and damage can greatly be reduced if the warning is issued in a timely manner. Such a warning, however, tends to increase stress as the onset of the event approaches (Tobin and Montz 1997, p. 175). Local emergency managers and the National Weather Service through local television and radio stations have the authority to issue a flood warning and advise people whether to evacuate or not. If an evacuation is ordered, people are advised leave their homes as soon as possible and take refuge on higher ground away from rivers, streams, creeks, and storm drains. After a flood watch is issued, people are cautioned to monitor TV and/or radio broadcasts for relevant information and advice, including the possibility of an upgrade of the watch to a flood warning. In addition to the dissemination of a flood warning through the local media, Police, Fire Department, and Civil Defense personnel delivered flood warning bulletins and flyers to residents of several low-lying areas of both Arkansas City and Augusta. Nearly three-fourths of the respondents surveyed were not pleased with the flood warning component of emergency response measures considered in this study. Of the 122 respondents who did rate their satisfaction level, 71 (58.20%) were very dissatisfied, while only six respondents (4.92%) were very satisfied with the flood warnings (Table 4). The average satisfaction score for flood warnings is 1.93, signifying the respondents of both cities were displeased. Similar to the response for flood watches, the average level of satisfaction with flood warning was higher for the respondents of Arkansas City than those of Augusta, however, the difference was not statistically significant (Table 4).

Several respondents believed the authorities of both cities knew several

hours in advance that certain parts of the city were going to be flooded, but deliberately informed people that they had nothing to worry about in order to avoid creating a panic situation. Nearly three-fourths of the respondents claimed that there was no flood warning in their area or it was not delivered in a timely manner. Several respondents from Augusta reported that they called city offices and the local radio station regarding flood warnings, but did not receive any useful information from them. Some respondents in both cities ignored the warnings and did nothing to safeguard property and belongings.

A number of respondents observed police or other city officials in the vicinity prior to the flooding, but these personnel did not instruct anyone to leave the area nor was instruction given about what to do in the event of flash flooding or where to go for shelter. Several respondents acknowledged receiving a flood warning, but felt that their houses were far enough from the flood- prone areas that they took no action. An overwhelming majority of respondents thought city authorities failed to caution residents against the flash flooding that occurred in Arkansas City and Augusta, Kansas in November of 1998. Many suggested that if the fire or tornado siren had sounded, more people would have been alerted.

Flash Flood Evacuation: The questionnaire survey shows that of the 128 respondents, 105 (82.03%) had to evacuate their homes as a result of the flash flooding. The evacuation rate was nearly 10% higher among the respondents of Augusta compared to those in Arkansas City. Nearly one dozen organizations including the American Red Cross (ARC), the Salvation Army (SA), the Lions Club, area churches, City Police, the Fire Department, City Employees and Civil Defense, and Army National Guard personnel were involved in the flood evacuation process. Friends and relatives also helped many respondents evacuate their property.

All respondents who evacuated their residences were asked about the location and nature of their temporary accommodations. Twelve respondents reported that they stayed in more than one place. As many as 59 respondents stayed and/or were still staying with friends and relatives at the time of the survey. Twenty evacuees found accommodations with their parents or other family members and

nineteen stayed in motels. Only ten respondents stayed in flood shelters organized by the ARC and the SA, the remaining respondents lived in rented apartments or in trailer parks. Most of the evacuees stayed within a five mile radius of their homes. Nearly half of the respondents who stayed in motels and flood shelters were there for several days before moving in with friends and relatives or to rented apartments.

The survey indicates that respondents who evacuated their property lived on average about 20 days outside their homes. Eighty-four (80%) of the 105 respondents who were required to evacuate, stayed elsewhere before returning to their homes. While away, these respondents returned periodically to repair their damaged homes. A considerable number of respondents were still living with their friends and relatives at the time of questionnaire survey. The average length of stay outside their homes was longer for the respondents of Augusta than Arkansas City.

Irrespective of flood experience and evacuation status, all respondents were asked to express their overall satisfaction level with flood evacuation efforts using the five-point Likert Scale. The average score was 2.19, indicating that a majority of respondents from both sites were generally dissatisfied with the way the two selected cities handled the evacuation (Table 5). Specifically, respondents of Augusta were more dissatisfied with evacuation measures than those of Arkansas City. Nearly two-thirds of all respondents indicated that the flood evacuation was not as effectively executed by authorities as it could have been. Ten respondents evacuated themselves after learning that the dike had broken. Three respondents evacuated their mobile homes because the gas line was disconnected by the gas company. Most respondents, however, expressed general satisfaction with evacuation efforts undertaken by volunteer organizations.

Other Emergency Measures: Other emergency measures undertaken by various organizations prior to- and/or during the flash flooding included sandbagging, traffic control, and food distribution to the flood victims. In addition to various departments of both selected cities, area churches, local and national voluntary organizations, and local businesses participated in these emergency measures as did individual residents of Arkansas City, Augusta, and neighboring communities.

The survey indicates that nearly 25% of all respondents participated in other emergency measures. Several respondents wrote that they could not participate because they were pre-occupied with saving their belongings, while others had no time to do so. Although no statistically significant variation was observed with respect to participation in other emergency measures between the respondents of the two selected cities, the participation rate was higher among the respondents who did not experience flooding compared to those who did.

As mentioned earlier, levees were constructed along the two rivers passing through Arkansas City and Augusta to protect these cities from flooding. While undertaking emergency response measures, city officials feared that flood water might top the levees at several points and they also identified weak spots on the levees where breaching might occur. It was then deemed necessary to raise the height of levees and enhance strength of the levees in several places. A properly constructed sandbag dike can prevent or reduce flood damage. City personnel and others participated in filling sand bags and stacking them on levees. The National Guard was mobilized to aid in the levee work in both cities and approximately 40 members of the nearby Winfield Correctional Facility were also utilized in Arkansas City. Many individuals also made attempts to protect their residences by constructing sandbag diversions. All areas of Arkansas City and Augusta which were already flooded or had a high potential for flooding were blocked to traffic and many roads into these two towns had to be closed for several days because of the high water. Individual volunteers and the National Guard were employed to help divert traffic from flooded and/or flood-prone areas. The latter also helped to patrol the dike to check for breaches or seepage and to protect evacuated property.

The average satisfaction level with other emergency measures is less than three, indicating the respondents, as a group, were less than satisfied (Table 6). Generally respondents indicated that the other emergency measures undertaken were less than adequate and not initiated in a timely manner. Among the four emergency measures considered in this study, the category of other emergency measures received the highest average satisfaction rating.

Based on the average satisfaction scores for all four emergency measures, respondents were most dissatisfied with the flash flood warnings, next with the flash flood watches, followed by the flood evacuation; they were least dissatisfied with the actions listed under the category of other emergency measures. However, all the scores remain below three, which suggests that respondents, as a group, were not satisfied with the measures taken. But respondents in selected parts of both cities were relatively satisfied with the emergency efforts of the local authorities.

The emergency response measures undertaken by the cities were site-specific, meaning that remedial activities were directed primarily to the 100-year floodplains. Police and other city workers went to these areas and issued flood warnings door-to-door and later evacuated many residents from these areas. This situation created some dissatisfaction among residents of non-flood plain areas, some of whom ultimately experienced flash flooding. However, an overwhelming majority of the flood victims of both cities lived within the 100-year floodplain. One of the important reasons for widespread dissatisfaction with the emergency response efforts was that respondents did not expect flooding to occur and most city residents were not prepared for it. The reason, in part, was that the levees generated a false sense of security to residents and many perceived that the threat of flooding had been eliminated through the construction of the levees. Unfortunately, some of the levees were over 40 years old and many were not properly maintained.

All indicators, including the extent of damage, the evacuation rate, and the length of stay outside damaged homes suggest that Augusta suffered more from the November 1998 flash flood than Arkansas City. The field survey reveals that the city authorities of Augusta had little time to act against flooding. In the words of a respondent: "everything happened fast - the levee broke fast, the water came fast, and rose fast." The problems were compounded when the city wastewater- treatment plant shut down and toilets sent raw sewage into the downtown area.

In contrast, the city authorities of Arkansas City had 24 to 36 hours to organize emergency response plans. Contrary to the claim of a considerable number of respondents, city officials of Arkansas City

contacted a majority of the residents of the 100-year floodplain as well as some residents in other parts of the city and warned them in advance. It appears that there was a lack of communication between local officials and some residents of flood-affected areas of Arkansas City. However, the overall respondent satisfaction level with three of the four emergency response measures does not differ statistically between the respondents of the two cities even though respondents of the two cities differ in several socio-economic and demographic characteristics (see Table 1).

Recovery from the 1998 Flash Flood

Recovery from natural disasters in the United States depends largely on how much and how fast the disaster victims receive aid and from public and private sources. The Federal Emergency Management Agency (FEMA) and the ARC classify these sources of aid into four broad groups: government disaster programs, volunteer organizations, insurance, and business (FEMA and ARC 1992, p. 30). Table 7 also lists an additional group "others" to include support provided to some flood victims by several small groups and individuals such as friends and relatives, and employers. The first two groups primarily helped by providing free labor to clean, repair and rebuild damaged houses.

If an area suffers severe flooding, residents of that area are eligible for low-interest loans and grants, and other types of federal and/or state disaster assistance. A Presidential disaster declaration further increases the types of assistance available to victims. The Disaster Housing Assistance (DHA) program is designed to provide flood victims temporary housing until necessary repairs to damaged homes are completed. Rent assistance or mobile homes may be provided to victims without insurance. If disaster victims are willing to repair their damaged homes quickly, the DHA program may also provide funds to make those repairs.

Flood victims with real or personal property losses may apply for low-interest loans through a program called Disaster Loans (DL). This program is administered by the Small Business Administration (SBA)

and the Farmers Home Administration (FHA). Both of these federal organizations may provide loans even in the absence of a Presidential disaster declaration. Interest rates on disaster loans vary according to the income of the applicant (FEMA and ARC 1992, 33). Flood victims who are unable to meet disaster-related immediate expenses such as medical treatment, home repair, and replacement of essential personal items may also receive funding through the Individual and Family Grants (IFG) program.

Through the Income Tax Deductions (ITD) program of the federal government, flood victims may qualify to file an amended tax return for the past year and get a partial refund for uninsured losses. The Floodproofing Assistance (FA) program aims to modify houses to withstand damage from future floods. The DL program of the SBA can provide additional money to cover certain floodproofing costs. The Government-sponsored counseling programs may help victims with unemployment, food stamps, income taxes, insurance claims, legal services, veterans benefits, and crisis counseling. Crisis counseling can be especially helpful in coping with the myriad of unforeseen problems disaster victims must cope with (FEMA and ARC 1992, pp. 33-34). Additionally, if any flood-affected area participates in the National Flood Insurance Program (NFIP), its residents can buy federal flood insurance policies. This program was enacted in 1968 and offers federally subsidized flood insurance to communities that have adopted effective floodplain regulations (NHRAIC 1992). The NIFP is designed to provide an alternative to disaster assistance, and to meet the costs of repairing damage to buildings and their contents caused by floods. Both Arkansas City and Augusta participate in the NFIP.

Private volunteer organizations such as the ARC, the SA, and church groups help through recovery with items flood victims need immediately, such as food, clothing, shelter, medical aid, and counseling. They may also provide the victims with a clean up kits which include a mop, a broom, a bucket, and cleaning supplies. Some private organizations help victims clean up and rebuild damaged houses and may provide these services free of charge regardless of victim eligibility for government aid (FEMA and ARC 1992, p. 30).

Flood victims with flood insurance can get compensation for items damaged by a flood. To help victims of flooding local businesses often sell items at reduced price to the flood victims. Businesses further support disaster relief efforts by donating cash, goods, and services. Some creditors may let victims defer monthly payments, and sometimes banks offer low-interest loans for reconstruction (FEMA and ARC 1992, p. 30).

The analysis of the survey data reveals that 81 (88.04%) of the 92 respondents who experienced flash flooding received support, often from multiple sources. Table 7 indicates that the largest number of flood victims obtained support from volunteer organizations followed by government disaster programs. In terms of individual organizational sources of assistance, the ARC ranks first followed by FEMA, the SA, and area churches (Table 7). One of the most important tasks of FEMA after any disaster is to inform individuals of the assistance available and to assist victims in the application and delivery process. The principal strategic goal of FEMA is to create an emergency management partnership with other federal agencies, state and local governments, volunteer organizations, and other entities to better serve the victims of disasters (Witt 1997, p. 1).

To make it easier for disaster victims to obtain information and help, FEMA usually establishes one or more Disaster Application Centers (DACs) in the disaster area (FEMA and ARC 1992, p. 32). FEMA and the Kansas Division of Emergency Management (KDEM) established a Disaster Recovery Center (DRC) in Augusta. Although FEMA works in conjunction with other federal and state emergency agencies to coordinate services and supports, many respondents mentioned receiving assistance only from FEMA. It appears that they failed to make any distinction between FEMA and other federal programs such as those of the SBA and the NFIP.

Several flood assistance sources provided support to the victims in both cities, while support from two sources, the NFIP and the State of Kansas, was limited to Augusta only. Surprisingly, only three respondents mentioned receiving support from the state government emergency management agency. This is because the state distributed a

major part of its assistance through FEMA. According to city offices in Arkansas City and Augusta, other organizations also assisted flood victims, but their names were not mentioned by the respondents of this study.

As many as 46 respondents obtained support from the ARC, 45 from FEMA, 38 from the SA, and 18 from local/regional churches. Each of other remaining sources provided support to less than 15 respondents. Table 7 shows that rankings of sources differ between two study sites. For example, in terms of number of respondents served, FEMA ranks first in Arkansas City while the ARC ranks first in Augusta. It is important to note that several respondents received assistance from both car and home owner's insurance companies yet these sources are aggregated under the insurance source listed in Table 7. Surprisingly, only six respondents reported receiving assistance from the business community. Despite continued governments request to become a full partner in the national emergency management system, the contribution of the business community still remains marginal (see Witt 1997, p. 1). The types of support received by flood victims included cash, checks, low interest loans, credit utilities, food, cleaning supplies, furniture, rental assistance, and clothing. Additionally, the ARC and the SA provided flood victims with vouchers to purchase clothing, food, and other items to meet emergency needs. Often disaster victims suffer from depression and stress for many days following an event, yet not a single respondent indicated they had received counseling. Three respondents, however, reported that their children had a difficult time following the flooding because the flood damaged their toys.

In monetary terms, all the support received by the respondents totaled about $590,000, which is only 26% of the total damage reported by the respondents (Table 8). This percentage differs between the two study sites. The respondents of Augusta suffered more damage from the flooding and consequently received support of greater monetary value than respondents from Arkansas City. Note that all respondents who experienced flood damage did not report the amount of support received; therefore, the actual amount of support received should be higher than the reported amount.

In monetary terms, government sources rank first with respect to amount of support provided to the flood victims (Table 8). These government sources accounted for slightly over 64% of all support received by the victims followed by insurance, volunteer organizations, business, and other sources. As noted earlier, volunteer organizations provided support to the largest number of victims, yet these organizations as a group rank third behind government sources and insurance companies in terms of value of the support offered (Table 8). Consequently, total contributions by volunteer organizations was lower than the total contribution provided by government sources and insurance companies. Insurance firms contributed the highest dollar value of assistance per victim than all other sources involved in delivering disaster relief.

Ranking and relative contribution by the four broad sources of support considered in this study differ between the two study sites. In Arkansas City, government emergency agencies provided as much as 81.60% of the total value of all support received; the corresponding percentage was 60.16 for Augusta (Table 8). The contributions of insurance agencies, business firms, and other groups as sources of support to the flood victims was lower in the Arkansas City relative to Augusta. This may explain why government sources provided a higher proportion of support to the respondents of Arkansas City than those of Augusta. City size and income level of respondents may also be associated with the amount of federal assistance flood victims received (see Tobin and Montz 1997, p. 174). As mentioned earlier, Augusta is smaller in population than Arkansas City, but the respondents of Augusta have a higher average income and thus their ability to recover from flooding was assumed to be substantially better than their counterparts in Arkansas City (see Table 1). In the aftermath of this particular flash flood event, it appears that a lower amount of support by one major source in one community was compensated by a higher amount of support by other sources in that same community. The contribution of volunteer organizations was comparable in both study sites.

Many respondents thought that the compensation they received was inadequate. As noted earlier, the various sources of support were able to compensate only 26% of the total reported losses of the flood victims.

For this reason, the flood victims had to adopt household level adjustments to compensate for damages caused by the flood. As many as 61 (66.30%) of the 92 respondents sold belongings, property, or spent previous savings to mitigate flood damage. A number of respondents also borrowed money from their friends and close relatives and several respondents used credit cards to defray necessary expenses.

Typical of disasters, some discontent was found with the official response to this flash flood event (also see Tobin and Montz 1994). As many as 26 respondents expressed dissatisfaction with the services provided by FEMA. Specifically, most complained that it was hard to contact FEMA personnel. They further criticized the slowness of the process required to receive payments and the incredible amount of documentation required. Several respondents directed animosity in their remarks at the ARC personnel. In contrast, many flood victims stated great appreciation for the assistance provided by the SA and area churches.

A Likert Scale was used to record the overall satisfaction level of the respondents with the support they received from external sources. Of the 81 respondents who rated their satisfaction level, 24 (29.63%) were neither satisfied nor dissatisfied (Table 9). Thirty-one respondents (39.02%) were either satisfied or very satisfied, while 26 (32.10%) were either dissatisfied or very dissatisfied (Table 9). The average score is 3.06, which indicates respondents were neither particularly satisfied nor dissatisfied with the support they received. The chi-square value suggests that respondents of the two study communities significantly differ in the level of satisfaction with the disaster assistance they received. The respondents of Arkansas City were relatively more satisfied with emergency response efforts than those in Augusta.

Note that the Likert Scale was used to record satisfaction levels in five categories. Among these, the external assistance category received the highest average rating. This finding is surprising since the amount of assistance received accounted for only 26% of the total damage reported by the respondents. It implies that the respondents were willing to accept a considerable amount of loss from the flooding and knew, or at least were willing to accept, that the amount of assistance they would receive

from external sources would be much less than the damage incurred. For this reason, they were not terribly dissatisfied with the disaster relief and aid they received from various sources.

CONCLUSION

This study examined the emergency response measures employed by local officials and emergency management agencies in response to a flash flood event. Overall satisfaction level with these measures was assessed by a survey of randomly selected residents of the two study communities. An attempt was also made to gain an understanding of how the flood victims adjusted to losses incurred by the flood. The findings of this study should be useful for local governments of small communities in the management of future flash flood responses.

The four emergency response measures included in this study are: the issuance of flood watches and warnings, evacuation, and other emergency measures such as sandbagging. All measures were poorly rated by the respondents, who indicated that the measures were not implemented properly or in a timely manner. One of the reasons for the poor performance was that the existing levee systems provided a false sense of confidence and ultimately failed to protect the cities from flooding. This confidence, to some extent, undermined planning for adequate emergency response should the levee system fail. But once flood water started to enter the cities, the local authorities and many emergency response agencies made valiant attempts to hold back the water; they raised the height of levees with sand bags and worked into the night.

The flash flood victims of both selected cities received emergency assistance from many sources including the Red Cross, the Salvation Army, the Army National Guard, and area churches. Although this assistance accounted for only one-fourth of the total losses reported by the respondents, their overall satisfaction level was higher with support they received from external sources than with the four emergency

response measures considered in this study. Various federal emergency management agencies took part in the recovery and federal assistance played the major role in mitigating hazard losses experienced by the respondents.

This study clearly suggests that improvements are needed in the areas of forecasting, warning, evacuation, and hazard mitigation in flash flood events. More specifically, officials of both study cities should revise their emergency response capabilities, adopt a comprehensive flash flood watch and warning system, and institute a public awareness and preparedness campaign. At the same time, federal emergency agencies should be more sensitive to the needs of hazard victims. Future research may be directed to examine the role of local officials in dealing with the risks and uncertainties posed by extreme natural events. Problems confronted by officials in organizing emergency response measures to an impending natural event may also be an important subject of future study.

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TABLES

Table 1. Selected Characteristics of the Respondents by Study Communities

Characteristic	Arkansas City Number (%)	Augusta Number (%)	Total Number (%)
Employment			
Employed Full-time	26 (41.94)	27 (45.76)	53 (43.80)
Employed Part-time	4 (6.45)	10 (16.95)	14 (11.57)
Retired	20 (32.26)	13 (22.03)	33 (27.27)
Others	12 (19.35)	9 (15.26)	21 (17.36)
	X^2=4.432 (d.f.=3; p=0.218)		
Income			
<$20,000	23 (40.35)	13 (22.41)	36 (31.30)
$20,000-39,999	25 (43.86)	26 (44.83)	51 (44.35)
$40,000-59,999	5 (8.77)	11 (18.97)	16 (13.91)
>$59,999	4 (7.02)	8 (13.79)	12 (10.43)
	X^2=6.373 (d.f.=3; p=0.090)		
Education			
Grade School	9 (13.24)	1 (1.72)	10 (7.94)

High School	32 (47.06)	28 (48.28)	60 (47.62)
Undergraduate	12 (17.65)	19 (32.76)	31 (24.60)
Graduate	9 (13.43)	9 (15.52)	18 (14.40)
Post-Graduatea	5 (7.46)	1 (1.72)	6 (4.80)
	X^2=8.507 (d.f.=3; p=0.037)		
Age (yr.)			
< 30	23 (40.35)	4 (7.69)	27 (24.77)
30-44	25 (43.23)	23 (44.23)	48 (44.04)
45-64	4 (7.02)	15 (28.85)	19 (17.43)
>64	5 (8.77)	10 (19.23)	15 (13.76)
	X^2=21.304 (d.f.=3; p=0.001)		
Gender			
Male	40 (58.82)	17 (29.31)	57 (45.24)
Female	28 (41.18)	41 (70.69)	69 (54.76)
	X^2=11.006 (d.f.=1; p=0.001)		
Marital Status			
Single	11 (16.18)	7 (11.86)	18 (14.17)
Married	45 (66.18)	40 (67.80)	85 (66.93)
Divorced	7 (10.29)	6 (10.17)	13 (10.24)
Widowed	5 (7.35)	6 (10.17)	11 (8.66)
	X^2=0.717 (d.f.=3; p=0.869)		
Flood Experience			
Yes	42 (61.76)	50 (83.33)	

92 (71.88)			
No	26 (38.24)	10 (16.67)	
36 (28.13)			
	X^2=7.335 (d.f.=1; p=0.007)		
Flood Insurance at the Time of Flooding			
Yes	10 (16.39)	10 (16.95)	
20 (16.67)			
No	51 (83.61)	49 (83.05)	
100 (83.33)			
	X^2=0.007 (d.f.=1; p=0.935)		

[a]Merged with graduate category to calculate chi-square value.

Table 2. Dollar Value of Flood Damage as Reported by the Respondents

Study Community	Number of Respondents	Amount Lost (in million $)	Average Loss (in $)
Arkansas City	34	0.48	14,000
Augusta	43	1.76	41,000
TOTAL	77	2.24	29,000

Table 3. Respondent Satisfaction Level with Flood Watch Alerts

Satisfaction Level	Arkansas City	Augusta	Total
1	27	35	62
2	7	10	17
3	17	8	25
4	10	2	12
5	5a	1a	6
TOTAL	66	56	122
Average Score	2.38	1.64	2.04
X^2-Value	12.063 (d.f.=3; p=0.007)		

[a]Merged with graduate category to calculate chi-square value.

Table 4. Respondent Satisfaction Level with Flood Warnings

Satisfaction Level	Arkansas City	Augusta	Total

1	32	39	71
2	8	7	15
3	10	5	15
4	10	5	15
5	6a	0a	6
TOTAL	66	56	122
Average Score	2.24	1.57	1.93
X²-Value	7.416 (d.f.=3, p=0.060)		

[a]Merged with graduate category to calculate chi-square value.

Table 5. Respondent Satisfaction Level with the Flood Evacuation

Satisfaction Level	Arkansas City	Augusta	Total
1	26	28	54
2	9	11	20
3	15	10	25
4	11	6	17
5	4a	2a	

6			
TOTAL	65	57	122
Average Score	2.35	2.00	2.19
X²-Value	2.892 (d.f.=3; p=0.409)		

[a]Merged with graduate category to calculate chi-square value.

Table 6. Respondent Satisfaction Level with Other Emergency Measures

Satisfaction Level	Arkansas City	Augusta	Total
1	18	24	42
2	8	7	15
3	16	11	27
4	12	9	21
5	10	7	17
TOTAL	64	58	122
Average Score	2.81	2.45	2.64
X²-Value	2.519 (d.f.=4; p=0.640)		

Table 7. Number of Respondents Receiving External Support

Source	Arkansas City (N=42)	Augusta (N=52)	Total (N=92)
Government Disaster Programs	27	45	72
FEMA	17	28	45
SBA	2	5	7
IFGP	4	4	8
DHA	4	3	7
NFIP	0	2	2
KS Grant	0	3	3
Volunteer Organizations	34	72	106
ARC	15	31	46
SA	9	29	38
Church	8	10	10
Insurance	2	9	11
Flood	2	3	5
Home Owners	0	4	4

Others	0	2
2		
Business	2	4
6		
Others	1	10
11		
Friends and Relatives	1	7
8		
Others	0	3
3		

Table 8. Reported Amount of Support (in US$) Received by the Respondents

Major Source	Arkansas City	Augusta	Total
Government Sources	90,521 (81.60)[a]	287,427 (60.16)	377,948(64.19)
Volunteer Organizations	12,120 (10.92)	54,677 (11.44)	66,797 (11.34)
Insurance	6,700 (6.04)	60,950 (12.76)	67,650 (11.50)
Business	588 (0.53)	54,800 (11.47)	55,388 (9.42)
Others	1,000 (0.90)	19,850 (4.16)	20,850 (3.54)
TOTAL	110,929 (99.99)	477,704 (99.99)	588,633 (99.96)
No. of Respondents Reported Value of Support Received	34	48	

82			
Av. Value of Support Received (in $)	3,263	9,952	7,179
Support Received as % of Damage Reported	22.92	27.27	26.34

[a]Figures within parentheses indicate the percentage contribution of each major source to the total amount of support received by the respondents.

Table 9. Respondent Satisfaction Level with External Support

Satisfaction Level	Arkansas City	Augusta	Total
1	3a	11	14
2	1	11	12
3	14	10	24
4	8	9	17
5	7	7	14
TOTAL	33	48	81
Average Score	3.46	2.79	3.06
X^2-Value	10.779 (d.f.=3; p=0.013)		

[a]Merged with next level.

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